Memorandum

State of Florida
Department of Environmental Protection

TO: Clair Fancy

THRU: Bruce Mitchell

FROM: William Leffler, PE

DATE: April 4, 2001

SUBJECT **Conrad Yelvington Distributors, Inc**

Conrad Yelvington's (CYDI) March 6th response to our request for additional information on October 6, 2000 is still inadequate. I have crafted the attached letter. It needs to be posted today.

CYDI continues to handle bottom ash from TECO but they are not screening the ash, There is spent abrasive on the site but no evidence of recent screening. An inspection of a dust plume at CYDI's Tampa site on January 31,2000, led to a temporary operating agreement whereby Southwest District allowed CYDI to continue stockpiling and trans-loading ash from TECO's Big Bend plant, for rail shipment to Rinker's portland cement plant in Miami. CYDI agreed to make some temporary improvements to contain dust and leachate and CYDI further agreed to pursue a permit for a waste transfer station within 60 days. That application is expected to be filed within the week by Alex Pavda.

CYDI maintains that it is engaged in recycling. Specifically it claims to be part of a plan for "reusing" the ash and ABM so that these materials are not "waste". See Rule 62-701.700, F. A. C. regarding handling materials for "reuse" No one has considered whether the incorporation of ash or ABM is commercially necessary for the production of portland cement or whether the process is a "use constituting disposal" which brings the material back within the clear definition of "waste."

The public's interest will be best served by a permit which will regulate the nature of materials handled on CYDI's Tampa site. A comprehensive materials classification plan for a waste transfer station is a better regulatory mechanism than an air permit. The air permit's conditions apply only if the screener is used in the process .

Bob Butera at Southwest District advises me that some revisions to Rule 62-701 F.A.C., which have either just passed ERC, will expand the extent of review, nature of continuing assurances, and conditions for the waste processing plant permit Rule 62-701.801. The provisions for a general permit for a waste transfer station are repealed (former Rule 701.710, F.A.C.). It is probable that my concerns about the nature and properties of the materials handled by CYDI will be satisfactorily resolved by the solid waste permit.

If so, I foresee changing the solid waste prohibition in the intent to issue the air construction permit from: "No ABM or hazardous waste," to allowing the use of the screener "at a waste processing facility wherein the use of the screener is specifically authorized."

Mr. Butera and I agree in principle that the waste transfer station should include structural containment of the ash and ABM, provide a shelter over any processing area, and minimize any dust emissions from the storage piles, the processing, and any means of transportation.

Jerry Campbell, of Hillsborough EPC, concurs. He is of the opinion that regulation of the ash and ABM as a material will be more effective than attempting to keep track of a relocatable screener.

The solid waste permit process has many more articulated standards to require controls than we have in the air permitting program, including a burden upon the applicant to demonstrate no hazard to public health. In the air program we have no specific standards upon which to frame general public health permit conditions, especially in view of Guidance Memorandum DARM PER_03 .

Department of Environmental Protection

Jeb Bush
Governor

Marjory Stoneman Douglas Building
3900 Commonwealth Boulevard
Tallahassee, Florida 32399-3000

David B. Struhs
Secretary

April 04, 2001

CERTIFIED MAIL RETURN RECEIPT REQUESTED

Mr. William C. Thomas, III
Vice President of Industrial Development & Operations
Conrad Yelvington Distributors, Inc.
Post Office Box 1686
Daytona Beach, Florida 32115

Re: Second Completeness Review for an Amended Application for an Air Construction Permit
Powerscreen Sand and Gravel Classifier: Permit No.: 7770473-001-AC

Dear Mr. Thomas:

Conrad Yelvington Distributors, Inc.

On April 19, 2000, CYDI submitted an application for a relocatable permit to allow its Powerscreen Chieftain 510 material classifier to be operated throughout the state of Florida. No specific material was specified on the application. Prior to issuing a draft construction permit, it was learned that CYDI planned to use this machine to process spent abrasive blast media (ABM). Rather than deny the permit, a prohibition against processing hazardous waste including ABM was included as a special condition in the draft permit.

The public notice of the draft permit has never been published. CYDI requested an opportunity to submit additional material to justify elimination of the special condition prohibiting ABM and hazardous waste.

On October 2, 2000, CYDI submitted a short letter with projected air emissions of metals based on AP42 factors and TCLP laboratory tests. This submission precipitated an incompleteness letter on October 6, 2000.

in response to the

On March 6, 2001, ~~the Division of Air Resources Management~~ we received a package of material from Stephanie Brooks, P.E., ~~which was furnished in reply to Our October 6, 2000~~ incompleteness letter. Generally, the reply denies that spent ABM is a hazardous waste and suggests that the permit restrictions are unreasonable.

These responses are deficient in the following aspects:

The Department requested ~~in inquiries Nos. 1, 2, 4, and 8,~~ information concerning the ultimate analysis, analytical methods, and quality control issues regarding the material to be processed through the powerscreen. CYDI responded by providing a number of technical documents and a few analytical laboratory results. It is still unclear how CYDI proposed to quantify air emissions from TCLP laboratory data. The TCLP and related tests are not an appropriate criteria for determining air emissions. The technical data provided does not provide a statistically relevant correlation between mass concentrations and TCLP results. It is also unclear as to whether any of these laboratory samples constitute a representative sample of the material to be processed, what the range of concentrations might be expected in any batch ~~of Spent Abrasive Blast Media~~ ABM, or what procedures are established to deal with materials which contains contaminants in excess of regulatory thresholds.

The Department requested information regarding other permitting at the Tampa site ~~(Inquiry No. 5)~~, specifically requesting copies of any solid waste, hazardous waste and groundwater permits or applications.

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Re: Second Completeness Review for an Amended Application for an Air Construction Permit
Powerscreen Sand and Gravel Classifier: Permit No.: 7770473-001-AC

Dear Mr. Thomas:

Therefore, +

On March 6, 2001, Conrad Yelvington Distributors, Inc., through its engineering consultant, Stephanie Brooks, P.E., submitted a letter and a package of supporting documents in reply to our October 6, 2000 incompleteness letter. This responses is deficient in the following aspect:

The response letter received March 6, 2001 and supporting attachments were not submitted under the Professional Engineer's seal.

This deficiency was reported to Ms. Brooks on March 20, 2001.

The last paragraph of our October 6, 2000 letter and Rule 62-4.050(3), F.A.C., require that all applications for a Department permit must be certified by a professional engineer registered in the State of Florida. This requirement applies to responses to Department's requests for additional information of an engineering nature. also

The Department will resume processing your amended application after receipt of the requested information. You are again advised that Rule 62-4.055(1), F.A.C., requires applicants to respond to requests for information within 90 days, with processing time on the permit tolled during the actual time taken for the response. If you have any questions, please call me at (850) 921-9522.

Sincerely,

W. Leffler

William Leffler, P.E.
Permitting Engineer

cc:
Stephanie S. Brooks, P.E. Brooks and Associates, Inc.
Clair Fancy, BAR
Bruce Mitchell, BAR
Jerry Campbell, Hillsborough County Environmental Protection Commission – HCEPC
Richard B. Tedder, Division of Waste Management
Robert Butera, P.E. Southwest District Solid Waste

FLORIDA

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On March 6, 2001, Conrad Yelvington Distributors, Inc., through its engineering consultant, Stephanie Brooks, P.E., submitted a letter and a package of supporting documents in reply to our October 6, 2000 incompleteness letter. The last paragraph of our October 6, 2000 letter and Rule 62-4.050(3), F.A.C., require that all applications for a Department permit must be certified by a professional engineer registered in the State of Florida. This requirement also applies to responses to Department's requests for additional information of an engineering nature. Therefore, this responses is deficient in the following aspect:

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Permitting Engineer

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Clair Fancy, BAR
Bruce Mitchell, BAR
Jerry Campbell,E.P.C.H.C.
Richard B. Tedder, Division of Waste Management
Robert Butera, P.E., Southwest District Solid Waste

62-713.900 Forms.

The forms used by the Department for soil treatment facilities are adopted and incorporated by reference in this section. The form is listed by rule number, which is also the form number, and with the title, subject and effective date. Copies of forms may be obtained from a local District Office or by writing to the Florida Department of Environmental Protection, Solid Waste Section, MS 4565, 2600 Blair Stone Road, Tallahassee, Florida 32399-2400.

(1) Form 62-713.900(1): Application for Permit to Construct or Operate a Stationary Soil Treatment Facility, effective August 5, 1999.

(2) Form 62-713.900(2): Notification of Intent to Use a General Permit to Construct or Operate a Mobile Soil Treatment Facility, effective August 5, 1999.

(3) Form 62-713.900(3): Soil Testing Reporting Form, effective August 5, 1999.

Specific Authority 403.061, 403.704 FS. Law Implemented 403.0877, 403.707 FS. History–New 8-5-99.

Table A. Minimum Number of Soil Samples Required

Amount of Soil by Volume, yd3	Amount of Soil by Weight, tons	Number of Discrete Samples Required for Volatile Organics	Number of Composite Samples Required for non-Volatile Organics
<100	<140	1	1
100 to <500	140 to <700	3	3
500 to <1000	700 to <1400	5	5
For each additional 500 yd3	For each additional 700 tons	1	1

Table B. Total Metals Analysis and TCLP Test Requirements

If	Exceeds	TCLP Test Criteria
Total Arsenic	100 mg/kg	5.0 mg/L
Total Barium	2000 mg/kg	100.0 mg/L
Total Cadmium	20 mg/kg	1.0 mg/L
Total Chromium	100 mg/kg	5.0 mg/L
Total Lead	100 mg/kg	5.0 mg/L
Total Mercury	4 mg/kg	0.2 mg/L
Total Selenium	20 mg/kg	1.0 mg/L
Total Silver	100 mg/kg	5.0 mg/L

(d) Within the time frames specified in the VCA or Rule 62-782.790, F.A.C., the Department shall:

1. Provide the participant with written approval of the Interim Source Removal Proposal; or

2. Notify the participant in writing, stating the reason(s) why the Interim Source Removal Proposal does not contain information adequate to support a product recovery method pursuant to Rule 62-782.500(2)(c), F.A.C.

(e) Product recovery shall be deemed complete when the objectives in Rule 62-782.500(1), F.A.C., have been met.

(f) Within 10 days after initiation of product recovery, written notification shall be provided by the participant to the Department on Form 62-782.900(1).

(g) Within the time frames and frequencies specified in the VCA or Rule 62-782.790, F.A.C., an Interim Source Removal Status Report documenting the recovery progress and summarizing all recovery activities for a specified period shall be submitted by the participant to the Department for review.

(3) Short-term Groundwater Recovery.

(a) The participant may perform a short-term groundwater recovery strategy as a source removal activity. The use of a pumping test or overdeveloping of shallow aquifer well(s) within the plume as an Interim Source Removal strategy may be implemented without requesting approval from the Department provided the following criteria are met:

1. The groundwater contamination is of limited extent, such that the pumping of shallow aquifer well(s) within the plume may result in the site achieving the criteria for No Further Action in Rule 62-782.680, F.A.C., or the criteria for Natural Attenuation with Monitoring in Rule 62-782.690, F.A.C.;

2. Free product is not present;

3. The duration of the groundwater recovery does not exceed three days, unless the participant demonstrates to the Department that extended groundwater recovery will not result in the spread of contamination;

4. The recovered groundwater is properly disposed at a publicly owned treatment works or at a permitted Hazardous Waste Treatment, Storage or Disposal facility, if the recovered groundwater is a hazardous waste; and

5. The groundwater recovery is limited to one pumping event.

(b) Within the time frames and frequencies specified in the VCA or Rule 62-782.790, F.A.C., an Interim Source Removal Status Report documenting the recovery progress and summarizing all recovery activities for a specified period shall be submitted by the participant to the Department for review.

(4) Groundwater Recovery, Treatment and Disposal.

(a) The participant may perform groundwater recovery prior to the approval of a Remedial Action Plan prepared and submitted in accordance with Rule 62-782.700, F.A.C., provided the Participant submits a proposal that includes the same level of engineering detail as a Remedial Action Plan pursuant to Rule 62-782.700, F.A.C. Applicable sections must be signed and sealed in accordance with Rule 62-782.400, F.A.C.

(b) Within the time frames specified in the VCA or Rule 62-782.790, F.A.C., the Department shall:

1. Provide the participant with written approval of the proposal; or

2. Notify the participant in writing, stating the reason(s) why the proposal does not contain information adequate to perform groundwater recovery prior to the approval of a Remedial Action Plan pursuant to Rule 62-782.500(4), F.A.C.

(c) Within the time frames and frequencies specified in the VCA or Rule 62-782.790, F.A.C., an Interim Source Removal Status Report documenting the recovery progress and summarizing all recovery activities for a specified period shall be submitted by the participant to the Department for review.

(5) Soil and Sediment Removal, Treatment and Disposal.

(a) The participant may excavate contaminated soil or contaminated sediment for proper treatment or proper disposal as an interim source removal activity provided the following criteria are met:

1. Contamination is not spread into previously uncontaminated areas or less contaminated areas through untreated discharges, improper treatment, improper disposal or improper storage;

2. Flammable products are handled in a safe manner;

3. When a soil vacuum extraction system is necessary to abate an imminent threat to human life, health, or safety within a structure or utility conduit, then the vacuum extraction system must be designed and operated only to abate the imminent threat. The Department must be notified, within 24 hours, of the imminent threat and the intent to use a soil vacuum extraction system. The air emissions monitoring and frequency of monitoring shall be performed in accordance with Rules 62-782.700(5)(a) and (12)(i), F.A.C.;

4. USEPA Test Method 1311, Toxicity Characteristic Leaching Procedure (TCLP), must be performed on a number of samples sufficient to verify that the contaminated soil or sediment does not exceed the applicable criteria for a hazardous waste unless the soil or sediment is known to be contaminated by a known listed hazardous waste; and

5. When excavated soil or sediment is temporarily stored or stockpiled on-site, the soil shall be secured in a manner that prevents human exposure to contaminated soil or sediment and prevents soil or sediment exposure to precipitation that may cause surface runoff, and any excavation shall be secured to prevent entry by the public. The temporary storage or stockpiling of excavated contaminated soil or sediment shall not exceed 60 days, or 90 days if the excavated contaminated soil or sediment is stored in accordance with Chapter 62-730, F.A.C. Participants are advised that other federal or local requirements may apply to these activities.

2. Notify the PRFBSR in writing, stating the reason(s) why the Interim Source Removal Proposal does not contain information adequate to support a product recovery method pursuant to Rule 62-785.500(2)(c), F.A.C.

(e) Product recovery shall be deemed complete when the objectives in Rule 62-785.500(1), F.A.C., have been met.

(f) Within 10 days after initiation of product recovery, written notification shall be provided by the PRFBSR to the Department or to the delegated local program on Form 62-785.900(1).

(g) Within the timeframes and frequencies specified in the BSRA, an Interim Source Removal Status Report documenting the recovery progress and summarizing all recovery activities for a specified period shall be submitted by the PRFBSR to the Department or to the delegated local program for review.

(3) Short-term Groundwater Recovery.

(a) The PRFBSR may perform a short-term groundwater recovery strategy as a source removal activity. The use of a pumping test or overdeveloping of shallow aquifer well(s) within the plume as an Interim Source Removal strategy may be implemented without approval from the Department or delegated local program provided the following criteria are met:

1. The groundwater contamination is of limited extent, such that the pumping of shallow aquifer well(s) within the plume may result in the site achieving the criteria for No Further Action in Rule 62-785.680, F.A.C., or the criteria for Natural Attenuation with Monitoring in Rule 62-785.690, F.A.C.;

2. Free product is not present;

3. The duration of the groundwater recovery does not exceed three days, unless the PRFBSR demonstrates to the Department or to the delegated local program that extended groundwater recovery will not result in the spread of contamination;

4. The recovered groundwater is properly disposed at a publicly owned treatment works or at a permitted Hazardous Waste Treatment, Storage or Disposal facility, if the recovered groundwater is a hazardous waste; and

5. The groundwater recovery is limited to one pumping event.

(b) Within the timeframes and frequencies specified in the BSRA, an Interim Source Removal Status Report documenting the recovery progress and summarizing all recovery activities for a specified period shall be submitted by the PRFBSR to the Department or to the delegated local program for review.

(4) Groundwater Recovery, Treatment and Disposal.

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(b) Within the timeframes specified in the BSRA, the Department or the delegated local program shall:

1. Provide the PRFBSR with written approval of the proposal; or

2. Notify the PRFBSR in writing, stating the reason(s) why the proposal does not contain information adequate to perform groundwater recovery prior to the approval of a Remedial Action Plan pursuant to Rule 62-785.500(4), F.A.C.

(c) Within the timeframes and frequencies specified in the BSRA, an Interim Source Removal Status Report documenting the recovery progress and summarizing all recovery activities for a specified period shall be submitted by the PRFBSR to the Department or to the delegated local program for review.

(5) Soil and Sediment Removal, Treatment and Disposal.

(a) The PRFBSR may excavate contaminated soil or contaminated sediment for proper treatment or proper disposal as an interim source removal activity provided the following criteria are met:

1. Contamination is not spread into previously uncontaminated areas or less contaminated areas through untreated discharges, improper treatment, improper disposal or improper storage;

2. Flammable products are handled in a safe manner;

3. When a soil vacuum extraction system is necessary to abate an imminent threat to human life, health, or safety within a structure or utility conduit, then the vacuum extraction system must be designed and operated only to abate the imminent threat. The Department or the delegated local program must be notified, within 24 hours, of the imminent threat and the intent to use a soil vacuum extraction system. The air emissions monitoring and frequency of monitoring shall be performed in accordance with Rules 62-785.700(5)(a) and (10)(i), F.A.C.;

4. USEPA Test Method 1311, Toxicity Characteristic Leaching Procedure (TCLP), must be performed on a number of samples sufficient to verify that the contaminated soil or sediment does not exceed the applicable criteria for a hazardous waste unless the soil or sediment is known to be contaminated by petroleum or petroleum products or from a known listed hazardous waste; and

5. When excavated soil or sediment is temporarily stored or stockpiled on-site, the soil shall be secured in a manner that prevents human exposure to contaminated soil or sediment and prevents soil or sediment exposure to precipitation that may cause surface runoff, and any excavation shall be secured to prevent entry by the public. The temporary storage or stockpiling of excavated contaminated soil or sediment shall not exceed 60 days, or 90 days if the excavated contaminated soil or sediment is stored in accordance with Chapter 62-730, F.A.C. PRFBSR are advised that other federal or local requirements may apply to these activities.

sufficient if the field screening results indicate that contaminated soil is not present. The actual number of laboratory samples shall be based on the horizontal and vertical extent of contamination and the degree of correlation between field soil screening and laboratory results;

(f) Use of piezometers or monitoring wells to determine the frequency of occurrence, horizontal and vertical extent, and thickness of free product;

(g) Use of monitoring wells, piezometers, or other sampling and measurement techniques to obtain a three-dimensional evaluation of the source of contamination, of the migration of contaminants below the water table, of groundwater flow, and of relevant hydrologic parameters;

(h) Use of piezometers or monitoring wells to determine horizontal direction(s) of groundwater flow and horizontal and vertical hydraulic gradients, as applicable;

(i) Survey of every top-of-casing to the National Geodetic Vertical Datum (NGVD) of 1929 or to the North American Vertical Datum (NAVD88) of 1988;

(j) Use of field screening techniques (for example, use of temporary wells, piezometers, or direct push technology to obtain groundwater samples for on-site analyses using gas chromatography) to optimize monitoring well placement;

(k) Sampling of monitoring wells for the appropriate laboratory analyses to determine the degree and extent of groundwater contamination, if applicable, such that:

1. Drill cuttings and drilling mud generated during monitoring well installation shall be handled and disposed of in such a manner that contamination is not spread into previously uncontaminated or less contaminated media. Authorization under this rule does not relieve the PRFBSR from the obligation to comply with other Department rules (for example, Chapters 62-701, 62-730, 62-770, and 62-782, F.A.C.) for handling and disposal of contaminated media. PRFBSR are advised that other federal or local requirements may apply; and

2. Development water and purge water shall be handled and disposed of in such a manner that contamination is not spread into previously uncontaminated or less contaminated media. Authorization under this rule does not relieve the PRFBSR from the obligation to comply with other Department rules (for example, Chapters 62-701, 62-730, 62-770, and 62-782, F.A.C.) for handling and disposal of contaminated media. PRFBSR are advised that other federal or local requirements may apply;

(l) Sampling of surface water and sediment for the appropriate laboratory analyses to determine the degree and extent of surface water and sediment contamination, if applicable;

(m) Inspection of public records (such as those at the local Department of Health office, at the appropriate Water Management District office, and at local municipalities) and performance of a field reconnaissance, as appropriate, to locate all water supply wells (including potable, irrigation and industrial wells) in accordance with Rule 62-785.600(2)(j), F.A.C., and injection wells or drainage wells as defined in Chapter 62-528, F.A.C.;

(n) If the possibility exists that the contamination may have affected public or private water supply wells, sampling of the well or wells for the appropriate laboratory analyses, with the consent of the owner(s), to determine whether any contamination is present;

(o) Use of available and appropriate literature in conjunction with site-specific lithologic logs to identify aquifers present beneath the site. An analysis for Total Dissolved Solids shall be used if the PRFBSR chooses to demonstrate that the natural background quality of the groundwater on-site would allow it to be classified as an area of G-III groundwater;

(p) Performance of slug tests or a pumping test, if appropriate, on different strata of the surficial aquifer or of different aquifers, if applicable, using water-table monitoring wells, intermediate depth monitoring wells, and vertical extent monitoring wells. Performance of a pumping test may be deferred until the Remedial Action Plan phase if groundwater extraction is proposed in accordance with the provisions of Rule 62-785.700, F.A.C. If a pumping test is performed within the plume, at least two samples of the groundwater withdrawn during the test shall be collected and analyzed for the appropriate contaminants and physical properties (for example, Hardness, Iron, Total Dissolved Solids and Total Suspended Solids) that may affect the treatment system and disposal options. At a minimum, one sample shall be collected at the mid-point of the pumping test and one at the end of the pumping test;

(q) Review of historical land use records and existing aerial photographs;

(r) Sampling of soil for USEPA Test Method 1312, Synthetic Precipitation Leaching Procedure (SPLP) analyses, or for USEPA Test Method 1311, Toxicity Characteristic Leaching Procedure (TCLP) analyses if the contamination is derived from used oil or similar petroleum products or if the information available indicates that the soil has the potential to be a hazardous waste, or for the analyses of the physical parameters listed in Chapter 62-777, F.A.C., Table III; and

(s) Establishment of the parameters or exposure assumptions that will be used to develop the alternative cleanup target levels pursuant to Rule 62-785.650, F.A.C., if the PRFBSR chooses this option.

(5) If there is no historical evidence of certain contaminants being used within the site and if initial testing of representative monitoring well(s), performed pursuant to Rule 62-785.600(4), F.A.C., does not indicate the presence of any contaminants within a specific analytical procedure, or indicates that the presence of a contaminant is due to a background concentration, subsequent testing at the site need not include that analytical procedure.

(6) Two copies of a Site Assessment Report (that may reference previously submitted documents) shall be submitted by the PRFBSR to the Department or to the delegated local program for review within the timeframes specified in the BSRA.

(7) The Site Assessment Report shall:

62-4.530 Procedures.

(1) Persons wishing to use one or more of the general permits set forth in the Department's Rules shall, at least 30 days before beginning any work, notify the Department in writing or on forms adopted by the Department. They shall describe the proposed project, and include supporting documents depicting the proposed project, its location, and other pertinent information as required by Rule to demonstrate that they qualify for the requested general permit. Persons wishing to use a general permit shall notify the appropriate office of the Department in writing. Persons wishing to use a general permit are hereby placed on notice that projects undertaken without proof of notice to the Department shall be considered as being undertaken without a permit and shall be subject to enforcement pursuant to Section 403.161, F.S.

(2) A proposed project which may be reasonably expected to violate air quality standards, water quality standards, or drinking water standards or which will not meet the public interest requirements set forth in Chapter 403, F.S., shall not be entitled to use of a general permit.

(3) Pursuant to s. 258.397, F.S., no project which is located in the Biscayne Bay Aquatic Preserve is eligible for a general permit.

(4) Suspension or revocation of the use of a general permit shall be in accordance with Chapter 120, F.S. Good cause for the suspension or revocation shall include:

(a) Submission of false or inaccurate information in the notification for use of a general permit or in the required reports;

(b) Violation of law, Department orders, rules or permit conditions;

(c) Refusal of lawful inspection under Section 403.091, F.S.; or

(d) Any other act on the part of the permittee in the use of the general permit which results or may result in harm or injury to human health or welfare or which causes harm or injury to animal, plant or aquatic life, or to property.

(5) Unless otherwise required below as part of a specific category of general permit, persons qualifying for the use of a general permit are not required to, but may, publish in a newspaper of general circulation in the area affected by the proposed project a notice of intent to use a general permit. The notice, if published, shall follow substantially the format in Fla. Admin. Code Rule 62-103.150 and shall be published within 14 days of the date when the Department receives notification pursuant to Rule 62-4.530(1). No person who has published notice shall begin work until after the 21 days for requesting a hearing has passed or a hearing is held and a decision is rendered.

(6) Any person complying with the requirements of a general permit may use the permit 30 days after giving notice to the Department without any agency action. When no agency action is taken, unless the Department or the applicant publishes notice of the application, the provisions of Chapter 120, Florida Statutes, granting to affected parties the right to an administrative hearing do not apply.

Specific Authority: 403.814(1), FS.
Law Implemented: 253.123, 253.124, 258.165, 403.061, 403.087, 403.088, 403.702-403.73, 403.814, 403.851-403.864, FS.
History: New 7-8-82, Amended 6-16-84, 8-31-88, 3-19-90. Previously numbered as 17-4.53, Formerly 17-4.530.

62-4.540 General Conditions for All General Permits.

(1) The terms, conditions, requirements, limitations, and restrictions set forth in this Part are "general permit conditions" and are binding upon the permittee. The conditions are enforceable under Chapter 403, F.S.

(2) The general permit is valid only for the specific activity indicated. Any deviation from the specified activity and the conditions for undertaking that activity shall constitute a violation of the permit. The permittee is placed on notice that violation of the permit may result in suspension or revocation of the permittee's use of the general permit and may cause the Department to begin legal proceedings.

(3) The general permit does not convey any vested rights or any exclusive privileges. It does not authorize any injury to public or private property nor any invasion of personal rights. It does not authorize any infringement of federal, state or local laws or regulations. It does not eliminate the necessity for obtaining any other federal, state or local permits that may be required, or allow the permittee to violate any more stringent standards established by federal or local law.

(4) The general permit does not relieve the permittee from liability and penalties when the construction or operation of the permitted activity causes harm or injury to human health or welfare; causes harm or injury to animal, plant or aquatic life; or causes harm or injury to property. It does not allow the permittee to cause pollution in contravention of Florida Statutes and Department rules.

(5) The general permit conveys no title to land or water, nor does it constitute State recognition or acknowledgment of title. It does not constitute authority for reclamation of submerged lands. Only the Board of Trustees of the Internal Improvement Trust Fund may express State opinion as to title.

(6) No general permit shall authorize the use of state owned land without the prior consent of the Board of Trustees of the Internal Improvement Trust Fund pursuant to Section 253.77, F.S.

(7) The general permit may be modified, suspended or revoked in accordance with Chapter 120, Florida Statutes, if the Secretary determines that there has been a violation of any of the terms or conditions of the permit, there has been a violation of state water quality standards or state air quality standards, or the permittee has submitted false, incomplete or inaccurate data or information.

(8) The general permit shall not be transferred to a third party except pursuant to Fla. Admin. Code Rule 62-4.120.

(9) The general permit authorizes construction and where applicable operation of the permitted facility.

(10) The permittee agrees in using the general permit to make every reasonable effort to conduct the specific activity or construction authorized by the general permit in a manner that will minimize any adverse effects on adjacent property or on public use of the adjacent property, where applicable, and on the environment, including fish, wildlife, natural resources of the area, water quality or air quality.

(11) The permittee agrees in using the general permit to allow a duly authorized representative of the Department access to the permitted facility or activity at reasonable times to inspect and test upon presentation of credentials or other documents as may be required by law to determine compliance with the permit and the Department rules.

(12) The permittee agrees to maintain any permitted facility, or activity in good condition and in accordance with the plans submitted to the department under Rule 62-4.530(1).

(13) A permittee's use of a general permit is limited to five years. However, the permittee may request continued use of the general permit by notifying the Department pursuant to Rule 62-4.530(1). However, the permittee shall give notice of continued use of a general permit thirty days before it expires.

Specific Authority: 403.814(1), FS.

Law Implemented: 253.123, 253.124, 403.061, 403.087, 403.088, 403.702-403.73, 403.814, 403.851-403.864, FS.

History: New 7-8-82. Amended 8-31-88. Previously numbered as 17-5.54, Formerly 17-4.540.

62-701.300 Prohibitions.

(1) General prohibition.

(a) No person shall store, process, or dispose of solid waste except at a permitted solid waste management facility or a facility exempt from permitting under this chapter.

(b) No person shall store or dispose of solid waste in a manner or location that causes air quality standards to be violated or water quality standards or criteria of receiving waters to be violated.

(2) Disposal. Unless authorized by a Department permit or site certification in effect on January 6, 1993, no solid waste shall be stored or disposed of by being placed:

(a) In an area where geological formations or other subsurface features will not provide support for the solid waste;

(b) In any area where the absence of geological formations or subsurface features would allow for the unimpeded discharge of waste or leachate to ground or surface water. A person may dispose of solid waste in such an area upon demonstration to the Department that permanent leachate control methods will result in compliance with water quality standards under Chapters 62-302 and 62-520, F.A.C.;

(c) Within 500 feet of an existing or approved potable water well unless disposal takes place at a facility for which a complete permit application was filed or which was originally permitted before the potable water well was in existence. This prohibition shall not apply to any renewal of an existing permit that does not involve lateral expansion, nor to any vertical expansion at a permitted facility;

(d) In a dewatered pit unless the pit is lined and permanent leachate containment and special design techniques are used to ensure the integrity of the liner;

(e) In an area subject to frequent and periodic flooding unless flood protection measures are in place;

(f) In any natural or artificial body of water including ground water;

(g) Within 200 feet of any natural or artificial body of water, including wetlands within the jurisdiction of the Department, except bodies of water contained completely within the property boundaries of the disposal site, which do not discharge from the site to surface waters. A person may dispose of solid waste within the 200 foot setback area upon demonstration to the Department that permanent leachate control methods will result in compliance with water quality standards under Chapters 62-302 and 62-520, F.A.C. Stormwater control methods shall meet stormwater requirements of

Chapter 62-25, F.A.C. However, nothing contained herein shall prohibit the Department from imposing conditions necessary to assure that solid waste disposed of within the 200 foot setback area will not cause pollution from the site in contravention of Department rules.

(h) On the right of way of any public highway, road, or alley; and

(i) Within 1000 feet of an existing or approved potable water well serving a community water system as defined in Rule 62-550.200(9), F.A.C., unless disposal takes place at a facility for which a complete permit application was filed or which was originally permitted before the water well was in existence. It is the intent of the Department that this provision shall be repealed on the effective date of any rule promulgated by the Department which regulates wellhead protection areas generally. This prohibition shall not apply to any renewal of an existing permit that does not involve lateral expansion, nor to any vertical expansion at a permitted facility.

(3) Burning. Open burning of solid waste is prohibited except in accordance with Rule 62-701.520(2), F.A.C. Controlled burning of solid waste is prohibited except in a permitted incinerator, or in a facility in which the burning of solid waste is authorized by a site certification order issued under Chapter 403, Part II, F.S.; clean vegetative and wood wastes may be burned in an air curtain incinerator in accordance with Rule 62-2.500(1)(e), F.A.C.

(4) Hazardous waste. No hazardous waste shall be disposed of in a solid waste management facility unless such facility is permitted pursuant to Chapter 62-730, F.A.C.

(5) PCBs. No person may dispose of liquids containing a polychlorinated biphenyl (PCB) concentration of 50 parts per million or greater, or non-liquid PCBs at concentrations of 50 parts per million or greater in the form of contaminated soil, rags, or other debris, in any solid waste disposal unit in this state.

(6) Biohazardous waste. Biohazardous waste shall be properly incinerated so that little or no organic material remains in the ash residue, or shall be processed by a method approved by the Department pursuant to Chapter 62-712, F.A.C. No untreated biohazardous waste shall be knowingly deposited in any landfill.

(7) Class I surface waters. The Department shall not issue a construction permit for a landfill within 3,000 feet of Class I surface waters.

(8) Special wastes for landfills. No person who knows or who should know of the nature of such solid waste shall dispose of the following wastes in any landfill:

(a) Lead-acid batteries;

(b) Used oil, except as provided in Chapter 62-710, F.A.C.;

(c) Yard trash, except in unlined landfills classified by Department rule;

(d) White goods; and

(e) Whole waste tires, except as provided in Chapter 62-711, F.A.C.

(9) Special wastes for waste-to-energy facilities. No person who knows or who should know of the nature of such solid waste shall dispose of lead-acid batteries in any waste-to-energy facility.

(10) Liquids restrictions.

(a) Noncontainerized liquid waste shall not be placed in solid waste disposal units unless:

1. The waste is household waste other than septic waste; or

2. The waste is leachate or gas condensate derived from the solid waste disposal unit, or byproducts of the treatment of such leachate or gas condensate, and the solid waste disposal unit is lined and has a leachate collection system.

(b) Containers holding liquid waste shall not be placed in a solid waste disposal unit unless:

1. The container is a small container similar in size to that normally found in household waste;

2. The container is designed to hold liquids for use other than storage; or

3. The waste is household waste.

(c) Containers or tanks twenty gallons or larger in capacity shall either have one end removed or cut open, or have a series of punctures around the bottom to ensure the container is empty and free of residue. The empty container or tank shall be compacted to its smallest practical volume for disposal.

(11)(a) Except as provided in paragraph (b) of this subsection, no person may mix or commingle used oil with solid waste that is to be disposed of in landfills or directly dispose of used oil in landfills. Oily wastes may be disposed of in landfills unless prohibited in other department rules.

(b) The Department shall allow disposal of used oil commingled with solid waste if it determines that it is not practicable to separate the used oil from the solid waste, and if such disposal will pose no significant threat to public health or the environment.

Specific Authority 403.704, FS.
Law Implemented 403.704, 403.707, 403.708, FS.
History -- Transferred from 10D-12.06, 10D-12.07, 10-1-74; Amended 5-24-79, 5-27-82; Previously Numbered as 17-7.04; Amended 12-10-85; Formerly 17-7.040; Amended 6-25-90; Formerly 17-701.040; Amended 1-6-93, 1-2-94, 5-19-94, Formerly 17-701.300, Amended 12-23-96, 4-23-97.

62-701.310 Approval of Alternate Procedures and Requirements.

(1) Applicability. Any person subject to the provisions of this chapter or Chapters 62-702 through 62-720, F.A.C., may request in writing a determination by the Secretary that a requirement shall not apply, and shall request approval of alternate procedures or requirements.

(2) Criteria. The request shall set forth at a minimum the following information:

(a) The specific facility for which an exception is sought;

(b) The specific provisions from which an exception is sought;

(c) The basis for the exception;

(d) The alternate procedure or requirement for which approval is sought and a demonstration that the alternate procedure or requirement provides an equal degree of protection for the public and the environment; and

(e) A demonstration of the effectiveness of the proposed alternate procedure.

(3) Department order. The Secretary shall specify by order each alternate procedure or requirement approved in accordance with this section or shall issue an order denying the request for such approval. The Department's order shall be agency action, reviewable in accordance with Section 120.57, F.S.

(4) Alternate sampling procedures. Approval of alternative or new field and laboratory sampling and analysis procedures shall be requested in accordance with Rules 62-160.430, 62-160.520 and 62-160.530, F.A.C.

(5) Variances. Requests for variances from specific statutory requirements shall be made pursuant to Section 403.201, F.S., and Rule 62-103.100, F.A.C.

(6) Requests for alternate procedures shall be accompanied by a fee of $2000 in accordance with Rule 62-4.050(4)(n)4., F.A.C. Requests must be submitted to the Director of the Division of Waste Management, 2600 Blair Stone Road, Twin Tower Office Building, Tallahassee, Florida 32399-2400.

Specific Authority 403.704, FS.
Law Implemented 403.704, 403.707, FS.
History --New 7-1-85; Amended 12-10-85; Formerly 62-7.078; Formerly 62-701.078; Amended 1-6-93, 5-19-94, Formerly 62-701.310.

62-701.320 Solid Waste Management Facility Permit Requirements, General.

(1) Permit requirements. No solid waste management facility shall be constructed, operated, maintained, modified, or closed without a permit issued by the Department.

(2) Exemptions. Except as provided in Section 403.707(2), F.S., no permit under this chapter shall be required for the following activities or facilities. For purposes of this subsection, disposal shall be deemed to include storage prior to disposal or processing.

(a) Disposal by persons of solid waste resulting from their own activities on their own property, provided such waste is either from their residential property or is rocks, soils, trees, tree remains, and other vegetative matter which normally results from land development operations.

(b) Disposal by persons of solid waste resulting from their own activities on their property, provided that the environmental effects of such disposal on ground water and surface waters are:

1. Addressed or authorized by a site certification issued under Chapter 403, Part II, F.S., Electrical Power Plant Siting;

2. Addressed or authorized by a permit issued by the Department, including solid waste management permits or other environmental permits modified to include conditions for proper disposal; or

3. Addressed or authorized by, or specifically exempted from the requirement to obtain, a ground water monitoring plan approved by the Department.

(c) On-site disposal of construction and demolition debris, provided that disposal conforms to Rule 62-701.730(3), F.A.C.

(d) Clean debris which is used as fill material.

(e) Disposal of solid waste resulting from normal farming operations.

(f) Storage of solid waste in containers on property which is owned, rented, or leased by the persons who generated the waste from their own activities which occurred on their property, if the solid waste in such containers is collected at least once a week.

(g) Disposal by persons of solid waste resulting from their own activities on their own property, if that waste disposal occurred before October 1, 1988.

(3) Irresponsible applicant.

In addition to the provisions of Rule 62-4.070(5), F.A.C., When determining whether the applicant has provided reasonable assurances that Department standards will be met, the Department shall consider repeated violations of applicable statutes, rules, orders, or permit conditions caused by a permit applicant after October, 1988, relating to the operation of any solid waste management facility in this state if the applicant is deemed to be irresponsible. For purposes of this subsection, the following words have the following meanings:

(a) "Applicant" means the owner or operator of the solid waste management facility in this state, and includes a business entity, a parent of a subsidiary corporation, a partner, a corporate officer or director, or a stockholder holding more than 50 percent of the corporate stock.

(b) "Irresponsible" means that an applicant owned or operated a solid waste management facility in this state, including transportation equipment or mobile processing equipment used by or on behalf of the applicant, which was subject to a state or federal notice of violation, judicial action, or criminal prosecution for activities that constitute violations of Chapter 403, F.S., or the rules promulgated thereunder, and could have prevented the violation through reasonable compliance with Department rules.

(4) Modification of an approved permit. Nothing in this rule shall be construed to limit or prohibit modifications of a permit under the provisions of Rule 62-4.080, F.A.C.

(5) Permit application.

(a) Applications for a solid waste management facility shall be submitted on appropriate Department forms listed in Rule 62-701.900, F.A.C., to the Department district office with jurisdiction where the facility is located. A minimum of six copies each of the application, engineering plans and reports, and all supporting information for the proposed construction, substantial modification, operation or closure of a facility shall be provided to the Department.

(b) Information in every application shall be of sufficient detail to show how the facility will be constructed, operated, and closed, and how it will be monitored and maintained after closure, in order to comply with the requirements of this chapter.

(c) Combination facilities. An application for a permit to construct or operate a solid waste management facility having multiple solid waste management components which, if standing alone, would require solid waste management facility permits, shall include all information required to be submitted had each component been proposed as a separate facility, independent of the other components. Such information may be combined or otherwise presented so as to avoid duplicative or repetitive submittals. Additionally, such applications shall be accompanied by such fees as would be required for each facility component; however, the total permit fees for a facility shall not exceed $25,000, exclusive of modifications and renewals.

(6) Engineer of record and professional certification. All engineering plans, reports, and information supporting the application shall be compiled by the engineer of record who shall be responsible for assurance that all technical components have been prepared under the direction and supervision and signed and sealed by the professional registered in Florida in each contributing technical discipline. The engineer of record's signature and seal on the application shall assure that all appropriate technical professional disciplines have been employed in development of the application. The application shall provide that the engineer of record or another qualified professional

shall make periodic inspections during construction of the facility to ensure that design integrity is maintained.

(7) Application content and format. Applications for permits to construct, operate, modify, or close a solid waste management facility shall include in the following sequence:

(a) A letter of application transmittal;

(b) A completed application form dated and signed by the applicant;

(c) The permit fee specified in Rule 62-4.050, F.A.C., in check or money order, payable to the Department.

(d) An engineering report addressing the requirements of this rule which shall:

1. Contain a cover sheet stating the project title, location, applicant's name, and the engineer's name, address, signature, date of signature and seal;

2. Have the text printed on 8 1/2 inch by 11 inch consecutively numbered pages;

3. Contain a table of contents or index describing the body of the report and the appendices; and

4. Include the body of the report and all appendices.

(e) Appendices submitted as part of an engineering report to support a permit application shall contain, where required under applicable sections of this rule:

1. An operation plan appropriate for the type of facility;

2. A contingency plan appropriate for the type of facility to cover operations interruptions and emergencies such as fires, explosions, or natural disasters;

3. Illustrative charts and graphs;

4. Records or logs of tests, soil borings, hydrogeological information, geochemical surveys, and water quality analyses; and

5. Engineering calculations, including literature citations.

(f) Plans or drawings for all solid waste management facilities shall:

1. Use sheets 22 inches by 34 inches or 24 inches by 36 inches, and include title blocks;

2. Have a cover sheet that includes the project title, applicant's name, sheet index, legend of symbols, and the engineer's name, address, signature, date of signature and seal;

3. Include a regional map or plan showing the project location;

4. Include a current vicinity map, or aerial photograph taken within one year preceding the application;

5. Have a site plan containing the location of all property boundaries certified by a registered Florida land surveyor; and

6. Clearly show all necessary details and be numbered, titled, and referenced to the narrative report. Drawings shall contain a north arrow and horizontal and vertical scales, and shall specify drafting or origination dates. All elevations shall be referenced to National Geodetic Vertical Datum.

(g) Proof of property ownership, or a copy of any lease agreement, transfer of property agreement with right of entry for long-term care, interlocal government agreement, or any other agreement between the facility operator and property owner which may affect the facility; and

(h) For facilities owned or operated by a county, a description of the existing or proposed recycling facilities or activities, if any, at the site and a description of whether, and the extent to which, these recycling facilities or activities will contribute to the county's achievement of the recycling goals contained in Section 403.706, F.S.

(i) For purposes of the evaluation required in subsection (3) of this section, a history and description of any enforcement actions described in subsection (3) of this section relating to solid waste management facilities in this state.

(8) Notice of application.

(a) An applicant for a permit to construct or substantially modify a solid waste management facility shall publish and provide proof of publication to the Department of a Notice of Application in a newspaper of general circulation in the area where the facility will be located, in accordance with Rule 62-103.150, F.A.C.

(b) For all landfills, the Department shall mail a notice of receipt of permit application to the Chair of the Board of County Commissioners, the highest ranking elected official of the municipality, and each State Senator and Representative serving the jurisdiction in which the project is located. After the Department completes the permit review, a copy of the notice of intent to issue or deny the permit will also be sent to these same officials.

(9) Permits for construction, modification, operation, and closure. Complete permit applications for construction or operation of a solid waste management facility, renewal of an operation permit for an existing facility, modification of an existing facility, or closure of a facility shall be evaluated by the respective Department district office in accordance with Chapters 62-4 and 62-701, F.A.C. The Department shall:

(a) Issue a construction permit, or a construction/operation permit for a solid waste management facility, or for a substantial modification of an existing solid waste management facility. After all specified construction has been completed and before acceptance of any solid waste, the owner or operator shall submit to the Department a certification of construction completion, Form 62-701.900(2), signed and sealed by a professional engineer, and any modifications of the record drawings, and shall arrange for Department representatives to inspect the facility in the company of the permittee, the engineer, and the proposed facility operator. The facility shall not be operated until the certification has been submitted and approved, all documentation required as a condition of the permit has been submitted, and a facility inspection by Department personnel has been conducted; or

(b) Issue an operation permit for a new facility that has been satisfactorily constructed, or to an existing facility which is being operated in accordance with this chapter at the time for permit renewal; or

(c) Issue a closure permit for closing and long-term care of a landfill which complies with the requirements of Rules 62-701.600 - .620, F.A.C.; or

(d) Deny the issuance of a permit if reasonable assurances are not provided that the requirements of Chapters 62-4 and 62-701, F.A.C., will be satisfied.

(10) Identification number. The Department shall assign an identification number to each solid waste management facility that receives a permit. The number shall be unique to that facility, and shall remain assigned to that facility at all times. The identification number shall be used on all correspondence and records related to that facility.

(11) Local zoning. The Department does not evaluate compliance with local zoning or land use ordinances when determining whether to issue or deny any permit under this chapter. Issuance of a permit does not relieve an applicant from compliance with local zoning or land use ordinances, or with any other laws, rules, or ordinances.

(12) Airport safety.

(a) Applicability. This subsection applies to those facilities constructed after January 6, 1993, as well as lateral expansions of facilities which were constructed prior to January 6, 1993. For purposes of this subsection, an "airport runway" does not include facilities used solely for helicopters or other aircraft which take off and land vertically.

(b) Solid waste management facilities where waste is stored, disposed, or processed outdoors, shall not be located within 10,000 feet of any licensed and operating airport runway used by turbine powered aircraft, or within 5,000 feet of any licensed and operating airport runway used only by piston engine aircraft, unless the applicant demonstrates that the facility is designed and will be operated so that it does not pose a bird hazard to aircraft.

(c) Applicants proposing to site new landfills and lateral expansions of existing landfills within a five-mile radius of any licensed and operating airport runway used by turbine powered or piston engine aircraft shall notify the affected airport, the Federal Aviation Administration, and the Florida Department of Transportation when the application is filed with the Department, and shall provide evidence of such notification to the Department.

(13) Other facility permits. In addition to the exemptions in subsection (2) of this section, the following solid waste management facilities which are constructed and operated under an appropriate and currently valid permit are not required to obtain a separate solid waste permit pursuant to this chapter:

(a) Incinerators which are constructed and operated under a permit issued pursuant to Chapters 62-296 or 62-256, F.A.C.; however, if the facility is also storing or disposing of solid waste on the site, and such storage or disposal is not addressed in the permit, a separate solid waste permit is required;

(b) Incinerators which are constructed and operated under a site certification pursuant to Chapter 403, Part II, F.S.;

(c) Solid waste management facilities, such as composting facilities, waste tire processing facilities, used oil recycling facilities, and biohazardous waste treatment or storage facilities, which are required to obtain permits under Rules 62-702 through 62-729, F.A.C.

(14) Operator training. The owner or operator of a landfill, waste-to-energy facility, biological waste incineration facility, or mobile soil thermal treatment facility shall not employ a person to perform, nor may any person perform, the duties of an operator of such facility unless that person is a trained operator or an interim operator.

(a) For purposes of this subsection, "operator" means any person, including the owner, who is principally engaged in, and is in charge of, the actual operation, supervision, and maintenance of a solid waste management facility and includes the on-site person in charge of a shift or period of operation during any part of the day, such as facility managers, supervisors and equipment operators. It does not include office personnel, laborers, equipment operators not in a supervisory capacity, transporters, corporate directors, elected officials, or other persons in managerial roles unless such persons are directly involved in on-site supervision or operation of a solid waste management facility.

(b) For purposes of this subsection "interim operator" means a person who has, in the opinion of the facility manager, shown competency in his chosen occupation

through a combination of work experience, education and training and who has at least one year of experience at that facility or a similar facility.
Specific Authority 403.061, 403.704, 403.716, FS.
Law Implemented 403.0877, 403.702, 403.704, 403.707, 403.716, FS.
History -- New 1-6-93; Amended 1-2-94, 5-19-94, Formerly 62-701.320, Amended 12-23-96.

62-701.801 General Permit for Solid Waste Transfer Station.

(1) General permit. A general permit is hereby granted to any person for the construction and operation of a solid waste transfer station that has been designed or will be operated in accordance with the standards and criteria set forth in Rules 62-4.540 and 62-701.300, F.A.C., and this section.

(2) Notification. Any person wishing to operate a transfer station pursuant to this section shall notify the Department on Form 62-701.900(4) and provide the following:

(a) Regional map. The regional map shall delineate the service area of the proposed transfer station.

(b) Site plan. The site plan shall include:

1. Site conditions and projected use including all site structures, buildings, fences, gates, entrances and exits, parking areas, on-site roadways, and signs;

2. Property boundaries, access roads, surface water bodies, and the location of 100-year flood plain boundaries;

3. Proposed structures and areas designated for unloading, sorting, storage, and loading, including dimensions, elevations, and floor plans of these structures and areas, and the general process flow; and

4. Adjacent properties including the location of public and private water supplies on these properties.

(c) Engineering report. The engineering report shall include:

1. A description of the general operating plan for the proposed facility including the origin, composition, and expected weight or volume of all solid waste to be accepted at the facility, the maximum time waste will be stored, where all wastes will be disposed, the capacity of the facility, the operating hours of the facility, and the expected life of the facility;

2. A description of all machinery and equipment to be used, including the design capacity;

3. A transfer plan specifying the transfer route, the number and type of transfer vehicles to be used, and how often solid waste will be transferred to the disposal site;

4. A description of the facility's drainage system and water supply system;

5. A plan for hiring and training equipment operators and other personnel concerning the operation of the facility; and

6. A contingency plan describing alternate solid waste handling procedures for periods of inoperation or delays in transporting solid waste.

(3) Design requirements. Minimum design requirements for transfer stations are as follows:

(a) On-site roads and unloading areas shall be designed for efficient movement and unloading of vehicles.

(b) Tipping, processing, sorting, storage and compaction areas that are in an enclosed building or covered area shall have ventilation systems. The areas that are not enclosed shall be equipped with litter control devices and visual screening.

(c) The facility shall be designed with a leachate control system to prevent discharge of leachate and mixing of leachate with stormwater.

(d) Provisions shall be made for weighing or measuring all incoming solid waste and recovered materials. Storage areas shall be designed to hold the expected volume of materials until they are transferred for disposal or recycling.

(e) Where the general public may use the transfer facility, safety procedures shall be established for private vehicles.

(4) Operational requirements.

(a) Prohibited wastes shall not be accepted at a transfer station. Handling of unauthorized wastes shall be addressed in the contingency plan.

(b) An attendant shall be on duty whenever the facility is operating. Operating hours shall be posted, and fencing, gates, or other means shall be used to prevent unauthorized access when the station is closed.

(c) Litter, insects, odors and vectors shall be controlled to prevent sanitary nuisance and unsightly appearance.

(d) Wastes shall be handled on a first-in, first-out basis to the extent practicable. All waste storage areas shall be cleaned at the end of each day's operations or during continuous operation, as necessary, to prevent odor or vector problems. All floors shall be free of standing liquids. Drainage from cleaning areas shall be discharged to sanitary sewers or the equivalent.

(e) Adequate fire protection must be available at all times.

(f) Recovered materials shall be clearly identified and stored in a safe, sanitary manner. A record of the type and quantity of recovered materials shall be maintained and reported as part of the county's recycling program.

(g) Operational records shall be maintained to include a daily log of the quantity of solid waste received and transported and the origin of the waste. Such records shall be compiled on a monthly basis and shall be available for inspection by the Department. Reports shall be retained at the station for three years.

(5) Certification of construction completion. Within 30 days of completion of construction, the engineer of record shall certify to the Department that the permitted construction is complete and that it was done in accordance with the plans submitted to the Department except where minor deviation was necessary. All deviations shall be described in detail and the reasons therefore enumerated.

(6) Stormwater. Stormwater shall be controlled in accordance with Chapter 62-25 and 62-330, F.A.C. A copy of any permit for stormwater control issued by the Department, or documentation that no such permit is required, shall be submitted to the Department before the facility receives waste. Applicants should be aware that other government agencies may also regulate stormwater management and may require separate permits.

(7) Any person wishing to construct or operate a transfer station pursuant to this section shall publish, in a newspaper of general circulation in the area affected, notice of application for a general permit. Such public notice of application shall be published within 14 days after the applicant notifies the Department. Within 21 days after publication of notice, any person whose substantial interests are affected may request a hearing in accordance with Section 120.57, F.S. No person shall begin work

pursuant to a general permit until after the time for requesting a hearing has passed or, if a hearing is requested, until final agency action is taken authorizing construction.
Specific Authority 403.814(1), FS.
Law Implemented 403.061, 403.087, 403.088, 403.702-403.73, 403.814, FS.
History -- New 7-8-82; Previously numbered as 62-4.61; Formerly 62-4.610; Formerly 62-7.801; Amended 1-6-93, 5-19-94, Formerly 62-701.801.

CHAPTER 62-701
SOLID WASTE MANAGEMENT FACILITIES

62-701.100 Intent. The intent of Chapters 62-701 through 62-722, F.A.C., is to establish standards for the construction, operation, and closure of solid waste management facilities to minimize their threat to public health and the environment; to provide for the safe handling, storage, disposal, or beneficial use of ash residue from the combustion of solid waste; to establish a procedure for the examination and certification of resource recovery equipment to implement the tax exemptions provided by Section 212.08(7)(q), F.S., and Rule 12A-1.001(20), F.A.C.; to regulate the production and use of compost made from solid waste; to establish a comprehensive program for the proper management and recycling of used oil; to regulate waste tire storage, collection, transport, processing, recycling, reuse, and disposal; to establish procedures for disbursement of recycling and education grants, small county grants, and waste

tire grants, litter control and prevention grants, and small county landfill closure grants to local governments for recycling and solid waste education; to provide a uniform procedure by which certain persons in this state who handle, purchase, receive, recover, sell or are end users of recovered materials shall be certified by and report to the Department and register with and report to certain local governments; and to implement the provisions of the Florida Solid Waste Management Act, Sections 403.702-403.7193 and 403.75-403.769, Florida Statutes.
Specific Authority 403.061, 403.704 FS.
Laws Implemented 403.021, 403.061, 403.087, 403.702-403.7193 and 403.75-403.769, FS.
History -- New 1-6-93, Formerly 17-701.100, Amended 12-23-96, 5-27-01.

62-701.200 Definitions. The following words, phrases or terms as used in Chapters 62-701 through 62-722, F.A.C., unless the context indicates otherwise, shall have the following meaning:

(1) "Agricultural wastes" means the solid wastes resulting from normal farming operations, the raising and slaughtering of animals, and the processing of animal products, orchard, and field crops, which are stored, transported, or disposed of as an unwanted waste material.

(2) "Airport" means any area of land or water, or any manmade object or facility located thereon, which is used, or intended for use, for the landing and takeoff of aircraft, and any appurtenant areas which are used, or intended for use, for airport buildings or other airport facilities or rights-of-way, together with all airport buildings and facilities located thereon

(3) "Air quality standards" means, unless otherwise specified, those standards set forth in Chapter 62-204, F.A.C.

(4) "ASTM" means the American Society for Testing and Materials.

(5) "Aquifer" means a geologic formation, group of formations, or part of a formation capable of yielding a significant amount of ground water to wells, springs, or surface water.

(6) "Ash residue" means all the solid residue and any entrained liquids resulting from the combustion of solid waste in a solid waste combustor, including bottom ash, fly ash and combined bottom and fly ash, but excluding recovered metals glass, and other recovered materials separated from the ash residue.

(a) "Bottom ash" means the solid material remaining after combustion of solid waste, which is discharged from the grates or stoker of a solid waste combustor.

(b) "Fly ash" means the residue from the combustion of solid waste, which is entrained in the gas stream of a solid waste combustor. Fly ash includes particulates, cinders, soot, and solid waste from air pollution control equipment.

(7) "Backyard composting" means the composting of organic solid waste, such as grass clippings, leaves or food waste, generated by a homeowner or tenant of a single or multi-family residential unit or an apartment complex unit, where composting occurs at that dwelling unit.

(8) "Biomedical waste" has the meaning given it in Rule 64E-16, F.A.C.

(9) "Biological waste" means solid waste that causes or has the capability of causing disease or infection and includes biomedical waste, animals which died from disease, and other wastes capable of transmitting pathogens to humans or animals. The term does not include human remains that are disposed of by persons licensed under Chapter 470, F.S.

(10) "Bird hazard" means an increase in the likelihood of bird/aircraft collisions that may cause damage to the aircraft or injury to its occupants.

(11) "Bulky wastes" means items whose large size or weight precludes or complicates their handling by normal collection, processing, or disposal methods.

(12) "Cell" means a volume of solid waste received since the last previous application of initial cover. The compacted waste and subsequent initial cover constitute a cell which usually contains wastes deposited in one day.

(13) "Class I waste" means solid waste which is not hazardous waste, and which is not prohibited from disposal in a lined landfill under Rule 62-701.300, F.A.C.

(14) "Class III waste" means yard trash, construction and demolition debris, processed tires, asbestos, carpet, cardboard, paper, glass, plastic, furniture other than appliances, or other materials approved by the Department that are not expected to produce leachate which poses a threat to public health or the environment.

(15) "Clean debris" means any solid waste which is virtually inert, which is not a pollution threat to ground water or surface waters, is not a fire hazard, and is likely to retain its physical and chemical structure under expected conditions of disposal or use. The term includes brick, glass, ceramics, and uncontaminated concrete including embedded pipe or steel.

(16) "Clean wood" means wood, including lumber, tree and shrub trunks, branches, and limbs, which is free of paint, glue, filler, penthachlorophenol, creosote, tar, asphalt, other wood preservatives or treatments.

(17) "Closing" means the time at which a solid waste management facility ceases to accept wastes, and includes those actions taken by the owner or operator of the facility to prepare the facility for any necessary monitoring and maintenance after closing.

(18) "Closure" means the cessation of operation of a solid waste management facility and the act of securing such a facility so that it will pose no significant threat to human health or the environment. This includes closing, long term monitoring, maintenance, and financial responsibility.

(19) "Cm/sec" means centimeters per second.

(20) "Co-disposal" means the disposal of two or more different types of waste in the same solid waste disposal unit.

(21) "Combustion" means the treatment of solid waste in a device that uses heat as the primary means to change the chemical, physical, or biological character or composition of the waste. Combustion processes include incineration and pyrolysis.

(22) "Commercial solid waste" means all types of solid waste generated by stores, offices, restaurants, warehouses, and other non-manufacturing activities, excluding residential and industrial wastes.

(23) "Compost" means solid waste which has undergone biological decomposition of organic matter, and has been disinfected using composting or similar technologies, and has been stabilized to a degree which is potentially beneficial to plant growth and which is used or sold for use as a soil amendment, artificial top soil, growing medium amendment or other similar uses.

(24) "Composting" means the process by which biological decomposition of organic solid waste is carried out under controlled aerobic conditions, and which stabilizes the organic fraction into a material which can easily and safely be stored, handled and used in an environmentally acceptable manner. The presence of anaerobic zones within the composting material will not cause the process to be classified as other than composting.

(25) "Composting facility" means a solid waste management facility where solid waste is processed using composting technology. Processing may include physical turning, windrowing, aeration or other mechanical handling of organic matter.

(26) "Composite liner" means a liner comprised of a geomembrane, which is underlain and in direct contact with a soil component.

(27) "Construction and demolition debris" means discarded materials generally considered to be not water soluble and non-hazardous in nature, including but not limited to steel, glass, brick, concrete, asphalt material, pipe, gypsum wallboard, and lumber, from the construction or destruction of a structure as part of a construction or demolition project or from the renovation of a structure, including such debris from construction of structures at a site remote from the construction or demolition project site. The term includes rocks, soils, tree remains, trees, and other vegetative matter which normally results from land clearing or land development operations for a construction project; clean cardboard, paper, plastic, wood, and metal scraps from a construction project; effective January 1, 1997, except as provided in Section 403.707(12)(j), F.S., unpainted, non-treated wood scraps from facilities manufacturing materials used for construction of structures or their components and unpainted, non-treated wood pallets provided the wood scraps and pallets are separated from other solid waste where generated and the generator of such wood scraps or pallets implements reasonable practices of the generating industry to minimize the commingling of wood scraps or pallets with other solid waste; and de minimis amounts of other non-hazardous wastes that are generated at construction or demolition projects, provided such amounts are consistent with best management practices of the construction and demolition industries. Mixing of construction and demolition debris with other types of solid waste will cause it to be classified as other than construction and demolition debris.

(28) "Contaminated soil" has the meaning given it in Rule 62-713.200(3), F.A.C.

(29) "Curing area" means an area where organic material that has undergone the rapid initial stage of composting is further stabilized into a humus-like material.

(30) "Degradable waste" means waste that decomposes through chemical breakdown or microbiological activity. It includes materials such as food and vegetative wastes, but does not include materials like concrete, ash residue from the combustion of solid wastes and metals.

(31) "Department" means the State of Florida Department of Environmental Protection.

(32) "Design period" means the operating life of the solid waste management facility plus any long-term care period after closing.

(33) "Disease vectors" means any rodents, flies, mosquitoes, or other animals, including insects, capable of transmitting disease to humans.

(34) "Disinfection" means, as relates to composting, the selective destruction of pathogens indicated by a reduction in indicator organisms to less than or equal to 100 fecal coliform most probable number per gram of volatile suspended solids where the organic solid waste was maintained at or above 55 degrees Celsius for three consecutive days in a mechanical composter or in an aerated, insulated static pile, or for 15 consecutive days in an aerated windrow with at least one turning or a non-aerated windrow with at least four turnings of the windrow.

(35) "Disposal" means the discharge, deposit, injection, dumping, spilling, leaking, or placing of any solid waste into or upon any land or water so that such solid waste or any constituent thereof may enter other lands or be emitted into the air or discharged into any waters, including ground waters, or otherwise enter the environment.

(36) "Engineer of record" means a professional engineer registered in the State of Florida in accordance with provisions of Chapter 471, F.S., who is appointed by the owner or operator of the solid waste management facility.

(37) "Facility" means all contiguous land and structures, other appurtenances, and improvements on the land used for solid waste management.

(38) "Fill" means man-made deposits of earth or waste materials used to fill excavations, to increase the vertical or horizontal extent of land or solid waste disposal units, or to build embankments.

(39) "Final cover" means the materials used to cover the top and sides of a landfill when fill operations cease.

(40) "Foreign matter" means the inorganic and organic constituents in a solid waste stream that are not readily decomposed and that may be present in the compost. For purposes of Chapter 62-709, F.A.C., foreign matter is metals, glass, plastics, rubber, bones, and leather, but does not include sand, grit, rocks or other similar materials.

(41) "Garbage" means all kitchen and table food waste, and animal or vegetative waste that is attendant with or results from the storage, preparation, cooking, or handling of food materials.

(42) "Gas condensate" means the liquid generated as a result of gas recovery processes at a landfill.

(43) "Gas recovery facility" means a system of wells, trenches, pipes, and other related ancillary structures such as manholes, compressors, and monitoring installations that collect and transport the gas produced in a waste disposal unit to one or more gas processing points or flares. The flow of gas through such a system may be produced by naturally occurring gas pressure gradients or may be aided by an induced draft generated by mechanical means.

(44) "Generation" means the act or process of producing solid waste.

(45) "Geocomposite" means a product composed of two or more materials, at least one of which is a geosynthetic.

(46) "Geomembrane" means a low-permeability synthetic membrane used as an integral part of a system designed to limit the movement of liquid or gas in the system.

(47) “Geogrid” means a geosynthetic formed by a regular network of integrally connected elements with apertures greater than 6.35 mm (1/4 inch) to allow interlocking with surrounding soil, rock, earth and other surrounding materials to function primarily as reinforcement.

(48) "Geonet" means a geosynthetic consisting of integrally connected parallel sets of ribs overlying similar sets at various angles for planar drainage of liquids or gases.

(49) “Geosynthetic” means a planar product manufactured from polymeric material used with soil, rock, earth, or other geotechnical engineering-related material as an integral part of a man-made project, structure or system.

(50) “Geosynthetic clay liner” means a low-permeability manufactured material consisting of a layer of low permeability clay placed between two geotextiles.

(51) "Geotextile" means a permeable textile used as a part of a system designed to act as a filter to prevent the flow of fine particles into drainage systems, to provide planar flow for drainage, to serve as a cushion to protect geomembranes, or to provide structural support.

(52) "GRI" means Geosynthetic Research Institute.

(53) "Ground water" means water beneath the surface of the ground within a zone of saturation, whether or not it is flowing through known and definite channels.

(54) "Hazardous waste" means a solid waste regulated by the Department as a hazardous waste pursuant to Chapter 62-730, F.A.C.

(55) "Household waste" means any solid waste, including garbage, trash, and sanitary waste in septic tanks, derived from households, including single and multiple residences, hotels and motels, bunkhouses, ranger stations, crew quarters, campgrounds, picnic grounds, and day-use recreation areas.

(56) "Indoor" means within a structure which excludes rain and public access and would control air flows in the event of a fire.

(57) "Industrial byproducts" means those materials which have a demonstrated recycling potential, can be feasibly recycled, and have been diverted or removed from the solid waste stream for sale, use, or reuse. The term does not include any materials which are defined as recovered materials. Industrial byproducts are regulated as solid waste unless otherwise exempted under Rule 62-701.220(2)(d), F.A.C.

(58) "Industrial solid waste" means solid waste generated by manufacturing or industrial processes that is not a hazardous waste. Such waste may include, but is not limited to, waste resulting from the following manufacturing processes: electric power generation; fertilizer/agricultural chemicals; food and related products or byproducts; inorganic chemicals; iron and steel manufacturing; leather and leather products; nonferrous metals manufacturing or foundries; organic chemicals; plastics and resins manufacturing; pulp and paper industry; rubber and miscellaneous plastic products; stone, glass, clay, and concrete products; textile manufacturing; transportation equipment; and water treatment. This term does not include mining waste or oil and gas waste.

(59) "Initial cover" means a 6-inch layer of compacted earth used to cover an area of solid waste before placement of additional waste, intermediate cover, or final cover. The term also includes other material or thickness, approved by the Department, that minimizes disease vector breeding, animal attraction, and moisture infiltration, minimizes fire potential, prevents blowing litter, controls odors, and improves landfill appearance.

(60) "Integral to" means, as regards the examination and certification of resource recovery equipment, that the machinery or equipment provides a significant function in the resource recovery or recycling process, such that the resource recovery or recycling process could not proceed without that piece of machinery or equipment.

(61) "Intermediate cover" means a layer of compacted earth at least one foot in depth applied to a solid waste disposal unit. The term also includes other material or thickness, approved by the Department, that minimizes disease vectors, odors, and fire, and is consistent with the leachate control design of the landfill.

(62) "Land clearing debris" means rocks, soils, tree remains, trees, and other vegetative matter which normally results from land clearing or land development operations for a construction project. Land clearing debris does not include vegetative matter from lawn maintenance, commercial or residential landscape maintenance, right-of-way or easement maintenance, farming operations, nursery operations, or any other sources not related directly to a construction project.

(63) "Land reclamation" means the restoration of productivity to lands made barren through processes such as erosion, mining or land clearing.

(64) "Landfill" means a solid waste disposal facility, which is an area of land or an excavation where wastes are or have been placed for disposal, for which a permit, other than a general permit, is required by Section 403.707, F.S. This term shall not include:

(a) a land spreading site;

(b) a surface impoundment;

(c) an injection well defined under and subject to the provisions of Chapter 62-528, F.A.C.; or

(d) a construction and demolition debris disposal site regulated by Rule 62-701.730, F.A.C.

(65) "Lateral expansion" means any horizontal increase in the dimensions of the waste boundary of an existing solid waste disposal unit.

(66) "Leachate" means liquid that has passed through or emerged from solid waste and may contain soluble, suspended or miscible materials.

(67) "Lead-acid battery" means those lead-acid batteries designed for use in motor vehicles, vessels, and aircraft, and includes such batteries when sold as a component part of a motor vehicle, vessel, or aircraft, but not when sold to recycle components.

(68) "Lift" means a completed horizontal series of cells.

(69) "Lined landfill" means a landfill constructed with a liner made of synthetic materials, low-permeability soils, or a combination of these materials, which has been permitted by the Department, and which met the Department's landfill design criteria specified in this chapter or previous versions of this chapter at the time of permitting.

(70) "Liner" means a continuous layer of low-permeability natural or synthetic materials, under the bottom and sides of a landfill, solid waste disposal unit, or leachate surface impoundment, which controls the downward or lateral escape of waste constituents, or leachate.

(71) "Liner system" means a system of leachate collection and liner layers comprised of natural or synthetic materials installed between the subgrade and the waste for the purpose of containing the waste and collecting and removing leachate.

(72) "Liquid waste" means any waste material that is determined to contain free liquids as defined by Method 9095 (Paint Filter Liquids Test), as described in "Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods" (EPA Pub. No. SW-846).

(73) "Local government" means any municipality, county, district, or authority, or any agency thereof, or a combination of two or more of the foregoing when acting jointly in connection with a project, which has jurisdiction over the collection, recycling, disposal or treatment of solid waste.

(74) "Lower explosive limit" means the lowest percent by volume of a mixture of explosive gases which will propagate a flame in air at a temperature of 25 degrees Celsius and atmospheric pressure.

(75) "Manure" means a solid waste composed of excreta of animals, and residual materials that have been used for bedding, sanitary or feeding purposes for such animals. For purposes of Chapter 62-709, F.A.C., manure does not mean such material generated and managed by normal farming operations.

(76) "Materials recovery" means any process by which one or more of the various components in solid waste is separated and concentrated for reuse.

(77) "Materials recovery facility" means a solid waste management facility that provides for the extraction from solid waste of recyclable materials, materials suitable for use as a fuel or soil amendment, or any combination of such materials.

(78) "Mesophilic stage" means a biological stage in the composting process characterized by active bacteria which favor a moderate temperature range of 20 - 45 degrees Celsius. It occurs later in a composting process after the thermophilic stage and is associated with a moderate rate of decomposition.

(79) "Method detection limit" means the smallest concentration of an analyte of interest that can be measured and reported with 99 percent confidence that the concentration is greater than zero. The method detection limit shall be determined pursuant to procedures outlined in Chapter 62-160, F.A.C., which is hereby incorporated by reference.

(80) "Monitoring wells" means strategically located wells from which water samples are drawn for water quality analysis.

(81) "Monofill" means a waste pile, landfill or solid waste disposal unit into which only one type of solid waste is placed.

(82) "Motor vehicle" means an automobile, motorcycle, truck, trailer, semitrailer, truck tractor and semitrailer combination, or any other vehicle operated in this state, used to transport persons or property, and propelled by power other than muscular power, but the term does not include traction engines, road rollers, such vehicles as run only upon a track, bicycles, moped, or farm tractors and trailers.

(83) "Normal farming operations" means the customary and generally accepted activities, practices, and procedures that farmers adopt, use, or engage in during the production and preparation for market of poultry, livestock, and associated farm products; and in the production, harvesting, or packaging of agricultural crops which include agronomic, horticultural, and silvicultural crops. Included are the management, collection, storage, composting, transportation, and utilization of organic agricultural waste, manure, and materials solely derived from agricultural crops.

(84) "Objectionable odors" has the meaning given that term in Rule 62-210.200, F.A.C.

(85) "Oily wastes" means those materials which are mixed with used oil and have become separated from that used oil. Oily wastes also means materials, including wastewaters, centrifuge solids, filter residues or sludges, bottom sediments, tank bottoms, and sorbents which have come into contact with, and have been contaminated by, used oil.

(86) "100-year floodplain" means the lowland and relatively flat areas adjoining inland and coastal waters, including flood-prone areas of offshore islands, that are inundated by the 100-year flood.

(87) "On-site" means on the same or geographically contiguous property, which may be divided by a public or private right-of-way. It does not include two or more parcels of land more than a mile apart which are connected only by a public or private right-of-way.

(88) "Open burning" means the burning of any material under such conditions that the products of combustion are emitted directly into the atmosphere.

(89) "Operator" means any person, including the owner, who is principally engaged in, and is in charge of, the actual operation, supervision, and maintenance of a solid waste management facility.

(90) "Person" means any and all persons, natural or artificial, including any individual, firm, or association; any municipal or private corporation organized or existing under the laws of Florida or any other state; any county of this state; and any governmental agency of this state or the Federal Government.

(91) "PGI" means PVC Geomembrane Institute.

(92) "Population" means the most recent population census determination under Section 186.901, F.S.

(93) "Potable water well" means any excavation that is drilled or bored, or converted from non-potable water use, when the intended use of such excavation is for the location and acquisition of ground water which supplies water for human consumption.

(94) "Processed tire" means a tire that has been treated mechanically, chemically, or thermally so that the resulting material is a marketable product or is suitable for proper disposal.

(95) "Processing" means any technique designed to change the physical, chemical, or biological character or composition of any solid waste so as to render it safe for transport; amenable to recovery, storage or recycling; safe for disposal; or reduced in volume or concentration. As regards used oil, the term means chemical or physical operations designed to produce from used oil, or to make used oil more amenable for production of, fuel oils, lubricants, or other used oil-derived products. Processing includes blending used oil with virgin petroleum products, blending used oils to meet the fuel specifications, filtration, simple distillation, chemical or physical separation and re-refining.

(96) "Professional engineer" means an engineer registered in the State of Florida in accordance with Chapter 471, F.S.

(97) "Professional geologist" means a geologist registered in the State of Florida in accordance with Chapter 492, F.S.

(98) "Public used oil collection center" means:

(a) An automotive service facility or government-sponsored collection facility which accepts for disposal small quantities of used oil from households; or

(b) A facility which stores used oil in aboveground tanks, and which accepts small quantities of used oil from households.

(99) "Putrescible waste" means solid waste which contains organic matter capable of being decomposed by microorganisms and of such a character and proportion as to be capable of attracting or providing food for birds. The term does not include uncontaminated yard trash or clean wood.

(100) "PVC" means polyvinyl chloride.

(101) "Quantity of tires" means either weight, volume, or actual number of tires. For purposes of Chapter 62-711, F.A.C., assume that, for passenger tires, there are 100 tires per ton and 10 tires per cubic yard and that, for truck tires, there are 20 tires per ton.

(102) "Recovered materials" means metal, paper, glass, plastic, textile, or rubber materials that have known recycling potential, can be feasibly recycled, and have been diverted and source separated or have been removed from the solid waste stream for sale, use, or reuse as raw materials, whether or not the materials require subsequent processing or separation from each other, but does not include materials destined for any use that constitutes disposal. Recovered materials as described above are not solid waste.

(103) “Recovered materials processing facility” means a facility engaged solely in the storage, processing, resale, or reuse of recovered materials. Such a facility is not a solid waste management facility if it meets the conditions of Rule 62-701.220(2)(c), F.A.C.

(104) "Recyclable material" means those materials which are capable of being recycled and which would otherwise be processed or disposed of as solid waste.

(105) "Recycling" means any process by which solid waste, or materials which would otherwise become solid waste, are collected, separated, or processed and reused or returned to use in the form of raw materials or products.

(106) "Recycling equipment" means machinery or equipment exclusively and integrally used in the actual process by which solid waste or materials which would otherwise become solid waste are separated or processed and reused or returned to use in the form of raw materials or products.

(107) "Resource recovery" means the process of recovering materials or energy from solid waste, excluding those materials or solid waste under control of the Nuclear Regulatory Commission.

(108) "Resource recovery equipment" means equipment or machinery exclusively and integrally used in the actual process of recovering material or energy resources from solid waste. This definition specifically includes recycling equipment.

(109) "Sanitary nuisance" means a condition created by any person, or the keeping, maintaining, propagation, existence, or permitting of anything by a person by which the health or lives of individuals may be threatened or impaired, or by which disease may be caused or transmitted.

(110) "Shredding" means a process of reducing the particle size of solid waste through the use of grinding, shredding, milling, or rasping machines.

(111) "Site" means the area of land or water within the property boundaries of a solid waste management facility where one or more solid waste processing, resource recovery, recycling, storage, or disposal areas are located.

(112) "Sludge" means a solid waste pollution control residual which is generated by any industrial or domestic wastewater treatment plant, water supply treatment plant, air pollution control facility, septic tank, grease trap, portable toilet or related operation, or any other such waste having similar characteristics. Sludge may be a solid, liquid, or semisolid waste but does not include the treated effluent from a wastewater treatment plant.

(113) "Solid waste" means: sludge unregulated under the federal Clean Water Act or Clean Air Act; sludge from a waste treatment works, water supply treatment plant, or air pollution control facility; or garbage, rubbish, refuse, special waste, or other discarded material, including solid, liquid, semisolid, or contained gaseous material resulting from domestic, industrial, commercial, mining, agricultural, or governmental operations. Materials not regulated as solid waste pursuant to this Chapter are: recovered materials; nuclear source or byproduct materials regulated under Chapter 404, F.S., or under the Federal Atomic Energy Act of 1954 as amended; suspended or dissolved materials in domestic sewage effluent or irrigation return flows, or other regulated point source discharges; regulated air emissions; and fluids or wastes associated with natural gas or crude oil exploration or production.

(114) "Solid waste combustor" means an enclosed device that uses controlled combustion, the primary purpose of which is to thermally break down solid, liquid, or gaseous combustible solid wastes to an ash residue that contains little or no combustible material.

(115) "Solid waste disposal facility" means any solid waste management facility which is the final resting place for solid waste, including landfills and incineration facilities that produce ash from the process of incinerating municipal solid waste.

(116) "Solid waste disposal unit" means a discrete area of land used for the disposal of solid waste.

(117) "Solid waste management" means the process by which solid waste is collected, transported, stored, separated, processed, or disposed of in any other way, according to an orderly, purposeful, and planned program which includes closure and long-term maintenance.

(118) "Solid waste management facility" means any solid waste disposal area, volume reduction plant, transfer station, materials recovery facility, or other facility, the purpose of which is resource recovery or the disposal, recycling, processing, or storage of solid waste. The term does not include recovered materials processing facilities which meet the requirements of

Rule 62-701.220(2)(c), F.A.C., except the portion of such facilities, if any, that is used for the management of solid waste.

(119) "Special wastes" means solid wastes that can require special handling and management, including but not limited to, white goods, waste tires, used oil, lead-acid batteries, construction and demolition debris, ash residue, yard trash, biological wastes, and mercury-containing devices and lamps.

(120) "Stabilized" means that biological and chemical decomposition of the wastes has ceased or diminished to a level so that such decomposition no longer poses a pollution, health, or safety hazard. As regards composting, the term means that the compost has at least passed through the thermophilic stage, and that biological decomposition of the solid waste has occurred to a sufficient degree that will allow beneficial use.

(121) "Subgrade" means soils native to or imported to a site, or other materials authorized by a Department permit or this chapter, which may be graded and compacted before a landfill liner system is constructed over them.

(122) "Thermophilic stage" means a biological stage in the composting process characterized by active bacteria which favor a high temperature range of 45 – 75 degrees Celsius. It occurs early in a composting process before the mesophilic stage and is associated with a high rate of decomposition.

(123) "Tire" means a continuous solid or pneumatic rubber covering encircling the wheel of a motor vehicle.

(124) "Tire disposal" means to deposit, dump, spill or place any waste tire or residuals into or upon any structure, land or water. Tire disposal also includes the burning of any waste tire or residuals in a waste-to-energy facility, incinerator, or other facility used solely for the disposal of solid waste.

(125) "Tire recycling" means any process by which waste tires or residuals are reused or returned to use in the form of products or raw materials.

(126) "Ton" means a short ton, 2000 pounds (.9078 metric tons).

(127) "Transfer station" means a facility the primary purpose of which is to store or hold solid waste for transport to a processing or disposal facility.

(128) "Unlined landfill" means a landfill which does not have a bottom liner system which was approved by the Department as part of a construction permit, or which has a bottom liner system which does not or did not meet the Department's landfill design criteria specified in this chapter or in previous versions of this chapter at the time of construction. This term includes landfills underlain by only in-situ soils unless these soils have been tested and approved by the Department as part of a construction permit.

(129) "Used oil" means any oil which has been refined from crude oil or synthetic oil and, as a result of use, storage, or handling, has become contaminated and unsuitable for its original purpose due to the presence of physical or chemical impurities or loss of original properties.

(130) "Used tire" means a whole waste tire which has a minimum tread depth of 3/32 inch or greater and is suitable for use on a motor vehicle.

(131) "Uppermost aquifer" means the geologic formation nearest the natural ground surface that is an aquifer, as well as lower aquifers that are hydraulically interconnected with this aquifer within a facility's property boundary.

(132) "Vector" means, as regards compost, a carrier organism that is capable of transmitting a pathogen from one organism to another.

(133) "Volume reduction plant" means an incinerator, pulverizer, compactor, shredding and baling plant, composting plant, or other plant which accepts and processes solid waste for recycling or disposal.

(134) "Waste tire" means a tire that has been removed from a motor vehicle and has not been retreaded or regrooved. "Waste tire" includes used tires and processed tires.

(135) "Waste tire collection center" means a site where waste tires are collected from the public before being offered for recycling or disposal and where fewer than 1,500 tires are kept on site on any given day.

(136) "Waste tire collector" means a person who transports more than 25 waste tires over public highways at any one time.

(137) "Waste tire processing facility" means a site where equipment is used to recapture reusable byproducts from waste tires or to cut, burn, or otherwise alter waste tires so that they are no longer whole. The term includes mobile waste tire processing equipment.

(138) "Waste tire residuals" means any liquids, sludges, metals, fabric or byproducts resulting from the processing or storage of tires. Residuals do not include processed tires held for recycling or disposal, provided the conditions of Rule 62-711.530, F.A.C., are met.

(139) "Waste tire site" means a site at which 1,500 or more waste tires are accumulated. For purposes of this term a site means a piece of property owned, rented, or otherwise controlled by a person, including all contiguous or adjacent properties owned, rented, or otherwise controlled by that person.

(140) "Water quality standards and criteria" means, unless otherwise specified, those standards and criteria set forth in Chapters 62-302 and 62-520, F.A.C.

(141) "White goods" means inoperative and discarded refrigerators, ranges, washers, water heaters, freezers, and other similar domestic and commercial large appliances.

(142) "Working face" means that portion of a landfill where waste is deposited, spread, and compacted before placement of initial cover.

(143) "Yard trash" means vegetative matter resulting from landscaping maintenance or land clearing operations and includes materials such as tree and shrub trimmings, grass clippings, palm fronds, trees and tree stumps.

(144) "Zone of discharge" has the meaning given it in Rule 62-520.200, F.A.C.

All other definitions found in Chapter 403, F.S., and Chapters 62-702 through 62-722, F.A.C., to the extent that they are consistent with the definitions of this chapter, are applicable to the terms used in this chapter.

Specific Authority 403.704, FS.
Law Implemented 403.702 - 403.717 and 403.75-403.769, FS.
History -- Formerly 10D-12.02, 10-1-74, Revised 7-20-76; Amended 5-24-79, 6-13-84, 4-25-85, 7-1-85, 12-10-85, Formerly 17-7.02, 17-7.020, Amended 8-2-89, 6-25-90, Formerly 17-701.020; Amended 1-6-93, 1-2-94, 5-19-94, Formerly 17-701.200, Amended 12-23-96, 5-27-01.

62-701.210 Documents Incorporated by Reference. Specific references to the documents listed below are made throughout this chapter. These documents are adopted as standards and are incorporated into this chapter by reference. The reference documents are available for inspection at the Department's district offices.

(1) EPA document EPA/600/R-93/182, Quality Assurance and Quality Control for Waste Containment Facilities, September, 1993.

(2) 40 CFR Parts 61.149, 61.150, 61.151, 61.154, Subpart M-National Emission Standard for Asbestos, July 1, 1992.

(3) ASTM Method E96-00, Procedure BW, "Standard Test Methods for Water Vapor Transmission of Materials," April 10, 2000.

(4) 40 CFR Part 136, Appendix B, Definition and Procedure for the Determination of the Method Detection Limit, revision 1.1; October 26, 1984.

(5) Method 9095, Paint Filter Test, found in EPA document EPA SW-846, Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods; Third Edition, September, 1986, as revised, December, 1987.

(6) 40 CFR Part 258, Appendix II; October, 1991.

(7) 40 CFR 258.13, Fault Areas; October, 1991.

(8) 40 CFR 258.14, Seismic Impact Zones; October, 1991.

(9) 40 CFR 258.15, Unstable Areas; October, 1991.

(10) 40 CFR 258, Appendices I and II; October, 1991.

(11) 40 CFR 264 subpart H, except for those sections specified in Rule 62-701.630(6)(b)1., F.A.C.; July 1, 2000.

(12) 40 CFR 261.24 Table 1-Maximum Concentration of Contaminants for the Toxicity Characteristic; July, 1992.

(13) GRI Test Method GM13 revision 2 dated April 29, 1999.

(14) PGI 1197 Specification for PVC Geomembrane, effective January 1, 1997.

(15) ASTM Method D5321 "Standard Test Method for Determining the Coefficient of Soil and Geosynthetic or Geosynthetic and Geosynthetic Friction by the Direct Shear Method," October 15, 1992.

(16) ASTM Method D4716 "Test Method for Determining the (In-plane) Flow Rate per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head," June 10, 1999.

(17) ASTM Method D5887 "Standard Test Method for Measurement of Index Flux Through Saturated Geosynthetic Clay Liner Specimens Using a Flexible Wall Permeameter," December 10, 1995.

(18) ASTM Method D6243-98 "Standard Test Method for Determining the Internal and Interface Shear Resistance of Geosynthetic Clay Liner by the Direct Shear Method," March 10, 1998.

Specific Authority 403.061, 403.704, FS.
Law Implemented 403.061, 403.702 - 403.717, FS.
History -- New 1-6-93, Amended 1-2-94, Formerly 17-701.210, Amended 5-27-01.

62-701.220. General Applicability.

(1) This chapter has been substantially amended several times since it was first promulgated. Except as otherwise specifically provided herein, facilities remain subject to the provisions which were in effect at the time the site was permitted or received a site certification, or at the time a complete application was submitted and deemed complete by the Department.

(2) This chapter applies to all solid waste and each solid waste management facility in this state, with the following exceptions:

(a) Surface impoundments not addressed in Rule 62- 701.400(6), F.A.C.;

(b) Injection wells defined under and subject to the provisions of Chapter 62-528, F.A.C.;

(c) Recovered materials or recovered materials processing facilities, if:

1. A majority of the recovered materials at a facility are demonstrated to be sold, used, or reused within one year;

2. The recovered materials or the products or byproducts of operations that process recovered materials are not discharged, deposited, injected, dumped, spilled, leaked, or placed into or upon any land or water so that such products or byproducts or any constituent thereof may enter other lands or be emitted into the air or discharged into any waters, including ground water, or otherwise enter the environment such that a threat of contamination in excess of applicable water quality standards and criteria or air quality standards is caused;

3. The recovered materials are not hazardous wastes; and

4. The facility is registered as required in Section 403.7046, F.S., and Chapter 62-722, F.A.C.;

(d) Industrial byproducts, if

1. A majority of the industrial byproducts are demonstrated to be sold, used, or reused within one year;

2. The industrial byproducts are not discharged, deposited, injected, dumped, spilled, leaked, or placed into or upon any land or water so that such industrial byproducts or any constituent thereof may enter other lands or be emitted into the air or discharged into any waters, including ground water, or otherwise enter the environment such that a threat of contamination in excess of water quality standards and criteria or air quality standards is caused; and

3. The industrial byproducts are not hazardous wastes;

(e) Phosphogypsum stack systems;

(f) Clean debris which has been segregated from other waste and which is used or stored for use as fill or raw material; and

(g) The collection and processing of soil, rocks, vegetative debris, asphalt, and similar materials normally associated with and actually from construction and routine maintenance of roads, as defined in Section 334.03(24), F.S., when such materials are beneficially used or reused by the generator as part of a road construction or maintenance project.

(3) There are several requirements throughout this chapter that requests or demonstrations must be approved by the Department. Unless otherwise specifically stated, this means that the requests or demonstrations must be submitted to the appropriate Department District Office as part of a permit application or request for permit modification. The Department will evaluate such requests or demonstrations in accordance with the applicable criteria set forth in this chapter, and will approve or modify permit conditions if those criteria are met.

(4) In accordance with former Rule 62-701.720, F.A.C., several persons or organizations requested approval of alternate requirements for certain industrial operations. Written determinations made by the Department prior to December 23, 1996, in response to such requests remain in effect even though Rule 62-701.720, F.A.C., has been repealed, until and unless the Department takes action to modify such determinations through rulemaking.

(5) Local zoning. The Department does not evaluate compliance with local zoning or land use ordinances when determining whether to issue or deny any permit under this chapter. Issuance of a permit does not relieve an applicant from compliance with local zoning or land use ordinances, or with any other laws, rules, or ordinances.

(6) There are several references in this chapter to facilities which are constructed or existing. Unless otherwise specified, these terms mean that the facility has received a permit or

is exempt from permitting, and has actually been built or is being built in accordance with that permit or exemption. The terms do not include parts of a facility which, although noted in a long-term design plan, were not authorized to be constructed within the five-year term of the facility's permit(s). A landfill with a slurry wall liner system is deemed to have been constructed when the slurry wall was constructed.

(7) There are several requirements in this chapter that stormwater be controlled in accordance with Part IV of Chapter 373 and the rules promulgated thereunder. Unless otherwise specifically provided, the referenced rules are Chapter 62-25, F.A.C., for facilities within the Northwest Florida Water Management District, and Chapter 62-330, F.A.C., for all other facilities.

Specific Authority 403.061, 403.704, FS.
Law Implemented 403.061, 403.702 - 403.717, FS.
History -- New 1-6-93, Amended 1-2-94, 5-19-94, Formerly 17-701.220, Amended 5-27-01.

62-701.300 Prohibitions.

(1) General prohibition.

(a) No person shall store, process, or dispose of solid waste except at a permitted solid waste management facility or a facility exempt from permitting under this chapter.

(b) No person shall store, process, or dispose of solid waste in a manner or location that causes air quality standards to be violated or water quality standards or criteria of receiving waters to be violated.

(2) Siting. Unless authorized by a Department permit or site certification in effect on May 27, 2001, or unless specifically authorized by another Department rule or a Department permit or site certification based upon site-specific geological, design, or operational features, no solid waste shall be stored or disposed of by being placed:

(a) In an area where geological formations or other subsurface features will not provide support for the solid waste;

(b) Within 500 feet of an existing or approved potable water well unless storage or disposal takes place at a facility for which a complete permit application was filed or which was originally permitted before the potable water well was in existence. This prohibition shall not apply to any renewal of an existing permit that does not involve lateral expansion, nor to any vertical expansion at a permitted facility;

(c) In a dewatered pit unless the pit is lined and permanent leachate containment and special design techniques are used to ensure the integrity of the liner;

(d) In an area subject to frequent and periodic flooding unless flood protection measures are in place;

(e) In any natural or artificial body of water including ground water;

(f) Within 200 feet of any natural or artificial body of water unless storage or disposal takes place at a facility for which a complete permit application was filed or which was originally permitted before the water body was in existence. For purposes of this paragraph, a "body of water" includes wetlands within the jurisdiction of the Department, but does not include impoundments or conveyances which are part of an on-site, permitted stormwater management system, or bodies of water contained completely within the property boundaries of the disposal site which do not discharge from the site to surface waters. A person may store or dispose of solid waste within the 200 foot setback area upon demonstration to the Department that permanent leachate control methods will result in compliance with water quality standards and criteria. However, nothing contained herein shall prohibit the Department from imposing conditions necessary to assure that solid waste stored or disposed of within the 200 foot setback area will not cause pollution from the site in contravention of Department rules.

(g) On the right of way of any public highway, road, or alley; and

(h) Within 1000 feet of an existing or approved potable water well serving a community water supply as defined in Rule 62-550.200(12), F.A.C., unless storage or disposal takes place at a facility for which a complete permit application was filed or which was originally permitted before the water well was in existence. It is the intent of the Department that this provision shall be repealed on the effective date of any rule promulgated by the Department which regulates wellhead protection areas generally. This prohibition shall not apply to any renewal of an existing permit that does not involve lateral expansion, nor to any vertical expansion at a permitted facility.

(3) Burning. Open burning of solid waste is prohibited except in accordance with Chapter 62-256. Controlled burning of solid waste is prohibited except in a permitted incinerator, or in a facility in which the burning of solid waste is authorized by a site certification order issued under Chapter 403, Part II, F.S.

(4) Hazardous waste. No hazardous waste shall be disposed of in a solid waste management facility unless such facility is permitted pursuant to Chapter 62-730, F.A.C.

(5) PCBs. Disposal of liquids containing a polychlorinated biphenyl (PCB), or non-liquid PCBs in the form of contaminated soil, rags, or other debris, may be restricted or prohibited by 40 CFR Part 761. Persons managing PCBs are advised to consult that federal regulation before attempting to dispose of PCBs in any solid waste disposal unit in this state.

(6) Biomedical waste.

(a) No biomedical waste shall be knowingly deposited in any solid waste management facility unless:

1. The solid waste facility is specifically permitted to receive untreated biomedical waste;

2. The biomedical waste has been properly incinerated so that little or no organic material remains in the ash residue, or treated by a process approved by the Department of Health, and the provisions in Rule 62-701.520(5)(c), F.A.C., are complied with; or

3. The biomedical waste is generated by an individual as a result of self-care, or care by a family member or other non health care provider. However, in order to reduce the chance of exposure to the public, home generators are advised to segregate and package such waste before disposal according to the guidelines for disposal of home-generated biomedical waste available from each county health department.

(b) No solid waste, including treated biomedical waste, shall be commingled with untreated biomedical waste unless the solid waste is being managed in the same manner as the untreated biomedical waste.

(c) Treated or untreated biomedical waste shall not be allowed to leak into the environment during transport.

(7) Class I surface waters. The Department shall not issue a construction permit for a landfill within 3,000 feet of Class I surface waters.

(8) Special wastes for landfills. No person who knows or who should know of the nature of such solid waste shall dispose of the following wastes in any landfill:

(a) Lead-acid batteries;

(b) Used oil, except as provided in Chapter 62-710, F.A.C.;

(c) Yard trash, except in unlined landfills classified by Department rule;
(d) White goods; and
(e) Whole waste tires, except as provided in Chapter 62-711, F.A.C.

(9) Special wastes for waste-to-energy facilities. No person who knows or who should know of the nature of such solid waste shall dispose of lead-acid batteries, mercury-containing devices, or spent mercury-containing lamps in any waste-to-energy facility.

(10) Liquids restrictions.

(a) Noncontainerized liquid waste shall not be placed in solid waste disposal units which accept household waste or construction and demolition debris for disposal unless:

1. The waste is household waste other than septic waste; or

2. The waste is leachate or gas condensate derived from the solid waste disposal unit, or byproducts of the treatment of such leachate or gas condensate, and the solid waste disposal unit is lined and has a leachate collection system.

(b) Containers holding liquid waste shall not be placed in a solid waste disposal unit unless:

1. The container is a small container similar in size to that normally found in household waste;

2. The container is designed to hold liquids for use other than storage; or

3. The waste is household waste.

(c) Containers or tanks twenty gallons or larger in capacity shall either have one end removed or cut open, or have a series of punctures around the bottom to ensure the container is empty and free of residue. The empty container or tank shall be compacted to its smallest practical volume for disposal.

(11)(a) Except as provided in paragraph (b) of this subsection, no person may mix or commingle used oil with solid waste that is to be disposed of in landfills or directly dispose of used oil in landfills.

(b) Oily wastes, sorbents or other materials used for maintenance or to clean up or contain leaks, spills or accidental releases of used oil, and soils contaminated with used oil as a result of spills or accidental releases are not subject to the prohibition in paragraph (a) of this subsection.

(12) Yard trash. The prohibitions in paragraphs (2)(b), (f), and (h) of this section apply to the storage, processing, or disposal of yard trash, except that the following setback distances shall apply:

(a) 100 feet from off-site potable water wells, no setback required from on-site water wells;

(b) 50 feet from water bodies; and

(c) 200 feet from wells serving community water supplies.

(13) Tanks. The prohibitions in subsection (2) of this section do not apply to the storage or treatment of solid waste in tanks which meet the criteria of Chapter 62-761 or Rule 62-701.400(6), F.A.C. Instead, no such storage tank shall be installed within 500 feet of any existing community water supply system or any existing non-transient non-community water supply system, nor shall any tank be installed within 100 feet of any other existing potable water supply well.

(14) Indoor storage. The prohibitions in subsection (2) of this section do not apply to the storage or processing of solid waste indoors, provided that the indoor storage area has an impervious surface and a leachate collection system. For the purposes of this subsection, an

impervious surface means either a poured concrete pad having a minimum thickness of four inches, or an asphalt concrete paving with both a minimum thickness of one and one-half inches and with an additional component to restrict leaching to ground water such as a soil cement sub-base, an epoxy seal or a geomembrane.

(15) Storage in vehicles. The prohibitions in subsection (2) of this section do not apply to the storage of solid waste in an enclosed or covered vehicle, provided that such vehicle has either been unloaded or moved over public highways within the previous seven days.

(16) Existing facilities. Those portions of facilities which were constructed prior to May 27, 2001 remain subject to the prohibitions that were in effect at the time the permit authorizing construction was issued. Lateral expansions of such facilities remain subject to the prohibitions that were in effect at the time the permit authorizing the lateral expansion was issued. For example, portions of facilities constructed prior to May 19, 1994 were subject to the prohibition against storing or disposing of solid waste within 500 feet of an existing or approved shallow water supply well, but are not subject to the prohibitions of paragraphs (2)(b) and (h) of this section. However, lateral expansions of such facilities which occurred after May 19, 1994 are subject to the prohibitions of paragraphs (2)(b) and (h) of this section.

Specific Authority 403.704, FS.
Law Implemented 403.704, 403.707, 403.708, FS.
History -- Formerly 10D-12.06, 10D-12.07, 10-1-74, Amended 5-24-79, 5-27-82, 12-10-85, Formerly 17-7.04, 17-7.040, Amended 6-25-90, Formerly 17-701.040, Amended 1-6-93, 1-2-94, 5-19-94, Formerly 17-701.300, Amended 12-23-96, 5-27-01.

62-701.310 Approval of Alternate Procedures and Requirements.

(1) Applicability. Any person subject to the provisions of this chapter or Chapters 62-702 through 62-722, F.A.C., may request in writing a determination by the Secretary that a requirement shall not apply, and shall request approval of alternate procedures or requirements.

(2) Criteria. The request shall set forth at a minimum the following information:

(a) The specific facility for which an exception is sought;

(b) The specific provisions from which an exception is sought;

(c) The basis for the exception;

(d) The alternate procedure or requirement for which approval is sought and a demonstration that the alternate procedure or requirement provides an equal degree of protection for the public and the environment; and

(e) A demonstration of the effectiveness of the proposed alternate procedure.

(3) Department order. The Secretary shall specify by order each alternate procedure or requirement approved in accordance with this section or shall issue an order denying the request for such approval. The Department's order shall be agency action, reviewable in accordance with Sections 120.569 and 120.57, F.S.

(4) Alternate sampling procedures. Approval of alternative or new field and laboratory sampling and analysis procedures shall be requested in accordance with Rules 62-160.430, 62-160.520 and 62-160.530, F.A.C.

(5) Variances. Requests for variances from specific statutory or rule requirements may be made pursuant to Section 403.201, F.S., and Rule 62-110.104, F.A.C. Requests for variances or waivers from rule requirements may also be made pursuant to Section 120.542, F.S., and Rule 28-104.002, F.A.C.

(6) Requests for alternate procedures shall be accompanied by the fee specified in Rule 62-701.315(8), F.A.C. Requests must be submitted to the Director of the Division of Waste Management, 2600 Blair Stone Road, Twin Tower Office Building, Tallahassee, Florida 32399-2400.

(7) To the extent that any request for alternate procedures or requirements involves the practice of engineering or geology, the request shall be signed and sealed by a professional engineer or a professional geologist.

Specific Authority 403.704, FS.
Law Implemented 403.0877, 403.704, 403.707, FS.
History --New 7-1-85, Amended 12-10-85, Formerly 17-7.078, Formerly 17-701.078, Amended 1-6-93, 5-19-94, Formerly 17-701.310, Amended 5-27-01.

62-701.315 Permit Fees for Solid Waste Management Facilities. Notwithstanding the provisions of Rule 62-4.050(4)(w), F.A.C., the following fees shall apply to permit applications for solid waste management facilities. The provisions of Rule 62-4.050(o) through (v), F.A.C., continue to apply to such permits or applications. Fees for permit modifications are established in Rule 62-701.320(4), F.A.C.

(1) Construction permits.	
(a) Class I landfill	$10,000
(b) Class II landfill	$10,000
(c) Class III landfill	$ 6,000
(d) Waste-to-energy facility not covered by the Florida Electrical Power Plant Siting Act	$10,000
(e) Other resource recovery facilities	$ 2,000
(f) Incinerator	$ 3,000
(g) Manure or yard trash composting facility	$ 2,000
(h) Solid waste composting facility	$ 5,000
(i) Waste tire processing facility	$ 1,250
(j) All other solid waste facilities	$ 1,000
(k) Offsite biomedical waste treatment facility other than a biomedical waste incinerator	$ 2,000
(2) Operation permits.	
(a) Class I landfill	$10,000
(b) Class II landfill	$10,000
(c) Class III landfill	$ 4,000
(d) Waste-to-energy facility not covered by the Florida Electrical Power Plant Siting Act	$10,000
(e) Other resource recovery facilities	$ 1,000
(f) Incinerator	$ 1,000
(g) Manure and yard trash composting facility	$ 1,000
(h) Solid waste composting facility	$ 3,000
(i) Off-site biomedical waste treatment facility other than a biomedical waste incinerator	$ 1,000
(j) All other solid waste facilities	$ 500
(3) Closure permits.	

(a) Class I landfill $ 7,500
(b) Class II landfill $ 7,500
(c) Class III landfill $ 4,000
(d) All other solid waste facilities $ 1,000
(e) Closure permit for landfill which involves only long-term care (10-year duration) $ 2,000
(4) Waste processing facility.
(a) Construction/operation permit $ 2,000
(b) Renewal permit which does not involve additional construction $ 1,000
(5) Construction and demolition debris disposal facilities.
(a) Construct, operate, and close a facility, including facilities that also recycle $ 2,500
(b) Renewal permit which does not involve additional construction $ 1,000
(c) Renewal permit involving only long-term care $ 250
(6) General permit for land clearing debris disposal facility. $ 100
(7) Construction permit and/or an operation permit for a facility which has multiple solid waste management components that normally would require individual solid waste permits. A single application may be submitted and the permit fee will be the sum of all individual permits; however, the total permit fees for the facility shall not exceed $25,000, exclusive of modifications and renewals.
(8) Request for an Alternate Procedure.
(a) Landfill $ 2,000
(b) Other $ 500
(9) Research, Development and Demonstration permits (one-year duration). $ 1,000
(10) Ground Water Monitoring Plan Approvals for landfills with no other Department permit. $ 500
(11) Transfer of permit. $ 50

Specific Authority 403.061, 403.087, 403.704, FS.
Law Implemented 403.0877, 403.702, 403.704, 403.707, 403.7221, FS.
History – New 5-27-01.

62-701.320 Solid Waste Management Facility Permit Requirements, General.

(1) Permit requirements. Except as otherwise provided in this chapter, no solid waste management facility shall be constructed, operated, maintained, modified, or closed without a permit issued by the Department, or by an approved local program acting under a delegation agreement with the Department.

(2) Exemptions. Except as provided in Section 403.707(2), F.S., no permit under this chapter shall be required for the following activities or facilities. For purposes of this subsection, disposal shall be deemed to include storage prior to disposal or processing.

(a) Disposal by persons of solid waste resulting from their own activities on their own property, provided such waste is either household waste from their residential property or is rocks, soils, trees, tree remains, and other vegetative matter which normally results from land development operations on that property. Disposal of materials which could create a public nuisance or adversely affect the environment or public health, such as white goods, automotive materials including batteries and tires, petroleum products, pesticides, solvents, or hazardous substances, is not covered under this exemption.

(b) Disposal by persons of solid waste resulting from their own activities on their property, provided that the environmental effects of such disposal on ground water and surface waters are:

1. Addressed or authorized by a site certification issued under Chapter 403, Part II, F.S., Electrical Power Plant Siting;

2. Addressed or authorized by a permit issued by the Department, including solid waste management permits or other environmental permits modified to include conditions for proper disposal; or

3. Addressed or authorized by, or specifically exempted from the requirement to obtain, a ground water monitoring plan approved by the Department.

(c) On-site disposal of construction and demolition debris, provided that disposal conforms to Rule 62-701.730(17), F.A.C.

(d) Disposal of solid waste resulting from normal farming operations.

(e) Storage of solid waste in containers on property which is owned, rented, or leased by the persons who generated the waste from their own activities which occurred on their property, if the solid waste in such containers is collected at least once a week.

(f) Disposal by persons of solid waste resulting from their own activities on their own property, if that waste disposal occurred before October 1, 1988.

(3) Irresponsible applicant.

In addition to the provisions of Rule 62-4.070(5), F.A.C., when determining whether the applicant has provided reasonable assurances that Department standards will be met, the Department shall consider repeated violations of applicable statutes, rules, orders, or permit conditions caused by a permit applicant after October, 1988, relating to the operation of any solid waste management facility in this state if the applicant is deemed to be irresponsible. For purposes of this subsection, the following words have the following meanings:

(a) "Applicant" means the owner or operator of the solid waste management facility in this state, and includes a business entity, a parent of a subsidiary corporation, a partner, a corporate officer or director, or a stockholder holding more than 50 percent of the corporate stock.

(b) "Irresponsible" means that an applicant owned or operated a solid waste management facility in this state, including transportation equipment or mobile processing equipment used by or on behalf of the applicant, which was subject to a state or federal notice of violation, judicial action, or criminal prosecution for activities that constitute violations of Chapter 403, F.S., or the rules promulgated thereunder, and could have prevented the violation through reasonable compliance with Department rules.

(4) Modification of permit.

(a) Permits shall be modified in accordance with the requirements of Rule 62-4.080, F.A.C.

(b) A modification which does not require substantial technical evaluation by the Department, does not require a new site inspection by the Department, and is not expected to lead to substantially different environmental impacts or will lessen the impacts of the original permit is considered a minor modification, the fee for which is set forth in Rule 62-4.050(4)(s), F.A.C.

(c) A modification which is reasonably expected to lead to substantially different environmental impacts which require a detailed review by the Department is considered a substantial modification, the fee for which is set forth in Rule 62-4.050(7), F.A.C.

(d) A modification which is reasonably expected to lead to substantially different environmental impacts, but which requires a less detailed review than does a substantial modification, is considered an intermediate modification, the fee for which is one-half of that required for a substantial modification.

(5) Permit application.

(a) Applications for a solid waste management facility shall be submitted on appropriate Department forms listed in Rule 62-701.900, F.A.C., to the Department district office with jurisdiction where the facility is located. A minimum of four copies each of the application, engineering plans and reports, and all supporting information for the proposed construction, substantial modification, operation or closure of a facility shall be provided to the Department.

(b) Information in every application shall be of sufficient detail to show how the facility will be constructed, operated, and closed, and how it will be monitored and maintained after closure, in order to comply with the requirements of this chapter.

(c) Combination facilities. An application for a permit to construct or operate a solid waste management facility having multiple solid waste management components which, if standing alone, would require solid waste management facility permits, shall include all information required to be submitted had each component been proposed as a separate facility, independent of the other components. Such information may be combined or otherwise presented so as to avoid duplicative or repetitive submittals. Additionally, such applications shall be accompanied by such fees as would be required for each facility component; however, the total permit fees for a facility shall not exceed $25,000, exclusive of modifications and renewals.

(6) Engineer of record and professional certification. All engineering plans, reports, and information supporting the application shall be compiled by the engineer of record who shall be responsible for assurance that all technical components have been prepared under the direction and supervision and signed and sealed by the professional registered in Florida in each contributing technical discipline. The engineer of record's signature and seal on the application shall assure that all appropriate technical professional disciplines have been employed in development of the application. The application shall provide that the engineer of record, or another qualified professional working under the supervision of the engineer of record, shall make periodic inspections during construction of the facility to ensure that design integrity is maintained.

(7) Application content and format. Applications for permits to construct, operate, modify, or close a solid waste management facility shall include in the following sequence:

(a) A letter of application transmittal;

(b) A completed application form dated and signed by the applicant;

(c) The permit fee specified in Rule 62-701.315, F.A.C., in check or money order, payable to the Department.

(d) An engineering report addressing the requirements of this rule which shall:

1. Contain a cover sheet stating the project title, location, applicant's name, and the engineer's name, address, signature, date of signature and seal;

2. Have the text printed on 8 1/2 inch by 11 inch consecutively numbered pages;

3. Contain a table of contents or index describing the body of the report and the appendices; and

4. Include the body of the report and all appendices.

(e) Appendices submitted as part of an engineering report to support a permit application shall contain, where required under applicable sections of this rule:

1. An operation plan and closure plan appropriate for the type of facility;

2. A contingency plan appropriate for the type of facility to cover operations interruptions and emergencies such as fires, explosions, or natural disasters;

3. Illustrative charts and graphs;

4. Records or logs of tests, soil borings, hydrogeological information, geochemical surveys, and water quality analyses; and

5. Engineering calculations, including literature citations.

(f) Plans or drawings for all solid waste management facilities shall:

1. Use sheets 22 inches by 34 inches or 24 inches by 36 inches, and include title blocks;

2. Have a cover sheet that includes the project title, applicant's name, sheet index, legend of symbols, and the engineer's name, address, signature, date of signature and seal;

3. Include a regional map or plan showing the project location;

4. Include a current vicinity map, or aerial photograph taken within one year preceding the application;

5. Have a site plan containing the location of all property boundaries certified by a registered Florida land surveyor; and

6. Clearly show all necessary details and be numbered, titled, and referenced to the narrative report. Drawings shall contain a north arrow and horizontal and vertical scales, and shall specify drafting or origination dates. All elevations shall be referenced to National Geodetic Vertical Datum.

(g) Documentation that the applicant either owns the property or has legal authorization from the property owner to use the site for a solid waste management facility; and

(h) For facilities owned or operated by a county, a description of the existing or proposed recycling facilities or activities, if any, at the site and a description of whether, and the extent to which, these recycling facilities or activities will contribute to the county's achievement of the waste reduction and recycling goals contained in Section 403.706, F.S.

(i) For purposes of the evaluation required in subsection (3) of this section, a history and description of any enforcement actions described in subsection (3) of this section relating to solid waste management facilities in this state.

(8) Notice of application.

(a) An applicant for a permit to construct or substantially modify a solid waste management facility shall publish and provide proof of publication to the Department of a Notice of Application in a newspaper of general circulation in the area where the facility will be located. This notice shall conform to the requirements of Rule 62-110.106, F.A.C., except that the notice shall be published within 14 days of submittal of a permit application to the Department.

(b) An applicant for a permit to construct or substantially modify a Class I, II, or III landfill shall mail a notice of application to the Chair of the Board of County Commissioners, the highest ranking elected official of the municipality, and each State Senator and Representative serving the jurisdiction in which the project is located. The notice shall be mailed within 14 days of submittal of the application to the Department, and proof of mailing shall be provided to the

Department. After the Department completes the permit review, the Department shall send a copy of the notice of intent to issue or deny the permit to these same officials.

(9) Permits for construction, modification, operation, and closure. Complete permit applications for construction or operation of a solid waste management facility, renewal of an operation permit for an existing facility, modification of an existing facility, or closure of a facility shall be evaluated by the respective Department district office in accordance with Chapters 62-4 and 62-701, F.A.C. The Department shall:

(a) Issue a construction permit, or a construction/operation permit for a solid waste management facility, or for a substantial modification of an existing solid waste management facility. After all specified construction has been completed and before acceptance of any solid waste, the engineer of record shall certify to the Department on Form 62-701.900(2) that the permitted construction is complete and that it was done in accordance with the plans submitted to the Department except where minor deviation was necessary. All deviations shall be described in detail and the reasons therefore enumerated. The applicant shall provide at least 14 days advance notice to the Department prior to accepting solid waste so that the Department has the opportunity to inspect the site; or

(b) Issue an operation permit for a new facility that has been satisfactorily constructed, or to an existing facility which is being operated in accordance with this chapter at the time for permit renewal; or

(c) Issue a closure permit for closing and long-term care of a landfill which complies with the requirements of Rules 62-701.600 - .620, F.A.C.; or

(d) Deny the issuance of a permit if reasonable assurances is not provided that the requirements of Chapters 62-4 and 62-701, F.A.C., will be satisfied.

(10) Permit renewals.

(a) A renewal application shall be timely and sufficient. If the renewal application is submitted prior to sixty days before expiration of the existing permit, it will be considered timely and sufficient. If the renewal application is submitted at a later date, it will not be considered timely and sufficient unless it is submitted and made complete prior to the expiration of the existing permit. When the application for renewal is timely and sufficient, the existing permit shall remain in effect until the renewal application has been finally acted upon by the Department or as otherwise provided in Section 120.60, F.S.

(b) Permits shall be renewed at least every five years. Applicants for permit renewal shall demonstrate how they will comply with any applicable new or revised laws or rules relating to construction, operation, or closure of solid waste management facilities. Closure plans shall be updated at the time of permit renewal to reflect changes in closure design, long-term care requirements, and financial responsibility documentation.

(c) Facility information that was submitted to the Department to support the expiring permit, and which is still valid, does not need to be re-submitted for permit renewal. The permit renewal application shall list and reaffirm that the information is still valid.

(11) Permit transfers.

(a) Any person wishing to transfer a permit shall submit such a request using Form 62-701.900(8). The form must be completed with the signatures of both the permittee and the proposed new permittee.

(b) A transfer of permit is required upon the sale or transfer of a facility. A transfer of permit is also required if a new or different person takes ownership or control of the facility. A transfer of permit is not required if the facility simply changes its name, although the permittee must notify the Department of such a change using Form 62-701.900(8). A transfer of permit is also not required solely as a result of the sale of stock or assets or a change of operating personnel, as long as ownership or control of the facility has not changed.

(c) The proposed new permittee shall provide reasonable assurance that it has the ability to comply with the conditions of the existing permit and that it meets any financial assurance requirements of the permit.

(d) Within 30 days of receipt of an application for permit transfer, the Department shall request additional information if the application is not complete. Within 30 days of receipt of a complete application, the Department shall either approve or deny the permit transfer. The Department's determination shall be based solely on its evaluation of the requirements in paragraphs (a) through (c) above. If the Department fails to take action to approve or deny the transfer within 30 days of receipt of a complete application, the transfer shall be deemed approved.

(e) Until this transfer is approved by the Department, the permittee and any other person constructing, operating, or maintaining the permitted facility shall be liable for compliance with the terms of the permit. The permittee seeking to transfer the permit shall remain liable for corrective actions that may be required as a result of any violations occurring prior to the sale or legal transfer of the facility.

(12) Identification number. The Department shall assign an identification number to each solid waste management facility that receives a permit. The number shall be unique to that facility, and shall remain assigned to that facility at all times. The identification number shall be used on all correspondence and records related to that facility.

(13) Airport safety.

(a) Applicability. This subsection applies to those solid waste management facilities constructed after January 6, 1993, as well as lateral expansions of facilities which were constructed prior to January 6, 1993. For purposes of this subsection, an "airport runway" does not include facilities used solely for helicopters or other aircraft which take off and land vertically.

(b) Solid waste management facilities where waste is stored, disposed, or processed outdoors, shall not be located within 10,000 feet of any licensed and operating airport runway used by turbine powered aircraft, or within 5,000 feet of any licensed and operating airport runway used only by piston engine aircraft, unless the applicant demonstrates that the facility is designed and will be operated so that it does not pose a bird hazard to aircraft.

(c) Applicants proposing to construct new landfills within a six mile radius, and applicants proposing to construct lateral expansions of existing landfills within a five-mile radius, of any licensed and operating airport runway used by turbine powered or piston engine aircraft shall notify the affected airport, the Federal Aviation Administration, and the Florida Department of Transportation when the application is filed with the Department, and shall provide evidence of such notification to the Department.

(d) The following facilities are exempt from the requirements of this subsection:

1. Enclosed solid waste management facilities where waste is received and processed indoors, where all waste or residue is removed by enclosed or covered vehicles, and where putrescible waste is not processed, stored, or otherwise managed outdoors except in enclosed or covered vehicles;

2. Recovered materials processing facilities;

3. Yard trash processing facilities;

4. Land clearing debris disposal facilities;

5. Ash monofills;

6. Construction and demolition debris disposal or recycling facilities which are not co-located with other solid waste disposal facilities accepting putrescible wastes; and

7. Any other solid waste management facility which does not accept putrescible waste for disposal, processing, or recycling.

(14) Other facility permits. In addition to the exemptions in subsection (2) of this section, the following solid waste management facilities which are constructed and operated under an appropriate and currently valid permit are not required to obtain a separate solid waste permit pursuant to this chapter:

(a) Incinerators which are constructed and operated under a permit issued pursuant to Chapters 62-296 or 62-256, F.A.C.; however, if the facility is also storing or disposing of solid waste on the site, and such storage or disposal is not addressed in the permit, a separate solid waste permit is required;

(b) Incinerators which are constructed and operated under a site certification pursuant to Chapter 403, Part II, F.S.;

(c) Solid waste management facilities, such as composting facilities, waste tire processing facilities, soil treatment facilities, and used oil processing facilities, which are required to obtain permits under Rules 62-702 through 62-722, F.A.C.

(15) Operator training. The owner or operator of a landfill, or other solid waste management facility required by this chapter to have trained operators or spotters, shall not employ a person to perform, nor may any person perform, the duties of an operator or spotter at ~~of~~ such facility unless that person is a trained operator or trained spotter, or an interim operator or interim spotter.

(a) Owners and operators of facilities shall ensure that operators employed at the facility are properly trained to operate the facility, and that spotters are properly trained to identify and properly manage any hazardous or prohibited materials which are received at the facility. A training plan shall be included as part of the permit application. The training plan shall either include a list and schedule of those classes offered to the public which will be attended by the facility's operators and spotters, or shall include a description of the facility's in-house training program. All training courses, whether public or in-house, must be approved by the Department in accordance with Section 403.716, F.S. Any in-house operator training program which includes an examination required by this subsection must be administered by an independent third party. Any other in-house operator training program must be administered by a trained operator. Any in-house spotter training program must be administered by a trained operator or a trained spotter. The training plan, along with records documenting how the training plan is being implemented, shall be kept at the facility at all times and be made available for inspection by Department staff. The Department will maintain a list of relevant training courses which are available in this State.

(b) In order to be considered trained, operators of the following facilities shall complete the following training requirements at courses described in the facility's operating plan:

1. Operators of Class I, II, or III landfills, and operators of construction and demolition debris disposal facilities, shall complete 24 hours of initial training, and shall pass an examination as part of that training. Within three years after passing the examination, and every three years thereafter, operators shall complete an additional 16 hours of continued training.

2. Operators of waste processing facilities shall complete 16 hours of initial training, and shall pass an examination as part of that training. Within three years after passing the examination, and every three years thereafter, operators shall complete an additional 8 hours of continued training.

(c) In order to be considered trained, spotters shall complete 8 hours of initial training at courses described in the facility's operating plan. Within three years after attending the initial training, and every three years thereafter, spotters shall complete an additional 4 hours of continued training.

(d) Training requirements for operators and spotters at landfills and construction and demolition debris disposal facilities shall be effective on May 27, 2001. Training requirements for operators and spotters at waste processing facilities, and training requirements for spotters at land clearing debris disposal facilities, shall be effective July 1, 2001.

(e) Operators and spotters who received initial training prior to May 27, 2001 will still be considered trained. Such persons shall complete the continued training requirements that were in effect prior to May 27, 2001, after which they shall comply with the continued training requirements of this subsection. Facilities operating on May 27, 2001 shall modify their training plans to comply with this subsection by the time any operators or spotters employed by the facility are required to meet these requirements.

(f) Notwithstanding the definition in Rule 62-701.200, F.A.C., and solely for purposes of this subsection, "operator" means any person, including the owner, who is principally engaged in, and is in charge of, the actual operation, supervision, and maintenance of a solid waste management facility and includes the on-site person in charge of a shift or period of operation during any part of the day, such as facility managers, supervisors and equipment operators. It does not include office personnel, laborers, equipment operators not in a supervisory capacity, transporters, corporate directors, elected officials, or other persons in managerial roles unless such persons are directly involved in on-site supervision or operation of a solid waste management facility. A trained operator may perform the duties of a trained spotter.

(g) For purposes of this subsection, "interim operator" means a person who has, in the opinion of the facility manager, shown competency in his chosen occupation through a combination of work experience, education and training and who has at least one year of experience at that facility or a similar facility. An interim operator may perform the duties of an operator, but only under the supervision of a trained operator.

(h) For purposes of this subsection, "spotter" means a person employed at a solid waste management facility whose job it is to inspect incoming waste and to identify and properly manage any hazardous or prohibited materials which are received at the facility. Spotters shall be stationed where they can thoroughly inspect each shipment of waste for prohibited materials. Placement of spotters shall be specified in the facility's operation plan.

(i) For purposes of this subsection, "interim spotter" means a person who has, in the opinion of the facility manager, shown competency in his chosen occupation through a

combination of work experience, education and training. An interim spotter may perform the duties of a spotter, but only under the supervision of a trained operator or trained spotter.

Specific Authority 403.061, 403.704, 403.716, FS.
Law Implemented 403.0877, 403.702, 403.704, 403.707, 403.716, FS.
History -- New 1-6-93, Amended 1-2-94, 5-19-94, Formerly 17-701.320, Amended 12-23-96, 5-27-01.

62-701.330 Landfill Permit Requirements.

(1) Applicability.

(a) Except as otherwise specifically provided herein, this chapter shall apply to all solid waste disposal units constructed or operated under a landfill permit issued after May 27, 2001, including renewals of existing permits.

(b) All holders of landfill construction or operation permits issued prior to May 27, 2001 which contain conditions not in conformance with this chapter shall apply for modification of the permit to conform to this chapter to the District Office of the Department which issued the permit. The submission shall occur at the time of application for renewal of an existing permit, or before November 23, 2001, whichever is later. For purposes of this paragraph, a permit issued prior to May 27, 2001, is deemed to include a completed permit application received by the Department prior to May 27, 2001.

(c) Rules 62-701.400 - .420, F.A.C., shall not apply to any solid waste disposal unit for which construction is completed prior to the later of the dates specified in paragraph (b) of this subsection. Such solid waste disposal unit may be operated until filled to its permitted or modified design dimensions which, if such unit is lined, may include any future vertical expansion over the liner in accordance with Rule 62-701.430, F.A.C.

(d) Facilities operating pursuant to a Consent Order with the Department in effect on May 27, 2001, shall continue to operate in accordance with the order until the order expires by its own terms, provided the landfill is in compliance with the terms and conditions of the order. If the facility owner or operator fails to comply with any substantive term or condition of the order, the facility covered by the order must comply with the operational, closure and long-term care requirements of this chapter.

(2) Term of permit. The time period for permits shall be no longer than five years from the date of issuance by the Department.

(3) Permit applications. Permit applications for landfills shall meet the requirements of Rule 62-701.320, F.A.C., and shall also include the following specific requirements:

(a) A vicinity map or aerial photograph not more than one year old which shows land use and local zoning within one mile of the landfill and is of sufficient scale to show all homes or other structures, water bodies, roads, and other significant features of the vicinity. All significant features shall be labeled.

(b) A vicinity map or aerial photograph not more than one year old which shows all airports that are located within five miles of the proposed landfill.

(c) A plot plan of the site showing dimensions, locations of proposed and existing water quality monitoring wells or points, locations of soil borings, proposed plan of trenching or disposal areas, original elevations, proposed final contours, any previously filled waste disposal areas, and fencing. Cross sections shall be included on the plot plan or on separate sheets showing both the original and proposed fill elevations. The scale of the plot plan shall not be greater than 200 feet to the inch.

(d) Topographic maps at a scale of not greater than 200 feet to the inch with 5-foot contour intervals. These maps shall show the proposed fill area, any borrow area, access roads, grades required for proper drainage and cross sections of lifts, special drainage devices if necessary, fencing, and equipment facilities.

(e) A report on the:

1. Current and projected population and area to be served by the proposed site;

2. Anticipated type, annual quantity, and source of solid waste, expressed in tons;

3. Anticipated life of the facility; and
4. Source and type of cover material.

(f) The hydrogeological and geotechnical investigations required by Rule 62-701.410, F.A.C.

(g) The ground water monitoring plan required by Rule 62-701.510, F.A.C.

(h) Evidence of an approved laboratory to do water quality monitoring in accordance with Chapter 62-160, F.A.C.

(i) A statement of how the applicant will demonstrate financial responsibility for the closing and long-term care of the landfill.

(j) Operational plans and drawings as required in Rules 62-701.500(2), (6), (7), (8), (9), (10), and (11), F.A.C.

Specific Authority 403.061, 403.704, FS.
Law Implemented 403.702, 403.704, 403.707, FS.
History -- New 1-6-93, Amended 1-2-94, Formerly 17-701.330, Amended 5-27-01.

62-701.340 General Criteria For Landfills.

(1) Performance standards. A landfill shall be designed, constructed, operated, maintained, closed, and monitored throughout its design period to control the movement of waste and waste constituents into the environment so that water quality standards and criteria and air quality standards will not be violated.

(2) Minimum ground water criteria. For those landfills or solid waste disposal units which are constructed after January 6, 1993, and which are constructed with at least a double or composite liner, the minimum ground water criteria specified in Rule 62-520.400, F.A.C., shall apply only outside of the footprint of the solid waste disposal unit, or if the unit is surrounded by a perimeter road, outside the perimeter road, notwithstanding the provisions of Rules 62-520.400 and .420, F.A.C.

(3) Classification of landfills. Landfills or solid waste disposal units are classified according to the amount or types of waste received.

(a) Class I landfills are those which receive an average of 20 tons or more of Class I waste per day.

(b) Class II landfills are those which receive an average of less than 20 tons of Class I waste per day.

(c) Class III landfills are those which receive only Class III waste. Class III landfills shall not accept putrescible household waste. The Department shall exempt Class III landfills from some or all of the requirements for liners, leachate controls, and water quality monitoring in Rules 62-701.400(3) and (4), and 62-701.510, F.A.C., if the applicant demonstrates that no significant threat to the environment will result from the exemption based upon the types of waste received, methods for controlling types of waste disposed of, and the results of the hydrogeological and geotechnical investigations required in Rule 62-701.410, F.A.C.

(4) Location requirements.

(a) The site shall provide structural support for the facility including total wastes to be disposed of and structures to be built on the site.

(b) A landfill or solid waste disposal unit shall not be located in the 100-year floodplain where it will restrict the flow of the 100-year flood, reduce the temporary water storage capacity of the floodplain unless compensating storage is provided, or result in a washout of solid waste.

(c) The minimum horizontal separation between waste deposits in a landfill and the landfill property boundary shall be 100 feet, measured from the toe of the proposed final cover slope.

(d) Landfills shall be screened from public view where such screening can practically be provided.

(5) Zone of discharge. A landfill's zone of discharge shall be determined pursuant to Chapter 62-522, F.A.C. For all solid waste disposal units constructed after January 6, 1993, the zone of discharge shall not exceed 100 feet from the edge of those solid waste disposal units permitted to be constructed, unless modified in accordance with Rule 62-522.500, F.A.C.

Specific Authority 403.061, 403.704, FS.

Law Implemented 403.0877, 403.702, 403.704, 403.707, FS.

History -- New 1-6-93, Amended 1-2-94, 5-19-94, Formerly 17-701.340, Amended 5-27-01.

62-701.400 Landfill Construction Requirements.

(1) Minimum design standards. The requirements of this rule are the minimum standards for constructing a landfill. Nothing in this rule shall be construed to prevent the Department from imposing more stringent standards as necessary to protect the environment and the public health and safety due to site specific conditions and types of wastes to be disposed of in the landfill or solid waste disposal unit. An applicant whose landfill design meets the design standards of this rule will be presumed to provide reasonable assurance that the performance standards of Rule 62-701.340(1), F.A.C., will be met.

(2) Planned construction and closure. All landfills shall be designed so that solid waste disposal units will be constructed and subsequently closed at planned intervals throughout the design period of the landfill.

(3) Landfill liner requirements. Landfills shall be constructed with composite or double liners, and a leachate collection and removal system.

(a) Liners shall be:

1. Constructed of materials that have appropriate physical, chemical, and mechanical properties to prevent failure due to physical contact with the waste or leachate to which they are exposed, climatic conditions, the stress of installation, and other applied stresses and hydraulic pressures which are anticipated during the operational and closure period of the solid waste disposal unit. The supplier of materials for the liner components shall provide test information accepted by the engineer of record, that supports the capabilities of the materials to meet these needs;

2. Installed upon a base and in a geologic setting capable of providing structural support to prevent overstressing of the liner due to settlements and applied stresses;

3. Constructed so that the bottom of the liner system is not subject to fluctuations of the ground water so as to adversely impact the integrity of the liner system;

4. Designed to resist hydrostatic uplift if the liner is located below the seasonal high ground water table; and

5. Installed to cover all surrounding earth which could come into contact with the waste or leachate.

(b) Composite liners.

1. The upper component of the composite liner shall be a 60-mil minimum average thickness geomembrane, as defined by method GRI GM13, or thicker geomembrane liner with a maximum water vapor transmission rate of 0.24 grams per square meter per day ($g/(m^2$ x day))

as determined by ASTM Method E96-00, procedure BW, "Standard Test Methods for Water Vapor Transmission of Materials." A primary leachate collection and removal system and a drainage layer shall be installed above the geomembrane liner. Except in sumps and leachate collection trenches, the system shall be designed to limit leachate head above the liner during routine landfill operation after placement of initial cover, as specified in Table A below, depending upon the thickness and hydraulic conductivity of the lower component of the composite liner. Leachate head calculations shall consider leachate recirculation if the leachate is recirculated.

2. The lower component of the composite liner shall be constructed in six-inch lifts. The thickness of the lower component may be varied in relation to the hydraulic conductivity of the lower component and the design leachate head above the liner, in accordance with Table A.

TABLE A:
Minimum Thickness of Lower Component of Composite Liner (feet)

Maximum Design Hydraulic Head (inches)	Maximum Hydraulic Conductivity (cm/sec)		
	$1x10^{-7}$	$5x10^{-8}$	$1x10^{-8}$
1	2.0	1.0	1.0
6	2.5	1.5	1.0
12	3.0	2.0	1.0

(c) Double liners.

1. Double liner systems shall consist of upper and lower 60-mil minimum average thickness geomembranes, as defined by method GRI GM13, with a maximum water vapor transmission rate of 0.24 g/(m^2 x day); a primary leachate collection and removal system lying above the upper geomembrane designed to limit the leachate head to one foot above the liner during routine landfill operations after placement of initial cover, except in sumps and leachate collection trenches; and a leak detection and secondary leachate collection system between the upper and lower liners. The lower geomembrane shall be placed directly on a sub-base which is a minimum six inches thick, is free of sharp materials or any materials larger than one-half inch, and has a saturated hydraulic conductivity of less than or equal to 1 x 10^{-5} cm/sec. A geosynthetic clay liner with a hydraulic conductivity not greater than 1 x 10^{-7} cm/sec may be used in place of the six-inch thick sub-base layer provided it is placed on a prepared subgrade which will not damage the geosynthetic clay liner.

2. The leak detection and secondary leachate collection system shall have a minimum hydraulic conductivity of ten cm/sec, shall be designed to limit the maximum hydraulic head on the lower liner to one inch, and shall not allow leachate head to exceed the thickness of the drainage layer. The hydraulic conductivity of the leak detection and secondary collection system material shall be derived from transmissivity and thickness measurements.

(d) Standards for geosynthetic components.

1. Geomembranes shall have factory and field seams whose shear strengths during testing are at least 90 percent of the specified minimum yield strength for that lining material, and the failure shall occur in the lining material outside the seam area. All field seams must also

be visually inspected and pressure or vacuum tested for seam continuity using suitable non-destructive techniques.

2. Geomembranes shall not be used at landfills unless they are subjected to continuous spark testing by the manufacturer at the factory and no defects have been found.

3. Geomembranes shall be protected from physical damage by placing a minimum 24-inch-thick protective layer above the upper liner. All materials in direct contact with the liner shall be free of sharp materials or any materials larger than one-half inch. The upper 12 inches of the protective layer shall be composed of soil, tire chips four square inches or smaller with no protruding wires that could pose a threat to the integrity of the liner, or other materials approved by the Department which are permeable, non-reactive, stable, and which offer protection for the liner from punctures.

4. The first layer of waste placed on the protective above the liner and leachate collection system shall be a minimum of four feet in compacted thickness, and consist of selected wastes containing no large, rigid objects that may damage the liner or leachate collection system. Materials that could damage the liner shall be removed from this layer.

5. High density polyethylene (HDPE) geomembranes shall meet the specification contained in method GRI GM13.

6. Polyvinyl chloride (PVC) geomembranes shall meet the specification contained in method PGI 1197.

7. Interface shear strength of the actual components which will be used in the liner system shall be tested with method ASTM D5321 or an equivalent test method. However, when testing geosynthetic clay liners, method ASTM D6243, or an equivalent test method, shall be used. Unless it can be justified otherwise, the interface shall be tested in a water-saturated state. For the purposes of this test, clays compacted in the test apparatus during setup which have a water content wet of optimum shall be considered water saturated.

8. The transmissivity of geonets shall be tested with method ASTM D4716, or an equivalent test method, to demonstrate that the design transmissivity will be maintained for the design period of the facility. The testing for the geonet in the liner system shall be conducted using actual boundary materials intended for the geonet at the maximum design normal load for the landfill, and at the design load expected from one lift of waste. At the maximum design normal load, testing shall be conducted for a minimum period of 100 hours unless data equivalent to the 100-hour period is provided in which case the test shall be conducted for a minimum period of one hour. In the case of the design load from one lift of waste, the minimum period shall be one hour. For geonets used in final covers, only one test shall be conducted for a minimum period of one hour using the expected maximum design normal load from the cover soils and the actual boundary materials intended for the geonet.

9. The hydraulic conductivity of geosynthetic clay liners shall be tested with method ASTM D5887, or an equivalent test method. First, the GCL test specimen shall be hydrated with the fluid which is expected to cause hydration in the field, or a similar fluid, for a minimum of 48 hours using sufficient backpressure to achieve a minimum B coefficient of 0.9 and using a confined effective consolidation stress not exceeding five pounds per square inch. Then, the hydraulic conductivity test on the GCL specimen shall be conducted, using the appropriate permeant fluid, at a confined effective consolidation stress not exceeding five pounds per square inch. The hydraulic conductivity test shall continue until steady state conditions are reached or a minimum of two pore volumes of permeant fluid have passed through the test specimen. The

permeant fluid shall be either leachate from the landfill (or a similar landfill) if the GCL is used in a liner system, or water if the GCL is used as a barrier layer in a final cover.

10. If not submitted as part of the permit application to the Department, then the testing required in subparagraphs (3)(d)7, 8 and 9 of this section for the materials used in the liner construction shall be conducted as part of the construction quality assurance activities, and the results of these tests shall be included in the completion of construction documents required in subsection (7) of this section.

11. The testing required in subparagraphs (3)(d)7, 8 and 9 of this paragraph are single-point tests required either as part of the permit application phase of a landfill project or prior to liner construction. The purpose of these tests is to confirm that the components selected for the liner construction meet the design criteria used in the permit application.

(e) The following specifications shall be provided for geosynthetic components:

1. Definition and qualifications of the designer, manufacturer, installer, geosynthetic quality assurance consultant, geosynthetic quality assurance laboratory, and quality assurance program;

2. Material specifications for geomembranes, geotextiles, geogrids, geocomposites, and geonets, including general requirements, specified geomembrane properties, and labeling;

3. Manufacturing and fabrication specifications including:

a. Geomembrane manufacturing, including raw material and roll quality control;

b. Geomembrane fabrication, including requirements of personnel, seaming equipment and products, seam preparation, weather conditions for factory seaming, overlapping and temporary bonding, trial seams, and nondestructive seam continuity testing;

c. Destructive seam strength testing including location and frequency, sampling procedure, size of samples, testing at the fabrication factory, laboratory testing, fabricator's laboratory testing, and procedures for destructive test failure; and

d. Repairs.

4. Geomembrane installation specifications including:

a. Earthwork;

b. Conformance testing;

c. Geomembrane placement, which shall address layout drawings, panel identification, and field panel placement;

d. Field seaming, which shall address seam layout, requirements of personnel, overlapping and temporary bonding, seam preparation, seaming equipment and products, weather conditions for seaming, trial seams, general seaming procedures, nondestructive seam continuity testing, destructive testing, and defects and repairs including identification, evaluation, and repair procedures;

e. Materials in contact with the geomembrane, including granular materials, concrete, and sumps and appurtenances; and

f. Lining system acceptance.

5. Geotextile and geogrid specifications including handling and placement, conformance testing, seams and overlaps, repair, and placement of soil materials and any overlying materials.

6. Geonet and geocomposite specifications including handling and placement, conformance testing, stacking and joining, repair, and placement of soil materials and any overlying materials.

7. Geosynthetic clay liner (GCL) specifications including handling and placement, conformance testing, seams and overlaps, repair, and placement of soil materials and any overlying materials.

(f) Standards for soil components.

1. Soil components of liner systems shall be constructed to preclude, to the greatest extent practicable, lenses, cracks, channels, root holes, pipes, or other structural inconsistencies that can increase the saturated hydraulic conductivity of the soil component. The design shall illustrate and describe those instances in which overexcavation of permeable areas and backfilling may be necessary to seal the permeable area. The soil component shall be placed and compacted in layers to achieve the design performance.

2. The permeability of soil liner components shall not be increased above the values specified for the component, as a result of contact with leachate from the solid waste disposal unit. Compatibility of the soil component and leachate shall be demonstrated by testing the soil component with actual or simulated leachate in accordance with EPA Test Method 9100 or an equivalent test method.

3. The soil component of the liner system may consist of in-situ soils, provided they meet the specifications for soil liners. Testing of in-situ soil shall be performed in accordance with the site specific Construction Quality Assurance Plan in accordance with Rules 62-701.400(7) and (8), F.A.C.

4. Specifications for the soil component of the liner system shall be provided to and approved by the Department, and shall contain at a minimum:

a. Allowable range of particle size distribution and Atterberg limits, to include shrinkage limit;

b. Placement moisture criteria and dry density criteria;

c. Maximum laboratory-determined saturated hydraulic conductivity, using simulated leachate as the saturating and testing liquid;

d. Minimum thickness of the soil liner;

e. Lift thickness;

f. Surface preparation (scarification) for tying lifts together; and

g. Type and percentage of clay mineral within the soil component.

5. The soil liner shall be placed using construction equipment and procedures that achieve the required saturated hydraulic conductivity and thickness. A field test section shall be constructed using the proposed construction equipment and tested to document that the desired saturated hydraulic conductivity and thickness is achieved in the field. Test results shall be submitted to the Department along with the completion of construction documents.

(4) Leachate collection and removal system. Landfills shall have a leachate collection and removal system that is designed, constructed, maintained, and operated to collect leachate and convey it to collection points for removal.

(a) The primary and secondary leachate collection and removal systems shall:

1. Be constructed of materials that are chemically resistant to the waste disposed of in the landfill and the leachate expected to be generated;

2. Have sufficient mechanical properties to prevent collapse under pressures exerted by overlying wastes, cover materials, and by any equipment used at the landfill;

3. Have granular material or synthetic geotextile filter overlying or surrounding the leachate collection and removal system to prevent clogging of the collection system by infiltration of fine particles; and

4. Have a method to test that the pipes in the system are not clogged, and a method for cleaning the pipes in the system if they become clogged. If any part of the system cannot be tested for clogging, the design shall assure that leachate can be rerouted from that part to a leachate sump in the event of collapse.

(b) The primary leachate collection and removal system shall have a granular drainage layer above the top geomembrane liner, at least 12 inches thick, with a hydraulic conductivity of not less than 1×10^{-3} cm/sec, overlain with an additional 12 inches of protective material as specified in Rule 62-701.400(3)(d)3., F.A.C., that is chemically resistant to the waste and leachate. It shall be designed with a bottom slope to achieve the required leachate head after the predicted settlement determined by the foundation analysis. Leachate collection systems incorporating synthetic drainage materials may be used if it can be demonstrated that they are equivalent to or more effective than the granular design, including chemical compatibility, flow under load, and protection of the geomembrane liner.

(5) Leachate recirculation. Leachate shall be recirculated only at solid waste disposal units which have a leachate recirculation system included in their operation plan, and which have been constructed and operated in a manner consistent with that system. If leachate is recirculated after closure, the operation plan shall be included as part of the approved closure plan. The leachate recirculation system shall include estimated impacts on the head of leachate over the liner, subsidence of the waste, and gas production, and shall meet the following requirements unless otherwise approved in the operation plan.

(a) The landfill shall be lined and have a leachate collection and removal system.

(b) Ditches, berms, or other devices shall be installed to control any leachate runoff. Initial and intermediate cover receiving recirculated leachate shall be graded to shed runoff into the leachate collection system and to minimize mixing of leachate runoff and storm water.

(c) Initial and intermediate cover shall be permeable to the extent necessary to prevent perched water conditions and gas buildup.

(d) Leachate shall not be recirculated during weather conditions or in quantities that may cause runoff outside the solid waste disposal unit, surface seeps, wind-blown spray, or exceedance of the limits of the leachate head on the liner. Ponding is prohibited unless it is an integral part of the design plan.

(e) Landfill gas shall be managed in accordance with Rule 62-701.530, F.A.C.

(f) Recirculation of leachate is prohibited on top of areas where a barrier layer which is part of the final cover has been installed. Irrigation of the final vegetative cover may be done with treated leachate which meets the water quality standards of the receiving water body, if such irrigation does not contribute significantly to leachate generation.

(6) Leachate storage tanks and leachate surface impoundments.

(a) The requirements of this subsection apply to all leachate storage tanks and leachate surface impoundments constructed after January 6, 1993. Leachate storage tanks in use on January 6, 1993 are not required to retrofit to comply with this subsection unless leakage, corrosion or other defects are found. Leachate surface impoundments in use on January 6, 1993 shall be replaced or modified to conform to this subsection by January 6, 1995.

(b) Surface impoundments for leachate treatment or storage that are located at landfills are subject to the following requirements:

1. Surface impoundments shall be constructed so that the bottom of the liner system is not subject to fluctuations of the ground water so as to adversely impact the integrity of the liner system. The applicant shall demonstrate that the surface impoundment design will minimize

infiltration of leachate into the environment so that ground water and surface water quality standards and criteria are not violated.

2. The surface impoundment shall be designed in segments such that any one segment may be taken out of service for inspection and repair with no interruption of service.

3. The impoundment shall have a double liner system consisting of an upper and lower 60-mil minimum average thickness geomembrane, as defined by method GRI GM13, and a leak detection and collection system between the geomembranes with a minimum hydraulic conductivity of one cm/sec. The lower geomembrane shall be placed directly on a subbase which is at least six inches thick and has a saturated hydraulic conductivity of less than or equal to 1×10^{-5} cm/sec. A geosynthetic clay liner with a hydraulic conductivity not greater than 1×10^{-7} cm/sec may be used in place of the six-inch thick sub-base layer provided it is placed on a prepared subgrade which will not damage the geosynthetic clay liner. The leak detection and collection system shall be checked daily. The design of the upper liner shall include calculations to predict the potential leakage through the upper liner. If the daily checks indicate the upper liner is leaking at a rate greater than predicted by the design calculations, the Department shall be notified. If the leakage rate will result in the flooding of the leak detection and collection system, the impoundment shall be emptied and the liner repaired.

4. To preserve the liner integrity and prevent uplift, ballast material such as rounded gravel or sand, that will not cause damage to the geomembrane liner, shall be placed on top of any liner which is located below the water table.

5. A minimum of two feet of freeboard above the depth which would occur in the event of a 25-year, 24-hour storm shall be maintained in leachate surface impoundments.

6. Disease vectors and off-site odors shall be controlled.

(c) Above ground leachate storage tanks that are located at solid waste management facilities are subject to the following requirements:

1. Tanks shall be constructed of concrete, steel, reinforced plastic, polyethylene, or fiberglass. Tanks shall be supported on a well drained, stable foundation.

2. Bottoms of steel tanks that rest on earthen material shall be cathodically protected with either sacrificial anodes or an impressed current system which is designed, fabricated, and installed in accordance with the engineering plan submitted to the Department.

3. The exterior surfaces of all steel storage tanks shall be protected by a primer coat, a bond coat, and two or more final coats of paint or other surface coating system designed to prevent corrosion and deterioration.

4. The interior of all tanks shall consist of a material or must be lined with a material, resistant to the liquid being stored.

5. All aboveground tanks shall have a secondary containment system which may consist of dikes, liners, pads, ponds, impoundments, curbs, ditches, sumps, or other systems capable of containing the stored leachate. The design volume for the secondary containment system shall be 110 percent of the volume of either the largest tank within the containment system or the total volume of all interconnected tanks, whichever is greater.

6. The secondary containment system shall be constructed of materials compatible with the liquid stored. The containment system shall be constructed of either:

a. A minimum three-foot layer of compacted soil with a maximum saturated hydraulic conductivity of 1×10^{-7} cm/sec or one foot of compacted soil with a maximum saturated hydraulic conductivity of 1×10^{-8} cm/sec with two feet of protective cover; or

b. A concrete pad that will maintain its integrity for the lifetime of the tank, provided that the tank, if made of steel, has a corrosion resistant coating; or

c. A geomembrane of a minimum average thickness of 60 mils, as defined by method GRI GM13, with a maximum water vapor transmission rate of 0.24 g/(m^2 x day).

7. A system shall be designed to contain and remove storm water from the secondary containment area. Provisions shall be included for the removal of any accumulated precipitation and be initiated within 24 hours or when 10 percent of the storage capacity is reached; whichever occurs first. Disposal of this stormwater shall be in accordance with the requirements of Rule 62-701.400(9), F.A.C.

8. All aboveground tanks shall be equipped with an overfill prevention system which includes level sensors and gauges, high level alarms, or automatic shutoff controls. The overfill control equipment shall be inspected weekly by the facility operator to ensure it is in good working order.

9. The exposed exterior of all aboveground tanks shall be inspected weekly by the facility operator for adequacy of the cathodic protection system, leaks, corrosion, and maintenance deficiencies. Interior inspection of tanks shall be performed whenever the tank is drained or at a minimum of every three years. If the inspection reveals a tank or equipment deficiency, leak, or any other deficiency which could result in failure of the tank to contain the leachate, remedial measures shall be taken immediately to eliminate the leak or correct the deficiency. Inspection reports shall be maintained and made available to the Department upon request for the lifetime of the liquid storage system.

(d) Underground leachate storage tanks that are located at solid waste management facilities are subject to the following requirements:

1. Tanks shall be constructed of concrete, fiberglass, reinforced plastic, steel that is cathodically protected, or steel that is clad with fiberglass.

2. A secondary containment and a continuous leak detection system shall be installed in the form of a double-walled tank, designed as an integral structure so that any release from the inner tank is completely contained by the outer shell.

a. The interstitial space shall be monitored at least once per week by the facility operator for tightness using pressure monitoring, vacuum monitoring, or electronic monitoring.

b. The tank system shall be protected from both corrosion of the primary tank interior and the external surface of the outer shell.

c. All resistant coatings applied to the primary tank interior shall be compatible with the stored leachate.

d. Cathodic protection systems, where installed, shall be inspected at least weekly by the facility operator. Any deficiency in the cathodic protection system shall be corrected when discovered.

3. All underground tanks shall be equipped with an overfill prevention system which includes level sensors and gauges, high level alarms, or automatic shutoff controls. The overfill control equipment shall be inspected weekly by the facility operator to ensure it is in good working order.

4. Inspection and leak detection monitoring reports shall be maintained at the facility and made available to the Department upon request for the lifetime of the liquid storage system.

(e) A schedule for routine maintenance of the leachate collection and removal system shall be established to ensure operation of the system. The maintenance schedule shall be a part of the facility operation plan.

(7) Liner systems construction quality assurance.

(a) Liner systems shall have a construction quality assurance plan to provide personnel with adequate information to achieve continuous compliance with the liner construction requirements. The plan shall include or refer to specifications and construction methods which use established engineering practices to construct a liner system and provide for quality control testing procedures and sampling frequencies. Sampling and testing shall be conducted in the field by trained personnel during construction and after construction completion. Such personnel will be under the direction of the construction quality assurance professional engineer, to assure the liner system will comply with the standards. The construction quality assurance professional engineer or his designee shall be on-site at all times during construction to monitor construction activities. Construction activities include the time during which the protective layer is installed over the geomembrane, to ensure that the placement techniques do not cause damage to the liner system materials.

(b) Liner systems shall be installed in accordance with a Department-approved construction quality assurance plan. Plans that comply with EPA Document EPA/600/R-93/182 shall be presumed to be in compliance with this section. The following minimum specific elements shall be included in the plan:

1. Responsibility and authority of all organizations and key personnel involved in permitting, designing, constructing, and providing construction quality assurance of the waste disposal facility shall be described fully;

2. Minimum qualifications of the construction assurance quality professional engineer and supporting personnel shall be in the plan to demonstrate that they possess the training and experience necessary to fulfill their identified responsibilities;

3. Procedures and tests that will be used to monitor the installation of the liner system components shall be described in detail;

4. The sampling activities, sample size, sample locations, frequency of testing, acceptance and rejection criteria, and plans for implementing corrective measures that may be necessary shall be described; and

5. Reporting requirements for construction quality assurance activities shall be described, including daily summary reports, observation data sheets, problem identification and corrective measures, and final documentation. All such documents shall be included in the final report which shall be forwarded to the Department.

(c) A laboratory experienced in the testing of geosynthetics, independent of the liner manufacturer and installer, shall perform the required testing which must include, at a minimum, conformance testing for all geosynthetics and geocomposites, and testing of seam shear and peel strength for geomembranes.

(d) The professional engineer in charge of construction quality assurance shall provide a signed, sealed final report and record drawings to the Department stating that the liner system has been installed in substantial conformance with the plans and specifications for the liner system.

(8) Soil liner construction quality assurance. In addition to the requirements of subsection (7) above, the following requirements apply to construction of the soil component of liner systems. All required testing and analysis shall be performed in accordance with generally accepted engineering procedures, such as those promulgated by the American Society for Testing and Materials (ASTM). Parenthetic references to ASTM methods are intended as guidance only.

(a) A construction quality assurance/quality control plan shall be prepared for each soil liner project to outline project specifications and construction requirements. The plan shall specify performance criteria for the soil liner, and provide quality control testing procedures and minimum sampling frequencies. In addition, the plan shall define the responsibilities of the parties that will be involved in soil liner construction, and shall present minimum qualifications of each party to fulfill their identified responsibilities.

(b) Field and laboratory testing during liner construction shall be conducted by a qualified soil-testing laboratory representing the owner. A qualified field technician representing the owner shall provide full time, on-site inspection during liner construction. The field technician shall work under the supervision of a professional engineer with experience in soil liner construction.

(c) Prior to soil liner installation, an appropriate borrow source shall be located. Suitability of the liner construction materials from that source shall be determined in accordance with the following:

1. If demonstrated field experience is available from at least three prior successful projects of five or more acres each to document that a given borrow source can meet the requirements of the project specifications, then extensive laboratory testing of the borrow source will not be required. However, the source of material shall be geologically similar to and the methods of excavating and stockpiling the material shall be consistent with those used on the prior projects. Furthermore, a minimum of three representative samples from the appropriate thickness of the in-situ stratum or from stockpiles of the borrow material proposed for liner construction shall be submitted to an independent soil testing laboratory to document through index testing that the proposed material is consistent with the material used on prior successful projects. At a minimum, index testing shall consist of percent fines, Atterberg limits and moisture content determinations.

2. If demonstrated field experience as defined above is not available or cannot be documented, then the following requirements shall be met.

a. A field exploration and laboratory testing program shall be conducted by an independent soil testing laboratory to document the horizontal and vertical extent and the homogeneity of the soil strata proposed for use as liner material. A sufficient number of index tests from each potential borrow stratum shall be performed to quantify the variability of the borrow materials and to document that the proposed borrow material complies with specifications. At a minimum, the index tests shall consist of percent fines, Atterberg limits and moisture content determinations.

b. Sufficient laboratory hydraulic conductivity tests shall be conducted on samples representative of the range invariability of the proposed borrow source (ASTM D-5084). For each such sample, test specimens shall be prepared and tested to cover the range of molding conditions (moisture content and dry density) required by project specifications. The hydraulic conductivity tests shall be conducted in triaxial type permeameters. The test specimens shall be consolidated under an isotropic consolidation stress no greater than 10 pounds per square inch and permeated with water under an adequate backpressure to achieve saturation of the test specimens. The inflow to and outflow from the specimens shall be monitored with time and the hydraulic conductivity calculated for each recorded flow increment. The test shall continue until steady state flow is achieved and relatively constant values of hydraulic conductivity are measured (ASTM D-5084). The borrow source will only be considered suitable if the hydraulic conductivity of the material, as documented on laboratory test specimens, can be shown to meet the requirements of the project specifications at the 98 percent confidence level.

(d) Prior to full-scale liner installation, a field test section or test strip shall be constructed at the site above a prepared subbase. The test strip shall be considered acceptable if the measured hydraulic conductivities of undisturbed samples from the test strip meet the requirements of the project specifications at the 98 percent confidence level. If the test section fails to achieve the desired results, additional test sections shall be constructed in accordance with the following requirements:

1. The test section shall be of sufficient size such that full-scale liner installation procedures can be duplicated within the test section;

2. The test section shall be constructed using the same equipment for spreading, kneading and compaction and the same construction procedures (e.g., number of passes, moisture addition and homogenization, if needed) that are anticipated for use during full-scale liner installation;

3. At a minimum, the liner test section shall be subject to the following field and laboratory testing requirements:

a. A minimum of five random samples of the liner construction material delivered to the site during test section installation shall be tested for moisture content (ASTM D-2216), percent fines (ASTM D-1140) and Atterberg limits (ASTM D-4318);

b. At least five field density and moisture determinations shall be performed on each lift of the compacted liner test section;

c. Upon completion of the test section lift, the thickness of the lift shall be measured at a minimum of five random locations to check for thickness adequacy; and

d. A minimum of five Shelby tube or drive cylinder (ASTM D-2937) samples shall be obtained from each lift of the test section for laboratory hydraulic conductivity testing. Laboratory hydraulic conductivity testing shall be conducted in triaxial type permeameters (ASTM D-5084). The test specimens shall be consolidated under an isotropic consolidation stress no greater than 10 pounds per square inch and permeated with water under an adequate backpressure to achieve saturation of the test specimens. The inflow to and outflow from the specimens shall be monitored with time and the hydraulic conductivity calculated for each recorded flow increment. The test shall continue until steady state flow is achieved and relatively constant values of hydraulic conductivity are measured (ASTM D-5084).

(e) Full scale liner installation may begin only after completion of a successful liner test section. During liner construction, quality control testing shall be provided to document that the installed liner conforms to project specifications. The testing frequencies for quality control testing are specified below; however, during construction of the first five acres of the liner, these frequencies shall be doubled. Samples shall be obtained from random locations selected by an independent soil testing laboratory. If there are indications of a change in product quality or construction procedures during liner construction, additional tests shall be performed to determine compliance.

1. Field testing during liner installation. The following field tests shall be performed:

a. Prior to the laying of the liner materials, the liner subbase shall be compacted to the specified density. Density tests shall be conducted at a minimum rate of two tests per acre;

b. A minimum of two moisture content and field density determinations shall be conducted per acre per lift of the compacted liner. The degree of compaction shall be checked using the one-point field Proctor test or other appropriate test procedures; and

c. A minimum of four thickness measurements shall be conducted per acre per lift of the compacted liner.

2. Laboratory testing during liner installation. The following laboratory tests shall be performed:

a. Percent fines (ASTM D-1140) of the liner construction material shall be determined at a minimum frequency of two tests per acre per lift of installed liner;

b. Atterberg Limits determinations shall be performed on one sample per acre per lift of installed liner; and

c. Hydraulic conductivity testing of Shelby tube or drive cylinder (ASTM D-2937) samples of the compacted liner shall be performed at a minimum frequency of one test per acre per lift. Laboratory hydraulic conductivity tests shall be conducted in triaxial type permeameters (ASTM D-5084). The test specimens shall be consolidated under an isotropic consolidation stress no greater than 10 pounds per square inch and permeated with water under an adequate backpressure to achieve saturation of the test specimens. The inflow to and outflow from the specimens shall be monitored with time and the hydraulic conductivity calculated for each recorded flow increment. The test shall continue until steady state flow is achieved and relatively constant values of hydraulic conductivity are measured.

(f) If the test data from a liner section does not meet the requirements of the project specifications, additional random samples may be tested from that liner section. If such additional testing demonstrates that the thickness and hydraulic conductivity meet the requirements of the project specifications at the 95 percent confidence level, that liner section will be considered acceptable. If not, that liner section shall be reworked or reconstructed so that it does meet these requirements.

(9) Surface water management systems.

(a) Stormwater shall be controlled in accordance with Part IV of Chapter 373, F.S., and the rules promulgated thereunder. A copy of any permit for stormwater control issued by the Department, or documentation that no such permit is required, shall be submitted to the Department and construction authorized by that permit shall be completed before the facility receives waste for disposal. Applicants should be aware that other government agencies may also regulate stormwater management and may require separate permits.

(b) A stormwater management system shall be designed, constructed and maintained which, at a minimum, prevents stormwater from the peak discharge of the 25 year storm event from running onto those portions of the landfill which have not been closed.

(c) Stormwater management systems shall be designed to avoid mixing of stormwater with leachate. Stormwater or other surface water which comes into contact with the landfilled solid waste or mixes with leachate shall be considered leachate and is subject to the requirements of Rules 62-701.500(8) and 62-701.510(5), F.A.C.

(10) Gas control systems. Landfills that receive degradable wastes shall be designed and constructed with a gas management system that complies with the requirements of Rule 62-701.530, F.A.C.

(11) Landfills in ground water. A landfill constructed so that the bottom liner is constantly in contact with ground water is not prohibited by this rule. However, an applicant proposing such a design shall include special design features which demonstrate that the landfill will provide an equivalent degree of protection for the environment as would a similar landfill whose bottom liner is not in contact with ground water. Such a design is not entitled to the presumption of compliance with performance standards which is set forth in subsection (1) of

this section. In addition to any other assurances of financial responsibility for closure, an applicant shall provide a performance bond sufficient to ensure long-term maintenance and operation of the leachate collection system.
Specific Authority 403.061, 403.704, FS.
Law Implemented 403.702, 403.704, 403.707, FS.
History -- New 1-6-93, Amended 1-2-94, 5-19-94, Formerly 17-701.400, Amended 5-27-01.

62-701.410 Hydrogeological and Geotechnical Investigation Requirements.

(1) Hydrogeological investigation and site report. The hydrogeological investigation and site report required by Rule 62-701.330(3), F.A.C., shall be site specific, shall be conducted by or under the supervision of a professional geologist or professional engineer with experience in hydrogeologic investigations, and shall:

(a) Define the landfill site geology and hydrology and its relationship to the local and regional hydrogeologic patterns including:

1. Direction and rate of ground water and surface water flow, including seasonal variations;

2. Background quality of ground water and surface water;

3. Any on site hydraulic connections between aquifers;

4. For all confining layers, semi-confining layers, and all aquifers below the landfill site that may be affected by the landfill, the porosity or effective porosity, horizontal and vertical permeabilities, and the depth to and lithology of the layers and aquifers; and

5. Topography, soil types and characteristics, and surface water drainage systems of the site and surrounding the site.

(b) Include an inventory of all the public and private water wells within a one-mile radius of the proposed landfill site. The inventory shall include, where available:

1. The approximate elevation of the top of the well casing and the depth of each well:

2. The name of the owner, the age and usage of each well, and the estimated daily pumpage; and

3. The stratigraphic unit screened, well construction technique, and static water levels of each well.

(c) Identify and locate any existing contaminated areas on the landfill site.

(d) Include a map showing the locations of all potable wells within 500 feet of the waste storage and disposal areas, and locations of all wells serving community water supplies within 1000 feet of the waste storage and disposal areas, to demonstrate compliance with Rules 62-701.300(2)(b) and (h), F.A.C.

(2) Geotechnical site investigation. The geotechnical site investigation required by Rule 62-701.330(3), F.A.C., shall be conducted by or under the supervision of a professional engineer with experience in geotechnical engineering. Prior to any construction on the landfill site, the engineer shall define the engineering properties of the site that are necessary for the design, construction, and support of the landfill and all installations of the facility and shall:

(a) Explore and describe subsurface conditions including soil stratigraphy and ground water table conditions;

(b) Explore and address the presence of muck, previously filled areas, soft ground, lineaments, and sinkholes;

(c) Evaluate and address fault areas, seismic impact zones, and unstable areas as described in 40 CFR 258.13, 258.14 and 258.15.

(d) Include estimates of the average and maximum high ground water table across the site; and

(e) Include a foundation analysis to determine the ability of the foundation to support the loads and stresses imposed by the landfill. It may include geotechnical measures necessary to modify the foundation to accommodate the imposed loads and stresses. The foundation shall be analyzed for short-term, end of construction, and long-term stability and settlement conditions. Considering the existing or proposed subgrade conditions and the landfill geometry, analysis shall include:

1. Foundation bearing capacity;
2. Subgrade settlements, both total and differential; and
3. Subgrade slope stability.

(3) Report. The geotechnical site investigation report shall describe the site subsurface conditions and shall include, at a minimum, the methods used in the investigation, all soil boring logs and laboratory results, analytical calculations, cross sections, interpretations and conclusions.

(4) Report verification. The site reports and supporting information, including detailed description of the methods, calculations, and interpretations used, shall be signed and sealed by the professional engineer or geologist.

Specific Authority 403.061, 403.704, FS.
Law Implemented 403.0877, 403.702, 403.704, 403.707, FS.
History -- New 1-6-93, Formerly 17-701.410, Amended 12-23-96, 5-27-01.

62-701.420 Geotechnical Investigation Requirements.

Specific Authority 403.061, 403.704, FS.
Law Implemented 403.702, 403.704, 403.707, FS.
History -- New 1-6-93, Amended 1-2-94, Formerly 17-701.420, Repealed 12-23-96.

62-701.430 Vertical Expansion of Landfills.

(1) Applicability. Construction of a solid waste disposal unit on top of or against the side slopes of a previously filled landfill, whether active, closed, or inactive is considered vertical expansion of that landfill. Vertical expansion shall require either a modification of the landfill permit, or a new permit if the landfill has been closed. If a landfill has not been closed at the time of the vertical expansion, then the closure requirements of that landfill will apply at the time of closure of the vertical expansion, unless the closure requirements for the vertical expansion are more stringent. The following requirements shall apply:

(a) The vertical expansion shall not cause or contribute to any leachate leakage from the existing landfill, and shall not adversely affect the closure design of the existing landfill.

(b) For vertical expansion over lined landfills, no interface liner is required between the old and new landfill slopes.

(c) For vertical expansion over unlined landfills or landfills that were not constructed in accordance with permit requirements, the vertical expansion shall comply with all the requirements of Rule 62-701.400, F.A.C., with the following exceptions:

1. Side slopes of six feet horizontal to one foot vertical rise or steeper require the installation of a single geomembrane slope liner overlain by a leachate collection and removal system;

2. The slope liner shall consist of a 60-mil or thicker geomembrane with a maximum water vapor transmission rate of 0.24 g/(m^2 x day) as determined by ASTM Method E96-00, procedure BW, "Standard Test Methods for Water Vapor Transmission of Materials."

3. The liner shall be protected from physical damage by a 24-inch thick protective layer above the liner and a bedding layer below the liner at least 24 inches thick to protect against the calculated differential settlement.

4. In all vertical expansion construction, grades shall slope toward the new expansion area.

5. If the vertical expansion consists exclusively of construction and demolition debris, the expansion must comply with the requirements of Rule 62-701.730, F.A.C., as well as paragraph (a) of this subsection. If the vertical expansion consists exclusively of land clearing debris, the expansion must comply with the requirements of Rule 62-701.803, F.A.C., as well as paragraph (a) of this subsection.

6. If the vertical expansion consists of a composting operation, it must meet the requirements of Chapter 62-709, F.A.C., as well as paragraph (a) of this subsection.

7. If the vertical expansion consists of a Class III landfill, the provisions of Rule 62-701.340(3)(c), F.A.C., apply.

(d) The provisions of Rule 62-701.610(7), F.A.C., are applicable to all operations, including recycling operations, conducted on top of closed landfills.

(2) Construction requirements. The design for the vertical expansion shall also provide calculations and supporting information on the following factors:

(a) Construction on the slopes of a filled landfill requires a determination of foundation stability in accordance with Rule 62-701.410, F.A.C., and calculations for the total settlement of the waste in the existing landfill and the waste that will be disposed of in the new disposal area to be constructed. Total settlement calculations shall address both compression and differential settlement and shall be based on worst case predictions. Total settlement calculations shall show the final elevations of the liner systems, that gravity drainage will be maintained, and that no other component of the design will be adversely affected.

(b) The vertical expansion design shall achieve a minimum safety factor of 1.5 for:

1. The liner system stability for liner systems installed over existing landfill slopes to prevent sliding along the interface between liner system components; and

2. Deep stability, to prevent sliding along all potential failure surfaces through the waste mass, along the liner systems, and through the foundation soils.

(c) Surface water management during construction of the vertical expansion over the slopes of an existing landfill shall be consistent with Rule 62-701.400(9), F.A.C., and shall require proper design of the drainageway at the interface between the existing slopes and vertical expansion area. The design shall:

1. Prevent infiltration into the existing and new landfills;
2. Minimize erosion of cover materials;
3. Carry the calculated flow; and
4. Comply with the cover requirements.

(d) A gas control system shall be installed to vent gas from the interface between the existing landfill slopes and the vertical expansion slopes to prevent accumulation of gas under the new liner system. Gas venting is achieved by installing a gas-venting layer under the entire slope that will be covered by the new liner system. The gas-venting layer shall convey gas to vertical vents at the crest of the interface slopes.

Specific Authority 403.061, 403.704, FS.
Law Implemented 403.702, 403.704, 403.707, FS.
History -- New 1-6-93, Amended 5-19-94, Formerly 17-701.430, Amended 5-27-01.

62-701.500 Landfill Operation Requirements.

(1) Operating personnel. All Class I and Class III landfills shall have at least one trained operator at the landfill during all times when the landfill receives waste, in accordance with Rule 62-701.320(15), F.A.C. If an operator is employed at a Class II landfill, that person must be a trained operator. All Class I and Class III landfills shall have at least one trained spotter at each working face at all times when the landfill receives waste to detect unauthorized wastes.

(2) Operation plan. Each landfill owner or operator shall have an operational plan that provides written, detailed instructions for the daily operation of the landfill. The operation plan shall be kept at or near the landfill facility and shall be accessible to landfill operators. The operation plan shall be substantially complied with at all times, and shall be revised if operational procedures change. The plan shall include procedures for:

(a) Designation of persons responsible for operation and maintenance of the facility;

(b) Contingency operations, alternate waste handling and disposal methods in case of emergency such as a fire, natural disaster or equipment failure;

(c) Controlling the type of waste received at the site. The plan shall specify inspection procedures, number and location of spotters for each working face, and procedures to be followed if prohibited wastes are discovered;

(d) Weighing incoming waste, if required under Rule 62-701.500(4)(a), F.A.C.;

(e) Vehicle traffic control and unloading;

(f) Method and sequence of filling waste;

(g) Waste compaction and application of cover;

(h) Operations of gas, leachate, and stormwater controls;

(i) Water quality monitoring; and

(j) Maintaining and cleaning the leachate collection system.

(3) Operating record. The operating record shall consist of: all records, reports, analytical results, demonstrations, and notifications required by this chapter; any construction, operation, and closure permits, including all modifications to those permits, issued by the Department, along with the engineering drawings and supporting information; and the training records required by Rule 62-701.320(15), F.A.C. The record is considered part of the operation plan, and shall be kept with the plan at or near the landfill facility, or in an alternate location designated in the operating permit which is readily accessible to landfill operators. The operating record shall be available for inspection at reasonable times by Department personnel.

(4) Waste records.

(a) The owner or operator of a Class I or Class III landfill, or of a Class II landfill owned or operated by a county or municipality, shall weigh all solid waste as it is received. Landfill operators shall record, in tons per day, the amount of solid waste received and shall estimate the amount of wastes listed in paragraph (b) of this subsection. Waste reports shall be compiled monthly, and copies shall be provided to the Department quarterly.

(b) Types of waste received:

1. Household waste
2. Commercial waste
3. Ash residue
7. Agricultural waste
8. Industrial waste
9. Yard trash

4. Incinerator by-pass waste
5. Construction and demolition debris
6. Treated biomedical waste
10. Sewage sludge
11. Industrial sludge
12. Water/air treatment sludges
13. Waste tires

(5) Control of access. To prevent unauthorized waste disposal, access to and use of the facility shall be controlled by fencing, gates, or other barriers, as well as signs and facility personnel. Public access and receipt of wastes shall occur only when an attendant is on duty.

(6) Monitoring of waste.

(a) The owner or operator shall implement a load-checking program to detect and discourage attempts to dispose of unauthorized wastes at the landfill. The load-checking program shall consist of the following minimum requirements:

1. The landfill operator shall examine at least three random loads of solid waste delivered to the landfill each week. The waste collection vehicle drivers selected by the inspector shall be directed to discharge their loads at a designated location within the landfill. A detailed inspection of the discharged material shall be made for any unauthorized wastes. If the landfill owner or operator also owns or operates a transfer station, this inspection may be carried out at that transfer station before delivery of the waste to the landfill.

2. If unauthorized wastes are found, the facility shall contact the generator, hauler, or other party responsible for shipping the waste to the landfill to determine the identity of the waste sources.

(b) Handling hazardous wastes.

1. If any regulated hazardous wastes are identified by random load checking, or are otherwise discovered to be improperly deposited at the landfill, the landfill operator shall promptly notify the Department, the person responsible for shipping the wastes to the landfill, and the generator of the wastes, if known. The area where the wastes are deposited shall immediately be cordoned off from public access. If the generator or hauler cannot be identified, the landfill operator shall assure the cleanup, transportation, and disposal of the waste at a permitted hazardous waste management facility.

2. Subsequent shipments from sources found or suspected to be previously responsible for shipping regulated hazardous waste shall be subject to precautionary measures prior to the solid waste management facility accepting wastes.

(c) Recording inspection results. Information and observations resulting from each random inspection shall be recorded in writing and retained at the landfill for at least three years. The recorded information shall include, at a minimum: the date and time of the inspection; the names of the hauling firm and the driver of the vehicle; the vehicle license plate number; the source of the waste, as stated by the driver; and observations made by the inspector during the detailed inspection. The written record shall be signed by the inspector.

(7) Waste handling requirements.

(a) All solid waste at Class I and Class II landfills shall be spread in layers of approximately two feet in thickness and compacted to approximately one foot in thickness or as thin a layer as practical before the next layer is applied. Solid waste at all Class III sites shall be spread in layers and compacted once every week using suitable heavy equipment. Bulky materials which are not easily compacted should be worked into other materials as much as practical.

(b) The first layer of waste placed above the liner and leachate collection system shall be a minimum of four feet in compacted thickness and consist of selected wastes containing no large rigid objects that may damage the liner or leachate collection system.

(c) Solid waste shall be formed into cells to construct horizontal lifts. The working face of the cell, and side grades above land surface, shall be at a slope no greater than three feet horizontal to one foot vertical rise. Lift depth should normally not exceed 10 feet but may be deeper, depending on specific operations, daily volume of waste, width of working face, and good safety practices.

(d) The working face shall be only wide enough to accommodate vehicles discharging waste, and to minimize the exposed area and unnecessary use of cover material.

(e) Initial cover shall be applied and maintained at landfills in order to minimize any adverse environmental, safety, or health effects such as those resulting from birds, unauthorized wastes, blowing litter, odors, disease vectors, or fires. The minimum frequency for applying cover is:

1. For Class I and II landfills, at the end of each working day. However, for those areas where solid waste will be deposited on the working face within 18 hours, initial cover may consist of a temporary cover, such as a tarpaulin, which may be removed prior to deposition of additional waste; and

2. For Class III landfills, at the end of each work week.

(f) An intermediate cover in addition to the six-inch initial cover shall be applied and maintained within seven days of cell completion if additional solid waste will not be deposited within 180 days of cell completion. The landfill operator may remove all or part of the intermediate cover before placing additional waste or installing final cover.

(g) Solid waste disposal units which have been filled to design dimensions shall receive final cover within 180 days after attaining final elevation or in accordance with the closure plan for the landfill.

(h) Uncontrolled and unauthorized scavenging shall not be permitted at any landfill site. Controlled salvaging for recycling may be permitted by the landfill operator.

(i) A litter policing operation shall be employed to keep litter from leaving the working area of the landfill. Litter outside the working area shall be picked up within 24 hours. Some litter may be exposed through the initial cover if it is in traffic areas and away from public view.

(j) Erosion control measures shall be employed to correct any erosion which exposes waste or causes malfunction of the storm water management system. Such measures shall be implemented within three days of occurrence. If the erosion cannot be corrected within seven days of occurrence the landfill operator shall notify the Department and propose a correction schedule.

(8) Leachate management.

(a) The landfill operator is responsible for leachate level monitoring, sampling, analysis of the landfill leachate, and for providing copies of the leachate analysis to the Department.

(b) The landfill operator is responsible for the operation of the leachate collection and removal system and for maintaining the system as designed for the design period. Leachate shall be collected and treated as necessary so that water quality standards and criteria are not violated. If the leachate is classified as a hazardous waste, it shall be managed in accordance with Chapter 62-730, F.A.C.

(c) Leachate may be discharged to an off-site treatment plant. The landfill operator is responsible for having a written contract or agreement with the off-site treatment plant to discharge leachate to the plant.

(d) On-site leachate treatment or pretreatment systems are part of the leachate collection and removal system and shall be designed according to the expected characteristics of the leachate. The design may include adjustments to the system as necessary to accommodate changing leachate characteristics.

(e) The landfill operator shall have a prepared contingency plan to handle leachate collection, removal, and treatment problems such as interruptions of discharges to a treatment plant.

(f) Quantities of leachate collected by the leachate collection and removal system shall be recorded in gallons per day before on-site treatment or transport off-site, and shall be included with the operating record.

(g) A recording rain gauge shall be installed, operated, and maintained to record precipitation at the landfill. Precipitation records shall be included with the operating record and shall be maintained and used by the permittee to compare with leachate generation rates.

(h) New leachate collection systems shall be water pressure cleaned or inspected by video recording after construction but prior to initial placement of wastes. Existing leachate collection systems shall be water pressure cleaned or inspected by video recording at the time of permit renewal. Results of the collection system cleanings or inspections shall be available to the Department upon request.

(9) Gas monitoring. All landfills that have received degradable wastes shall implement a gas management system to meet the requirements of Rule 62-701.530, F.A.C.

(10) Stormwater system management. Stormwater management systems shall be operated and maintained as necessary to meet the requirements of Rule 62-701.400(9), F.A.C.

(11) Equipment and operation features. The landfill shall have:

(a) Sufficient equipment to ensure proper operation of the landfill and for excavating, spreading, compacting, and covering waste;

(b) Sufficient reserve equipment or arrangement to obtain additional equipment within 24 hours of equipment breakdown;

(c) Communications equipment for emergency and routine communications;

(d) Dust control methods;

(e) Fire protection and fire-fighting capabilities adequate to control accidental burning of solid waste in the landfill. Fire protection includes procedures for notification of local fire protection agencies for assistance in emergencies;

(f) Litter control devices, portable fences, or other suitable devices; and

(g) Signs indicating the name of the operating authority, traffic flow, hours of operations and restrictions or conditions of disposal.

(12) Roads. The landfill shall have:

(a) An all-weather access road that is passable and safe under normal operating conditions; and

(b) An inside perimeter road and other on-site roads, maintained to allow access to monitoring devices and stormwater controls, for landfill inspections and fire fighting.

(13) Recordkeeping. In addition to records and reporting required by other sections of this chapter, the landfill owner or operator shall:

(a) Keep records of all information used to develop or support the permit applications and any supplemental information submitted to comply with this chapter pertaining to construction of the landfill throughout the design period. Records pertaining to the operation of the landfill shall be kept for the design period of the landfill.

(b) Retain records of all monitoring information, including calibration and maintenance records, all original chart recordings for continuous monitoring instrumentation, and copies of all records required by permit, for at least ten years. Background water quality records shall be kept for the design period of the landfill.

(c) Maintain an annual estimate of the remaining life and capacity in cubic yards of the existing, constructed landfill and remaining capacity and site life of other permitted areas not yet constructed. The annual estimate shall be based on a summary of the heights, lengths, and widths of the solid waste disposal units. The estimate shall be made and reported annually to the Department.

(d) Records which are more than five years old and which are required to be retained may be archived, provided that the landfill operator can retrieve them for inspection within seven days.

Specific Authority 403.061, 403.704, FS.
Law Implemented 403.702, 403.704, 403.707, FS.
History -- New 1-6-93; Amended 1-2-94, 5-15-94, Formerly 17-701.500, Amended 5-27-01.

62-701.510 Water Quality and Leachate Monitoring Requirements.

(1) Applicability.

(a) This section shall apply only to applications for construction or lateral expansion of a solid waste disposal unit received after January 6, 1993. However, no later than October 9, 1994, owners or operators of all solid waste disposal units receiving waste after January 6, 1993 shall submit their permit for modification to comply with the following:

1. Leachate shall be sampled and analyzed in accordance with subsection (5) and paragraph (6)(c) of this section (if the unit is lined);

2. All monitoring wells specified in the permit shall be sampled and analyzed semi-annually for the parameters listed in paragraph (8)(a) of this section; and

3. The water quality monitoring results shall be reported as required in subsection (9) of this section.

(b) This rule is intended to supplement the ground water monitoring requirements of Chapter 62-522, F.A.C. Any provisions of Chapter 62-522, F.A.C., which are not in direct conflict with the provisions of this rule remain applicable. This rule does not relieve a person from compliance with any permit condition or Department order, nor does it limit the Department's authority to modify a permit or ground water monitoring plan in accordance with Chapter 62-522, F.A.C.

(c) The requirements of this rule are the minimum standards for monitoring water quality and leachate. Nothing in this rule shall be construed to prevent the Department from imposing more stringent standards as necessary to protect the environment and the public health and safety due to site specific conditions and types of wastes to be disposed of in landfills or solid waste disposal units.

(2) Water quality monitoring plan and system.

(a) The permit applicant shall provide to the Department a water quality monitoring plan for the landfill that describes the proposed ground water, surface water, and leachate monitoring systems. The plan shall be based on the hydrogeological investigation required in Rule 62-701.410, F.A.C., and be prepared by, or under the supervision of, a professional geologist or professional engineer with experience in hydrogeologic investigations. The plan shall be signed and sealed by the professional geologist or professional engineer.

(b) The water quality monitoring system shall be installed and consist of: a sufficient number of ground water wells installed at appropriate locations and depths to yield ground water samples from the uppermost aquifer, as well as other aquifers reasonably expected to be affected by the landfill; surface water monitoring points installed at locations to yield samples of surface water that may be affected by the landfill; and leachate monitoring points to yield representative leachate samples. All sampling and analysis activities shall be performed in accordance with Chapter 62-160, F.A.C.

(c) The water quality monitoring plan shall comply with the provisions of Rule 62-522.600(3), F.A.C. The applicant shall specify sampling locations and frequency in the water quality monitoring plan, and shall provide justification for these locations and frequencies based upon site conditions.

(3) Ground water monitoring.

(a) Two or more detection wells shall be located within the zone of discharge hydraulically downgradient from the solid waste disposal unit, to detect leachate releases. These wells shall be located no more than 50 feet from the edge of the solid waste disposal unit, unless site specific conditions make such placement impractical. These wells shall be capable of monitoring each solid waste disposal unit as it is operated. However, in accordance with Section 403.704(14), F.S., only one detection well is required at Class II landfills unless it is affirmatively demonstrated by the Department that a significant change in the initial quality of the water has occurred in the detection well which adversely affects the beneficial uses of the water.

(b) Multiple downgradient compliance wells shall be located at or immediately adjacent to the compliance line of the zone of discharge, if required in subsection (7) of this section. If site-specific conditions require installation of compliance wells within the zone of discharge, then a confirmed exceedance of a ground water standard above background at such wells will be considered a violation of that standard.

(c) A sufficient number of background wells installed as part of the site hydrogeological investigation required in Rule 62-701.410, F.A.C., shall be maintained throughout the design life of the landfill to provide information on background water quality.

(d) Monitoring wells.

1. The location of each well, in degrees, minutes and seconds of latitude and longitude, and the elevation of the top of the well casing to the nearest 0.01 foot, National Geodetic Vertical Datum (NGVD 1929), shall be determined by a registered Florida land surveyor.

2. An identification number shall be assigned by the Department to each monitoring well in accordance with the Department's Water Assurance Compliance System computer file. The identification number shall be used on all water quality monitoring reports.

3. Well spacing shall be spaced no greater than 500 feet apart across the downgradient direction of ground water flow, and no greater than 1500 feet apart across the upgradient direction of ground water flow, in the uppermost aquifer within the zone of discharge, unless site specific conditions support the use of alternate well spacing. Conditions to be considered

include, but are not limited to, ground water flow directions and rates, estimated longitudinal and transverse dispersivity rates, proximity to or presence of sensitive environments and ground water users, nature of the wastes, method of disposal, and the proposed design and size of the facility.

4. Well screens shall be located to readily detect representative ground water conditions within the saturated thickness of the uppermost aquifer within the zone of discharge. Well screens shall not act as conduits through confining layers between water bearing strata. The annular space (the space between the borehole and well casing) above the sampling depth shall be sealed to prevent contamination of samples and ground water. Wells monitoring the unconfined water table shall be screened so that the water table can be sampled at all times. The applicant shall provide technical justification for the actual screen length chosen.

5. Any monitoring wells which are abandoned or which will be covered due to lateral expansions of a landfill or the construction of new solid waste disposal units shall be plugged as necessary so that they do not act as a conduit for any leachate release to the ground water. The Department shall be notified in writing before any monitoring wells are abandoned or plugged.

6. Detection sensors capable of detecting changes in ground water that may indicate leachate releases, linked to a data recorder, may be used to augment detection wells or may be used as an alternative to detection wells, upon demonstration of their effectiveness to the Department.

(4) Surface water monitoring.

(a) All surface water bodies that may be affected by a contaminant release from the facility shall be monitored, except bodies of water contained completely within the property boundaries of the disposal site which do not discharge from the site to surface waters. In bodies of standing water, one or more representative monitoring points shall be located as close as practical to the facility. For flowing water bodies, a sufficient number of upgradient and downgradient locations shall be used to allow the effect of the landfill to be measured.

(b) Discharges from detention ponds for storm water shall be sampled at the point of discharge to waters of the state or from the property, whichever is closer to the detention pond.

(c) The details concerning the sampling locations and the analysis requirements shall be specified in the water quality monitoring plan. Each monitoring location shall be marked and its position shall be determined by a registered Florida land surveyor in degrees, minutes and seconds of latitude and longitude.

(5) Leachate sampling. The water quality monitoring plan shall specify the location of, and proposed protocol for, landfill leachate sampling to obtain a representative characterization of the leachate composition in the leachate collection and removal system as the leachate comes from the wastes and before it is subjected to conditions that may change the characteristics of the leachate. All sampling points shall be located to minimize pumping of leachate before sampling.

(6) Initial and routine sampling frequency and requirements. Except as otherwise specified in a Department permit or order or in subsection (7) of this section, frequency of sampling and analysis shall comply with the following. However, the owner or operator of a solid waste disposal unit may request a permit modification from the appropriate District Office of the Department to delete specific monitoring parameters or field parameters from routine analyses of detection or compliance wells and surface water. The Department will grant such modification upon a demonstration that these parameters are not reasonably expected to be in or derived from the waste contained in the unit.

(a) Demonstration to delete parameters. A demonstration to delete monitoring parameters may include an evaluation of:

1. The concentration or contrast between monitoring parameters in leachate and in background water quality; and

2. The types, quantities and concentrations of constituents in the wastes, and their degradation products, managed at the facility;

(b) Initial background water quality.

1. Initial background water quality for a proposed landfill shall be determined by analysis of at least one water sample taken from each well that was installed, and each surface water monitoring location that was established, during the site hydrogeological investigation. The water quality information shall be submitted to the Department as part of the supporting information for the permit application.

2. Sampling and analysis for initial background ground water quality shall be for the parameters listed in paragraphs (8)(a) and (8)(d) of this section.

3. Sampling and analysis for initial background surface water quality shall be for the parameters listed in paragraph (8)(b) of this section.

(c) Routine leachate sampling.

1. Leachate shall be sampled and analyzed annually for the parameters listed in paragraphs (8)(c) and (d) of this section.

2. For landfills which are receiving waste, if this annual analysis indicates that a contaminant listed in 40 CFR Part 261.24 exceeds the regulatory level listed therein, the permittee shall initiate monthly sampling and analysis and shall notify the Department in writing. If in any three consecutive months no listed contaminant is found to exceed the regulatory level, the permittee may discontinue the monthly sampling and analysis and return to a routine sampling schedule.

(d) Routine monitoring well sampling. All detection wells, and a representative sample of background wells, shall be sampled and analyzed for the ground water parameters listed in paragraph (8)(a) of this section, in accordance with the water quality monitoring plan. For lined landfills, this shall be done at least semi-annually. The owner or operator of a solid waste disposal unit may request a permit condition or modification from the appropriate District Office of the Department to use an alternate monitoring frequency for background wells. The Department will approve such condition or modification upon a demonstration that the alternate frequency is appropriate based upon site specific lithology of the aquifer and unsaturated zone, hydraulic conductivity of the aquifer and unsaturated zone, ground water flow rates, minimum distance of travel and the fate and transport of parameters detected.

(e) Routine surface water sampling. Surface waters shall be sampled and analyzed semi-annually for the parameters listed in paragraph (8)(b) of this section, in accordance with the water quality monitoring plan.

(7) Evaluation monitoring, prevention measures and corrective action.

(a) Evaluation monitoring. If monitoring parameters are detected in detection wells in concentrations which are significantly above background water quality, or which are at levels above the Department's water quality standards or criteria specified in Chapter 62-520, F.A.C., the permittee may resample the wells within 30 days after the sampling data is received, to confirm the data. Should the permittee choose not to resample, the Department will consider the water quality analysis as representative of current ground water conditions at the facility. If the data is confirmed, or if the permittee chooses not to resample, the permittee shall notify the

Department in writing within 14 days of this finding. Upon notification by the Department, the permittee shall initiate evaluation monitoring as follows:

1. Routine monitoring of all monitoring wells, surface water monitoring locations and leachate sampling locations shall continue according to the requirements of subsection (6) of this section.

2. Within 90 days of initiating evaluation monitoring and annually thereafter, the permittee shall sample and analyze a representative sample of the background wells and all affected detection wells for the parameters listed in paragraph (8)(d) of this section. Any new parameters detected and confirmed in the affected downgradient wells shall be added to the routine ground water monitoring parameter lists required in subsection (6) of this section for the affected wells.

3. Within 90 days of initiating evaluation monitoring, the permittee shall install and sample compliance monitoring wells at the compliance line of the zone of discharge and downgradient from the affected detection monitoring wells. These wells shall be installed according to the requirements of paragraph (3)(d) of this section, and samples from these wells and the affected detection wells shall be analyzed quarterly for the parameters listed in paragraphs (8)(a) and (d) of this section.

4. Within 180 days of initiating evaluation monitoring, the permittee shall submit a contamination evaluation plan to the appropriate Department District Office. This plan shall be designed to delineate the extent and cause of the contamination, in order to predict the likelihood that Department water quality standards will be violated outside the zone of discharge, and to evaluate methods to prevent any such violations. After the Department and the permittee agree that the plan is so designed, the permittee shall implement this plan and submit a contamination evaluation report in accordance with the plan. All reasonable efforts shall be made by the permittee to prevent further degradation of water quality from the landfill activities.

5. The owner or operator of a solid waste disposal unit may request a permit modification from the appropriate District Office of the Department to use an alternate monitoring frequency, for repeated sampling during evaluation monitoring. The Department will grant such modification upon a demonstration that the alternate frequency is appropriate based upon site specific lithology of the aquifer and unsaturated zone, hydraulic conductivity of the aquifer and unsaturated zone, ground water flow rates, minimum distance of travel and the fate and transport of parameters detected.

6. The owner or operator of a solid waste disposal unit may request a permit modification from the appropriate District Office of the Department to delete specific monitoring parameters or field parameters from evaluation analyses of detection or compliance wells. The Department will grant such modification upon a demonstration that these parameters are not reasonably expected to be in or derived from the waste contained in the unit.

7. The permittee shall not discontinue evaluation monitoring, and return to routine monitoring only, until authorized to do so by the Department. The Department shall make this determination based upon the results of the contamination evaluation report and other relevant water quality data.

(b) Prevention measures and corrective actions.

1. If the contamination evaluation report indicates that water quality standards are likely to be violated outside the zone of discharge, the permittee shall, within 90 days, submit a prevention measures plan to the Department. Upon approval, the permittee shall initiate prevention measures to prevent such violations.

2. If any contaminants are detected and confirmed in compliance wells in concentrations which exceed both background levels and Department water quality standards or criteria, or are detected and confirmed in detection wells in concentrations which are above Department water quality minimum criteria, the permittee shall notify the Department within 14 days of this finding and shall initiate corrective actions. Evaluation monitoring shall continue according to the requirements of paragraph (7)(a) of this section.

(8) Water quality parameters. The following list of water quality monitoring parameters shall be used for each type of sampling to be done.

(a) Ground water monitoring parameters:

Field parameters	Laboratory parameters
Static water level in wells before purging	Total ammonia - N
Specific conductivity	Chlorides
pH	Iron
Dissolved oxygen	Mercury
Turbidity	Nitrate
Temperature	Sodium
Colors and sheens (by observation)	Total dissolved solids (TDS)
	Those parameters listed in 40 CFR Part 258 Appendix I

(b) Surface water monitoring parameters:

Field parameters	Laboratory parameters
Specific conductivity	Unionized ammonia
pH	Total hardness
Dissolved oxygen	Biochemical oxygen demand (BOD_5)
Turbidity	Copper
Temperature	Iron
Colors, sheens (by observation)	Mercury
	Nitrate
	Zinc
	Total dissolved solids (TDS)
	Total organic carbon (TOC)
	Fecal coliform
	Total phosphates
	Chlorophyll A
	Total nitrogen
	Chemical oxygen demand (COD)
	Total suspended solids (TSS)
	Those parameters listed in 40 CFR Part 258 Appendix I

(c) Leachate monitoring parameters:

Field parameters	Laboratory parameters
Specific conductivity	Total ammonia - N
pH	Bicarbonate
Dissolved oxygen	Chlorides
Colors, sheens (by observation)	Iron
	Mercury
	Nitrate
	Sodium
	Total dissolved solids (TDS)

(d) Those parameters listed in 40 CFR Part 258, Appendix II.

(9) Water quality monitoring reporting.

(a) The landfill owner or operator shall report all water quality and leachate monitoring results to the Department semi-annually, unless a different monitoring frequency is specified in the permit. Water quality data contained in the report may be submitted to the Department electronically, and may be used in place of written copies of the data, if approved by the Department in the permit. The Department shall approve such submittals if the permittee specifies in the operation plan a method of electronic submittals which is compatible with the Department's information systems. The operator of the landfill shall notify the Department at least 14 days before the sampling is scheduled to occur so that the Department may collect split samples. The report shall include at least the following:

1. The facility name and identification number, sample collection dates, and analysis dates;

2. All analytical results, including all peaks even if below maximum contaminant levels;

3. Identification number and designation of all surface water and ground water monitoring points;

4. Applicable water quality standards;

5. Quality assurance, quality control notations;

6. Method detection limits;

7. STORET code numbers for all parameters;

8. Water levels recorded prior to evaluating wells or sample collection. Elevation reference shall include the top of the well casing and land surface at each well site at a precision of plus or minus 0.01 foot (NGVD);

9. An updated ground water table contour map signed and sealed by a professional geologist or professional engineer with experience in hydrogeologic investigations, with contours at no greater than one-foot intervals unless site-specific conditions dictate otherwise, which indicates ground water elevations and flow direction; and

10. A summary of any water quality standards or criteria that are exceeded.;

(b) A technical report, signed and sealed by a professional geologist or professional engineer with experience in hydrogeologic investigations, shall be submitted to the Department every two years, and shall be updated at the time of permit renewal. The report shall summarize and interpret the water quality and leachate monitoring results and water level measurements collected during the past two years. The report shall contain, at a minimum, the following:

1. Tabular displays of any data which shows that a monitoring parameter has been detected, and graphical displays of any leachate key indicator parameters detected (such as pH,

specific conductance, TDS, TOC, sulfate, chloride, sodium and iron), including hydrographs for all monitor wells;

2. Trend analyses of any monitoring parameters consistently detected;

3. Comparisons among shallow, middle, and deep zone wells;

4. Comparisons between background water quality and the water quality in detection and compliance wells;

5. Correlations between related parameters such as total dissolved solids and specific conductance;

6. Discussion of erratic and/or poorly correlated data;

7. An interpretation of the ground water contour maps, including an evaluation of ground water flow rates; and

8. An evaluation of the adequacy of the water quality monitoring frequency and sampling locations based upon site conditions.

(c) All field and laboratory records specified in Rules 62-160.600 - .630, F.A.C., shall be made available to the Department and be retained for the design period of the landfill.

Specific Authority 403.061, 403.704, FS.
Law Implemented 403.702, 403.704, 403.707, FS.
History -- New 1-6-93; Amended 1-2-94, 5-19-94, Formerly 17-701.510, Amended 5-27-01.

62-701.520 Special Waste Handling.

(1) Motor vehicles. Motor vehicles that are brought to a landfill may be stored temporarily in a separate area until they are removed for recycling. If vehicles cannot be recycled, all fluids and batteries shall be removed from the vehicles, and they shall be compacted to minimize voids before being placed in the Class I area.

(2) Landfilling shredded waste. Landfilling shredded solid waste without daily soil cover may be an environmentally acceptable method of final disposal at a landfill that meets the requirements of Rule 62-701.340, F.A.C. A properly designed and operated shredding facility shall be approved by the Department contingent upon the following conditions:

(a) Particle size. Seventy percent of all shredded waste, dry weight, shall be capable of passing through a three-inch screen.

(b) Waste shall be spread to a smooth contour and compacted promptly after placement and left undisturbed to prevent odors. Blowing of shredded waste by the wind shall be controlled.

(c) All solid waste storage areas in the shredding facility shall be maintained and cleaned at the end of each day's operations or during continuous operation, as necessary, to prevent disease vector problems. All equipment shall be designed and maintained to control spillage and to achieve the required product quality.

(d) An operational plan shall include provisions for removal and proper disposal of wastes within 24 hours should the shredding facility breakdown or operational quality be diminished. The operational plan shall include provision for a stock pile of emergency soil cover material and a plan to convert the operation to a conventional landfill operation.

(e) Shredded waste disposal units that fill design dimensions shall be closed in accordance with Rule 62-701.600, F.A.C.

(3) Asbestos waste disposal.

(a) Asbestos-containing waste materials may be accepted for disposal at a permitted Class I, II, or III landfill. Each active waste disposal site that receives asbestos-containing waste material from a source covered under the National Emission Standards for Asbestos, 40 CFR Part 61, Subpart M, shall meet the requirements of 40 CFR Part 61.154, which are incorporated by reference herein. For purposes of this rule, the term "Administrator," when used in 40 CFR Part 61.154, shall mean Secretary of the Department of Environmental Protection.

(b) The waste generator shall make arrangements with the landfill operator before disposal of such regulated asbestos-containing waste materials, and inform the operator of the quantity of the waste and the scheduled date the shipment will arrive at the landfill.

(c) The landfill operator shall direct the waste transporter to the designated disposal location. The disposal location shall be recorded in accordance with 40 CFR Part 61.154, and a record of the asbestos location shall be maintained.

(4) Contaminated soil. Soil which has been contaminated with petroleum products or any other products which are not hazardous wastes may be disposed of in permitted, lined landfills. Petroleum contaminated soil which has been treated pursuant to Chapter 62-713, F.A.C., may be disposed of at permitted disposal facilities and may, if it meets the criteria of Rules 62-701.200(39), (59), and (61), F.A.C., be used as cover material at permitted landfills.

(5) Biological waste disposal.

(a) Disposal of bodies of domestic animals, upon the death of such animals due to disease, shall be accomplished pursuant to Section 823.041(1), F.S. This provision does not prohibit the disposal of such animals in Class I or II landfills.

(b) Disposal of dead poultry and hatchery residue shall be accomplished pursuant to Section 583.181(2), F.S.

(c) Biomedical waste that has been treated may be disposed of as solid waste that is not biomedical. Such treated waste must be in containers clearly labeled with the phrase "Treated Biomedical Waste." The local governments that are responsible for solid waste collection and disposal shall be notified that treated biomedical waste will be disposed of in their facility before such disposal. All transport vehicles transporting treated biomedical waste to a solid waste facility for disposal shall be fully enclosed and secured when unattended. This provision shall not be construed as superseding a solid waste management facility operator's authority to set limitations or restrictions on the disposal of treated biomedical waste at that facility. Treated biomedical waste shall be disposed of only at permitted Class I or II landfills or incinerators used to combust solid waste.

Specific Authority 403.061, 403.704, FS.
Law Implemented 403.702, 403.704, 403.705, 403.707, 403.708, FS.
History -- Formerly 10D-12.07, 10-1-74, Amended 5-24-79, 11-25-82, 7-10-84, 12-10-85, Formerly 17-7.06, 17-7.060, 17-701.060, Amended 1-6-93, 1-2-94, Formerly 17-701.520, Amended 5-27-01.

62-701.530 Gas Management Systems.

(1) Design requirements.

(a) Landfills that receive degradable wastes shall have a gas management system designed to prevent explosions and fires, and to minimize off-site odors, lateral migration of gases and damage to vegetation. Combustible gases shall be calibrated to methane. Owners or operators of such landfills shall submit a general gas management system design as part of their permit application, and may modify that design as necessary at the time of closure based upon site-specific conditions. Landfill gas management systems shall:

1. Be designed to prevent the concentration of combustible gases generated by the landfill from:

a. Exceeding twenty-five percent of the lower explosive limit for combustible gases in structures on- or off-site, excluding gas control or recovery components; and

b. Exceeding the lower explosive limit for combustible gases at or beyond the landfill property boundary;

2. Be designed for site-specific conditions;

3. Be designed to reduce gas pressure in the interior of the landfill by collecting the gases to prevent them from moving laterally. Collection pipes, pathways, or vents shall collect gas from at least the uppermost two-thirds of the filled waste or where the more anaerobic conditions exist. Air shall not be forced into the collection system. Passive venting or suction shall be used to extract gas; and

4. Be designed to not interfere with or cause failure of the liner, leachate control systems or final cover.

(b) Flaring of landfill gases may be used as a method of gas control, particularly control of objectionable odors, in accordance with the permitting requirements of Chapter 62-296, F.A.C.

(c) Landfills using piping or a similar conduit to convey gas shall be furnished with a positive means of gas condensate collection and disposal at each low point in the conveyance system.

(2) Monitoring requirements. Owners or operators of solid waste disposal units at landfills that have received degradable waste shall implement a routine gas monitoring program to ensure that the design requirements of subsections (1)(a)1 and 3 of this section are met. The routine gas monitoring program shall monitor concentrations of combustible gases at ambient monitoring points and in soil monitoring probes.

(a) Ambient monitoring points. Ambient monitoring points shall be located in on-site structures, excluding gas control or recovery components, that can be impacted by combustible gases from the landfill as determined by the location of these structures and property boundaries of the facility.

(b) Soil monitoring probes. Soil monitoring probes shall be installed along each property boundary segment of the facility, particularly those adjacent to off-site occupied structures within 100 feet of the property boundary or where distressed vegetation is present, and shall be spaced as needed to detect gas migration. When locating the soil monitoring probes, the owner or operator shall also consider the location of facility structures and the soil conditions, hydrogeologic conditions and hydraulic conditions surrounding the facility. Soil monitoring probes shall extend to the depth of the base of waste fill or at least three feet below ground surface, whichever is deeper. Sampling shall be conducted in the headspace of the monitoring probe without purging the gas before collecting the sample. Where sand, gravel, or more gas permeable soil strata may interconnect the waste deposit and the property boundary, multiple depth monitoring probes, or a single monitoring probe extending from the soil surface to the water table, are necessary to draw gas samples from the permeable layers.

(c) All ambient monitoring points and soil monitoring probes shall be sampled quarterly for concentrations of combustible gases, and the results reported to the Department. Combustible gases shall be determined as a percent of the lower explosive limit and shall be calibrated to methane.

(3) Construction and control requirements. The gas management system shall be constructed and operated as authorized by a Department permit or this section.

(a) Gas remediation plan. If the results of monitoring show that combustible gas concentrations exceed the lower explosive limits specified in subsection (1) of this section, the owner or operator shall:

1. Immediately take all necessary steps to ensure protection of human health and notify the Department; and

2. Within 7 days of detection, submit to the Department for approval a gas remediation plan for the gas releases. The plan shall describe the nature and extent of the problem and the proposed remedy. The remedy may include some or all of the gas management system design contained in subsection (1) of this section. The remedy shall be completed within 60 days of detection unless otherwise approved by the Department.

(b) Odor remediation plan. The facility shall be operated to control objectionable odors in accordance with Rule 62-296.320(2), F.A.C. If gas concentrations cause objectionable odors beyond the landfill property boundary, the owner or operator shall:

1. Implement a routine odor monitoring program to determine the timing and extent of any off-site odors; and

2. If the monitoring program confirms the existence of objectionable odors, submit to the Department for approval an odor remediation plan for the gas releases. The plan shall describe the nature and extent of the problem and the proposed remedy. The remedy shall be initiated within 30 days of approval.

(4) Closure requirements. Owners or operators of solid waste disposal units at landfills that have received degradable waste and have been filled to their design dimensions, and have not been certified closed prior to May 27, 2001, shall construct, if not already constructed, and operate a gas management system to ensure that the requirements of subsections (1), (2) and (3) of this section are met.

(5) Landfill gas recovery facilities.

(a) Landfill gas recovery facilities are considered solid waste management facilities, and shall be constructed and operated only in accordance with a Department permit. If a gas recovery facility is included in the approved closure plan or closure permit of the landfill, no separate permit for the facility is required, provided that the facility must meet all the requirements of this subsection.

(b) The application shall be on Form 62-701.900(1), and shall contain at least the following:

1. The information contained in Rules 62-701.320(7) and 62-701.330(3), F.A.C.;

2. Where relevant and practical, the information required in Rule 62-701.600(4), F.A.C.;

3. An estimate of the quantities of gas condensate currently collected or expected to be collected, and a description of how the condensate is or will be disposed of;

4. A description of the procedures for sampling, analyzing, and reporting data from the condensate sampling; and

5. A closure plan that shall include methods to control landfill gasses after operation of the recovery facility ceases and any other requirements contained in Rule 62-701.400(10), F.A.C.

(c) The owner or operator of a gas recovery facility shall post a performance bond to cover the estimated costs of closing the facility. If the gas recovery facility is included in the approved closure plan or closure permit of the landfill, and if the closure costs are included in the landfill closure cost estimates for which financial responsibility is required by Rule 62-701.630, F.A.C., then no separate proof of financial responsibility is required.

(6) Compliance with this section does not relieve an applicant from compliance with any applicable air requirements of Title V, county ordinance, or local programs.

Specific Authority 403.061, 403.704, FS.
Law Implemented 403.702, 403.704, 403.707, FS.
History -- New 5-27-01.

62-701.600 Landfill Final Closure.

(1) Applicability.

(a) Inactive landfills.

1. Landfills or solid waste disposal units which were closed in a manner approved by the Department prior to January 6, 1993, or which have received final cover before July 1, 1985, are exempt from the requirements of this section, although Rule 62-701.610(8), F.A.C., shall apply to any relocation of waste at such landfills or units.

2. Owners or operators of landfills or solid waste disposal units which were no longer receiving wastes on January 6, 1993, which have not been closed in accordance with an approved closure plan or closure permit, and which do not have an approved closure plan or closure permit shall comply with this section by May 19, 1995.

3. Owners or operators of landfills or solid waste disposal units which were no longer receiving wastes on January 6, 1993, which have not been closed in accordance with an approved closure plan or closure permit and which do have an approved closure plan or closure permit are exempt from the requirements of this section as long as the closure plan or closure permit is complied with.

(b) Active landfills. Landfills or solid waste disposal units which receive wastes after January 6, 1993, shall comply with the requirements of this section. Owners or operators of active landfills or solid waste disposal units which have an approved closure plan or closure permit on January 6, 1993 shall apply for modification of their plan or permit to comply with this section by May 19, 1995, or, if the landfill or solid waste disposal unit is not scheduled to close before the existing operation permit expires, at the time of permit renewal. Landfills or solid waste disposal units which are operating under a Department consent agreement, which have a closure permit, and which cease accepting wastes on or before December 1, 1992, are exempt from the requirements of this section except for Rule 62-701.600(5)(g), F.A.C.

(2) Closure schedule.

(a) At least one year prior to the projected date when wastes will no longer be accepted or when all solid waste disposal units are expected to reach design dimensions, the owner or operator shall provide a written notice to the Department with a schedule for cessation of waste acceptance and closure of the landfill. The closure schedule shall become an addendum to the landfill permit. If unforeseen circumstances do not allow the one-year notification, notice shall be provided as soon as the need to close the facility becomes apparent.

(b) Notice and advice to users. At least 120 days prior to the date when wastes will no longer be accepted at the landfill, the owner or operator shall advise users of the intent to close the landfill by posting signs at the entrance of the landfill giving the date of closing, the location of alternative disposal facilities, and the name of the person responsible for closing the landfill. These signs shall be maintained throughout the closing period. If unforeseen circumstances do not allow the 120 day notice to users, notice shall be provided as soon as the need to close the facility becomes apparent.

(c) Notice to the public. Within 10 days prior to the date when wastes will no longer be accepted at the landfill, the owner or operator shall publish a notice of the landfill closing in the legal advertising section of a newspaper of general circulation in the county where the activity is proposed, and shall provide proof of publication to the Department within seven days of publication.

(3) Closure permit requirements. The owner or operator shall submit an application to the Department for final closure of the landfill at least 90 days before the date when wastes will no longer be accepted. The application shall be on Form 62-701.900(1). If the landfill is operating under a Department permit, the owner or operator shall request a modification of the permit in lieu of submitting a closure permit application. The application or request for modification shall include a closure plan which is made up of the following:

(a) A closure report;

(b) A closure design plan;

(c) A closure operation plan;

(d) Closure procedures;

(e) A plan for long-term care; and

(f) A demonstration that proof of financial responsibility for long-term care will be provided.

(4) Closure report. A report on the final closure of the landfill shall address the following requirements, or shall contain an explanation of why the requirement is not applicable:

(a) General landfill information which shall contain:

1. Identification of the landfill;

2. Location, description and vicinity map;

3. Total acreage of waste disposal areas and total acreage of landfill property;

4. Legal description of property on which the landfill is located;

5. History of the landfill including dates of construction and a description of the location and sequence of fill operations; and

6. Identification of types of waste disposed of in the completed landfill based on records, composition studies, operator memory, major waste depositors, or other information sources.

(b) The geotechnical investigation report and water quality monitoring plan required in Rule 62-701.330(3), F.A.C.

(c) Land use information which shall contain a discussion and maps indicating:

1. Identification of adjacent landowners;

2. Zoning;

3. Present land uses; and

4. Roads, highways, rights-of-way, or easements.

(d) A report on actual or potential gas migration in landfills that contain degradable wastes which would allow migration of gas off the landfill property.

(e) An assessment of the effectiveness of the landfill design and operation, which shall provide information about the effects of the landfill on adjacent ground and surface waters, and the landfill area. Specific concerns to be discussed are:

1. Results of the geotechnical investigation;

2. Effects of surface water runoff, drainage patterns, and storm water controls;

3. Extent and effects of methane gas migration, lower explosive limit percentage readings in migration paths, and description of the gas venting system;

4. Condition of existing cover, thicknesses and types of soils or materials used for cover, and effectiveness of cover material as a leachate control mechanism; and

5. The nature and characteristics of the waste disposed of at the landfill.

(5) Closure design. The closure design plan shall consist of engineering plans and a report on closing procedures that apply to the final closing of solid waste disposal units during the operation of the landfill, the final closing of the landfill, and the monitoring and maintenance during the long-term care period. The closure design plan shall include the following information:

(a) A plan sheet showing phases of site closing.

(b) Drawings showing existing topography and proposed final grades.

(c) Provisions to close solid waste disposal units within the landfill as soon as they reach approved design dimensions and elevations and to finally close the landfill in accordance with the requirements of this rule. Landfills that are designed to be constructed in phases or sections shall include provisions for temporary closure of solid waste disposal units if subsequent, planned filling on top of them will not occur for six months or longer.

(d) Final elevations before settlement, based upon the capability of the foundation to support the total weight of the landfills, including water loading.

(e) Final side slope design. Side slopes of aboveground disposal units shall not be steeper than three feet horizontal to one foot vertical rise to control erosion of the final cover material. Such units shall incorporate reverse sloping benches or terraces into the side slopes of the landfill and shall contain down slope drainage ways with water flow energy dissipaters. Access for maintenance equipment shall be provided. Such designs shall address the susceptibility for erosion of the earthen material that is proposed for final cover relative to historical rainfall patterns for the area, the period between the patterns for the area, the period between the application of the final cover and establishment of vegetation, and maintenance procedures.

(f) Final cover installation plans showing the sequence of applying final cover. All areas filled with waste shall have a final cover designed to minimize infiltration of rainfall and subsequent generation of leachate, based on water balance calculations and leachate controls used.

1. The final cover shall be installed and tested in accordance with a construction quality assurance plan which meets the requirements of Rules 62-701.400(7) and (8), F.A.C.

2. Final cover shall be placed over the entire surface of each completed solid waste disposal unit or units within 180 days after the final waste deposit, or within the time frame set forth in the approved closure plan. The final cover shall be vegetated to control erosion and provide a moisture infiltration seal, with species that are drought resistant and have roots that will not penetrate the final cover.

3. Top gradients of final cover on landfill areas shall be graded to maximize runoff and minimize erosion, considering total fill height and expected subsidence caused by decomposing waste, and shall be designed to prevent ponding or low spots.

4. The closure design plan shall describe provisions for cover material for the long-term care erosion control, filling areas of subsidence or other depressions, maintaining berms, and general maintenance of the facility, and specify the anticipated source and amount of material necessary for proper closure of the landfill.

(g) Final cover design.

1. Landfills shall have a final cover designed to minimize infiltration and erosion, which shall include a barrier layer consisting of a soil layer, a geomembrane, or a combination of a geomembrane with a low permeability material. All geosynthetic and soil components used in the final cover shall meet the standards and specifications contained in Rules 62-701.400(3)(d)1. and 2., (3)(d)5.-11., (e), and (f). For lined Class I and Class II landfills, the barrier layer shall have a permeability which is substantially equivalent to, or less than, the permeability of the bottom liner system. If the landfill uses a geomembrane in the bottom liner system, the barrier layer shall also incorporate a geomembrane. For unlined Class I and Class II landfills, the barrier layer shall have a permeability of 1×10^{-7} cm/sec or less. For Class III landfills, the barrier layer shall have a permeability of 1×10^{-5} cm/sec or less. For Class III landfills which accepted only yard trash, no barrier layer is required; instead, final cover shall consist of a 24-inch thick soil layer, the upper six inches of which shall be capable of supporting vegetative growth.

2. If the barrier layer consists only of soil, it shall be at least 18 inches thick, installed in 6-inch thick lifts, and shall have a final, 18-inch thick layer of soil that will sustain vegetation to control erosion placed on top of the barrier layer.

3. If the barrier layer consists only of a geosynthetic clay liner (GCL), a protective soil layer at least 24 inches thick shall be placed on top of the GCL with the upper six inches being able to sustain vegetative growth. The GCL shall be placed on a protective soil layer at least six inches thick. Material specifications and installation methods, which may include a drainage layer between the GCL and the protective soil layer over the GCL, shall be adequate to protect the barrier layer from root penetration, resist erosion, and remain stable on the final design slopes of the landfill.

4. If a geomembrane is used in the barrier layer, it shall be a semi-crystalline thermoplastic with at least 40 mils average thickness, as defined by method GRI GM13, or a non-crystalline thermoplastic at least 30 mils thick, within the tolerances specified in method PGI 1197, with a maximum water vapor transmission rate of 2.4 g/(m^2 x day), have chemical and physical resistance to materials it may come in contact with, and withstand exposure to the natural environmental stresses and forces throughout the installation, seaming process, and settlement of the waste during the closure and long-term care period. A protective soil layer at least 24 inches thick shall be put on top of the geomembrane. Material specifications, installation methods, and compaction specifications, which may include a drainage layer between the geomembrane and the protective soil layer, shall be adequate to protect the barrier layer from root penetration, resist erosion, and remain stable on the final design slopes of the landfill. This layer shall include topsoil or soils that will sustain vegetative growth.

5. The final cover design shall include an evaluation of the stability of the cover system and the disposed waste. This evaluation shall include an analysis of the potential for slides along the weakest interface of the final cover system and of the potential for deep seated rotational or translational failures through the waste and the final cover.

6. An applicant may use an alternate design for the barrier layer, or parts of the barrier layer, upon a demonstration that the alternate design will result in a substantially equivalent rate of storm water infiltration through the final cover. Any alternate design shall be reviewed by the Department as part of its review of the closure design plan.

7. Nothing herein shall preclude the Department from requiring more stringent final or temporary cover designs in a permit or consent order if necessary to protect the public health or the environment because of the nature of wastes received or site specific geological or

hydrogeological conditions, or if the landfill has not been adequately constructed, operated, maintained, or closed.

(h) Proposed method of stormwater control. Stormwater occurring on the landfill property and from areas adjacent to the landfill property shall be prevented from coming onto or into waste filled areas. The closure design plan shall demonstrate how the stormwater management systems shall be operated and maintained as necessary to meet the requirements of Rule 62-701.400(9), F.A.C.

(i) Proposed method of access control. The closure design plan shall show how access to the closed landfill shall be restricted to prevent any future waste dumping or use of the facility by unauthorized persons. Restricted access shall remain in force until the landfill is stabilized and there is no evidence that facility property is being used as an unauthorized disposal site. If use of the property during the long-term care period is planned, access shall be restricted until landfill closing is completed and acknowledged by the Department in accordance with Rule 62-701.610(6), F.A.C.

(j) A description of any proposed final use of the landfill property.

(k) A description of the proposed or existing gas management system which complies with Rule 62-701.530, F.A.C.

(6) Closure operation plan. The closure operation plan shall:

(a) Describe the actions which will be taken to close the landfill, such as placement of cover, grading, construction of berms, ditches, roads, retention-detention ponds, installation or closure of wells and boreholes, installation of fencing, seeding of vegetation, and protection of on-site utilities and easements;

(b) Provide a time schedule for completion of the closing and long-term care;

(c) Contain appropriate references to the closure design and other supporting documents;

(d) Describe the proposed method of demonstrating financial responsibility for the long term monitoring and maintenance;

(e) Provide for the development and implementation of the water quality monitoring plan required in Rule 62-701.510, F.A.C.;

(f) Provide for the development and implementation of the gas management system required in Rule 62-701.530, F.A.C.; and

(g) Indicate any additional equipment and personnel needed to complete closure of the landfill.

(7) Temporary closure.

(a) Placement of final cover over a solid waste disposal unit may be delayed for a period of time specified in an approved closure plan for the following reasons:

1. For the purpose of promoting biological degradation of waste;

2. If additional solid waste will be deposited on the solid waste disposal unit within five years; or

3. If excavation of the waste is planned.

(b) Placement of final cover may be delayed only if the solid waste disposal unit is temporarily closed in accordance with an approved closure plan. Conditions of temporary closure shall include:

1. The solid waste disposal unit was constructed in compliance with its permit conditions, and has a liner and leachate control system;

2. A schedule for closure is shown in the closure plan application;

3. Final cover is installed on side slopes of each completed disposal unit which will not receive additional waste or which will not be mined, and all areas visible to the public are closed and landscaped;

4. Odors and disease vectors are controlled;

5. An intermediate cover is installed on the solid waste disposal unit;

6. The financial responsibility requirements of Rule 62-701.630, F.A.C., are met, and the closure cost estimate takes into account the costs of temporary closure as well as the costs of the final closure; and

7. The landfill owner or operator demonstrates that delaying placement of final cover will not cause or contribute to any significant increase in leachate escaping from the solid waste disposal unit into the environment.

(c) In addition, a solid waste disposal unit which will be mined in the future shall have a temporary final cover installed.

Specific Authority 403.061, 403.704, FS.
Law Implemented 403.702, 403.704, 403.707, FS.
History -- New 1-6-93, Amended 1-2-94, 5-19-94, Formerly 17-701.600, Amended 5-27-01.

62-701.610 Closure Procedures.

(1) Closing inspections. The Department shall specify in the closure permit which particular closing steps or operations must be inspected and approved by the Department before proceeding with subsequent closure actions.

(2) Survey monuments. For landfills with a final elevation of less than 20 feet above the natural land surface, concrete monuments shall be installed to mark the boundaries of the landfill property and other permanent markers shall be installed to outline the general waste filled areas. These markers shall be tied to one or more of the boundary markers by a survey performed by an engineer or a registered land surveyor. The location and elevation of all markers shall be shown on a site plan filed with the "Declaration to the Public" described in subsection (5) of this section.

(3) Final survey report. When landfill operations have been conducted which have raised the final elevations higher than 20 feet above the natural land surface, a final survey shall be performed after closure is complete by an engineer or a registered land surveyor to verify that final contours and elevations of the facility are in accordance with the plans as approved in the permit. Aerial mapping techniques which provide equivalent survey accuracy may be substituted for the survey. The survey or aerial mapping information shall be included in the report along with information reflecting the conditions of the landfill as constructed. Contours shall be shown at no greater than five-foot intervals. The landfill owner or operator shall submit this report to the Department in accordance with the closing schedule.

(4) Certification of closure construction completion. A certification of closure construction completion, signed, dated and sealed by a professional engineer independent of the contractor, shall be provided to the Department upon completion of closure. All substantial deviations from the permitted closure plans shall be noted.

(5) Declaration to the public. After closing operations are inspected and approved by the Department, the landfill owner or operator shall file a declaration to the public in the deed records in the office of the county clerk of the county in which the landfill is located. The declaration shall include a legal description of the property on which the landfill is located and a site plan specifying the area actually filled with solid waste. The declaration shall also include a

notice that any future owner or user of the site should consult with the Department prior to planning or initiating any activity involving the disturbance of the landfill cover, monitoring system or other control structures. A certified copy of the declaration shall be filed with the Department.

(6) Official date of closing. Upon receipt of the documents required in subsections (3), (4), and (5) of this section, the Department shall, within 30 days, acknowledge by letter to the facility operator that notice of termination of operations and closing of the facility has been received. If the entire landfill has been closed, the date of this letter shall be the official date of landfill closing for purposes of determining the long-term care period. If only a portion of the landfill has been closed, the long-term care period will begin upon the closing of the entire landfill, unless the portion which has been closed can be monitored and maintained separately from the rest of the landfill. The date of this letter shall be the official date of landfill closing for the purpose of determining the long-term care period.

(7) Use of closed landfill areas. Closed landfill areas, if disturbed, are a potential hazard to public health, ground water and the environment. The Department retains regulatory control over any activities which may affect the integrity of the environmental protection measures such as the landfill cover, drainage, liners, monitoring system, or leachate and stormwater controls. Consultation with the Department is required prior to conducting activities at the closed landfill areas.

(8) Relocation of waste. The owner of a closed landfill may request permission from the Department to move waste from one point to another within the footprint of the same solid waste disposal unit. If the landfill has a valid closure permit, the permittee shall seek a modification to reflect the relocation of waste. The Department shall approve such a request upon a demonstration that:

(a) The activity will not cause or contribute to any leachate leakage from the landfill, and will not adversely affect the closure design of the landfill;

(b) Any leachate, stormwater runoff, or gas which is generated by the activity is controlled on site;

(c) Any hazardous waste which is generated by the activity will be managed in accordance with Chapter 62-730, F.A.C.;

(d) Immediately after the activity is completed, the landfill will be covered, vegetated, and graded to comply with the closure requirements that apply to that landfill, which shall include a final cover of at least two feet of soil; and

(e) The appropriate District Office of the Department is notified at least seven days before the activity takes place in order to have the opportunity to inspect the site.

Specific Authority 403.704, FS.
Law Implemented 403.704, 403.707, FS.
History -- New 7-1-85, Formerly 17-7.074, Formerly 17-701.074, Amended 1-6-93, 1-2-94, Formerly 17-701.610, Amended 5-27-01.

62-701.620 Long -Term Care.

(1) Long-term care period. The owner or operator of any landfill which receives wastes after January 6, 1993, shall continue to monitor and maintain the integrity and effectiveness of the final cover as well as other appurtenances of the facility in accordance with an approved closure plan for 30 years from the date of closing. Before the expiration of the long-term care

monitoring and maintenance period, the Department may extend the time period if the closure design or closure operation plan is found to be ineffective.

(2) Long-term care permit. Long-term care shall be conducted in accordance with a closure permit. Closure permits involving only long-term care shall be issued with a duration of ten years unless the owner or operator specifically requests a shorter duration. If a shorter duration is requested, the permit fee shall be prorated.

(3) Reduced long-term care period. The owner or operator of a landfill may apply to the appropriate District Office of the Department for a permit modification to reduce the long-term care schedule or eliminate some aspects of long-term care. The Department will grant such modification if reasonable assurance is provided to the Department that there is no threat to human health or the environment and if the landfill:

(a) Has been constructed and operated in accordance with approved standards;

(b) Was closed with appropriate final cover, vegetative cover has been established, and a monitoring system has been installed;

(c) Has a 10-year history after closure of no violations of water quality standards or criteria detected in the monitoring system, and no increases over background water for any monitoring parameters which may be expected to result in violations of water quality standards or criteria; and

(d) Has had no detrimental erosion of cover, and subsidence of waste has ceased.

(4) Modified ground water monitoring plan. The owner or operator of a landfill may apply to the appropriate District Office of the Department for a modification to their ground water monitoring plan to remove a parameter from the list specified in Rule 62-701.510(8), F.A.C. The Department will grant such modification upon a demonstration that leachate and ground water have consistently been sampled and analyzed for the parameter, and that the parameter has never been detected in the leachate or in any ground water well or surface water point during the active life of the landfill.

(5) Gas monitoring. The gas collection and monitoring system required in Rule 62-701.600(6)(f), F.A.C., shall be maintained for the long-term care period of the landfill. The owner or operator of a landfill may apply to the appropriate District Office of the Department for a permit modification to reduce the long-term care schedule. The Department will grant such a modification if the applicant demonstrates that the landfill has stabilized to the point where there is no significant production of combustible gases or objectionable odors.

(6) Right of access. The landfill owner or operator shall possess or acquire a sufficient interest in, or a right to use, the property for which a permit is issued, including the access route onto the property to carry out the requirements of this rule. The permittee shall retain the right of entry to the landfill property for the long-term care period, after termination of solid waste operations, for inspection, monitoring and maintenance of the site.

(7) Successors in interest. Any person acquiring rights or ownership, possession or operation of a permitted landfill through lease or transfer of property shall be subject to all requirements of the permit for the facility and shall provide any required proof of financial responsibility to the Department in accordance with this rule. Any lease or transfer of property shall include specific conditions to delineate:

(a) The previous owner or operator is responsible for closure and shall maintain any required proof of financial responsibility until the person acquiring ownership, possession or operation of the landfill establishes the required proof of financial responsibility with the Department;

(b) Responsibility for the continuance of monitoring, maintenance, and correction of deficiencies or problems; and

(c) Mineral rights attached to the property and the rights to any recoverable materials that may be buried on the property or landfill gases that may be produced. A Department permit shall be required if any on-site operations subsequent to closing of a landfill involve disturbing the landfill.

(8) Transfer of permit. Transfer of a landfill permit shall be in accordance with the provisions of Rule 62-4.120, F.A.C., and this rule.

(9) Replacement of monitoring devices. If a monitoring well or other device required by the monitoring plan is destroyed or fails to operate for any reason, the landfill owner or operator shall, immediately upon discovery, notify the Department in writing. All inoperative monitoring devices shall be replaced with functioning devices within 60 days of the discovery of the malfunctioning unit unless the landfill owner or operator is notified otherwise in writing by the Department.

(10) Following completion of the long-term care period for each solid waste management unit, the owner or operator shall notify the Department that a certification, signed and sealed by a professional engineer, verifying that long-term care has been completed in accordance with the closure plan has been placed in the operating record.

Specific Authority 403.704, FS.
Law Implemented 403.704, 403.707, FS.
History -- New 7-1-85, Formerly 17-7.075, Formerly 17-701.075, Amended 1-6-93, 1-2-94, 5-19-94, Formerly 17-701.620, Amended 5-27-01.

62-701.630 Financial Assurance.

(1) Definitions. As used in this section:

(a) "Owner or operator" means, in addition to the usual meanings of the term, any owner of record of any interest in land whereon a landfill is or has been located and any person or corporation which owns a majority interest in any other corporation which is the owner or operator of a landfill.

(b) "Active life" means the operating life of the landfill as estimated in the construction permit or closure plan, but does not include the long-term care period.

(2) Applicability.

(a) A government-owned landfill closed on or before October 1, 1988, shall not be required to comply with this rule.

(b) As a condition for the issuance of a landfill construction permit, the owner or operator shall describe the financial mechanism to be used to demonstrate proof of financial assurance to the Department. The financial mechanism shall be created, and alternate financial mechanisms shall be fully funded, at least 60 days prior to the acceptance of any solid waste at the facility. The financial mechanism shall either be:

1. A landfill management escrow account; or

2. An alternate financial mechanism pursuant to subsection (6) of this section.

(c) Owners or operators of existing landfills or landfills which have received a construction permit prior to November 28, 1989, shall submit proof of financial assurance to the Department by October 1, 1990. Such proof shall be:

1. That a landfill management escrow account has been established and that such account and interest thereon is current as to the required level of funding pursuant to subsection (5) of this section; or,

2. Proof of the existence and current value of an alternate financial mechanism pursuant to subsection (6) of this section.

(d) Owners or operators of existing Class I or II landfills receiving waste after October 9, 1993, which are required to undertake a corrective action program in accordance with Rule 62-701.510(7), F.A.C., shall submit proof of financial assurance to the Department no later than 120 days after the corrective action remedy has been selected.

(3) Cost estimates for closure.

(a) For the purposes of determining the amount of proof of financial assurance that is required in subsections (5) and (6) of this section, the owner or operator shall estimate the total cost of closure for the permitted portions of the landfill or for those portions of the landfill for which a construction permit is sought, for the time period in the landfill operation when the extent and manner of its operation make closing most expensive. The annual cost of long-term care shall be estimated and listed separately, and multiplied by 30 years. The owner or operator shall submit the estimates, together with all necessary justification, to the Department along with the proof of financial assurance. The costs shall be estimated and certified by a professional engineer for a third party performing the work, on a per unit basis, with the source of estimates indicated.

(b) Closing costs shall be based on the nature and characteristics of the wastes disposed of at the site and shall include estimated costs of cover material, topsoil, seeding, fertilizing, mulching, labor, and any other costs of compliance with Rules 62-701.600 - .610, F.A.C.

(c) Long-term care costs shall include land surface care; gas monitoring; leachate pumping, transportation, monitoring and treatment; groundwater monitoring, collection and analysis; and any other costs of compliance with Rule 62-701.620, F.A.C.

(d) Cost estimates required in this section shall be prepared and submitted on Form 62-701.900(28).

(e) The owner or operator shall keep the latest closure cost estimate at the facility. When this estimate has been adjusted in accordance with paragraph (4)(a) of this section, the latest adjusted closure cost estimate shall also be kept at the facility.

(4) Cost adjustments for closure.

(a) Every owner or operator of a landfill shall annually adjust the closure cost estimate for inflation and submit updated information to the Department. Closing and long-term care costs shall be listed separately. For owners or operators using an alternate financial mechanism, this statement shall be submitted between January 1 and March 1 of each year. For owners or operators using an escrow account, this statement shall be submitted between July 1 and September 1 of each year. This paragraph does not prohibit an owner or operator from submitting other information updating the closure cost estimate at other times of the year.

(b) During the life of those portions of the landfill which have not been finally closed, as well as during the long-term care period, the owner or operator shall adjust the closure cost estimate for inflation and changes in the closing and long-term care plan. Such adjustments shall be made either by:

1. Recalculating the maximum cost of closure or long-term care, in current dollars, as specified in subsection (3) of this section; or

2. By using an inflation factor derived from the most recent Implicit Price Deflator for Gross National Product published by the U.S. Department of Commerce in its Survey of Current Business as specified in subparagraphs (4)(b)2.a. and b. of this section. The inflation factor is the result of dividing the latest published annual Deflator by the Deflator for the previous year.

a. The first adjustment is made by multiplying the closure or long-term care cost estimate by the inflation factor. The result is the adjusted closure or long-term care cost estimate.

b. Subsequent adjustments are made by multiplying the latest adjusted closure or long-term care cost estimate by the latest inflation factor.

(c) If the closure or long-term care plan is modified during the operating, closure or long-term care period, the owner or operator shall revise the cost estimate. Revisions shall be made and submitted as specified in subparagraph (4)(b)(1) of this section. Cost estimates submitted in accordance with this subsection will be used as the basis for comparison against the balance of the funding mechanisms specified in subsections (5) and (6) of this section.

(d) If the value of the alternate funding mechanism is less than the total amount of the current closure cost estimate, the owner or operator shall revise the funding mechanisms to reflect the new estimate within the time frames outlined in 40 CFR Part 264, Subpart H.

(5) Landfill management escrow account.

(a) The owner or operator of a landfill shall establish a fee, or a surcharge on existing fees, or other appropriate revenue-producing mechanism, to ensure the availability of financial resources for the proper closing and long-term care of the landfill.

(b) The revenue-producing mechanism shall produce revenue at a rate sufficient to generate funds to meet state landfill closure requirements.

(c) The revenue shall be deposited in an interest-bearing escrow account, the landfill management escrow account, to be held and administered by the owner or operator. The owner or operator shall file with the Department a signed duplicate original of the escrow account agreement and an annual audit of the account. The audit shall be conducted by an independent Certified Public Accountant and shall be filed no later than March 31 of the following year. The audit shall consist of reporting the balance in the landfill management escrow account as of the end of each fiscal year and a list of all deposits and withdrawals made. The list shall include the date and the amount of each deposit and withdrawal.

(d) Payments into the landfill management escrow account shall be made by the owner or operator at least annually according to one of the following methods:

1. For a new landfill, the first payment must be made before the end of the first fiscal year after the initial receipt of solid waste into the landfill. A notice of such payment shall be submitted to the Department. The first payment shall be equal to the current closing cost estimate for the landfill divided by the number of years in the active life of the landfill. Subsequent payments must be made at least annually, over the term of the active life of the landfill, on the anniversary date of the first payment. The calculations for such annual payment shall be determined using one of the following methods:

a. "Pay-in" method: payment = (CE - CV)/Y, where CE is the current calculated closure cost estimate, CV is the current value of the escrow account, and Y is the number of remaining years in the active life of the landfill; or

b. "Balance" method: the fiscal year end account balance = [CE x (DE/DL)] – E, where CE is the latest current dollar closure cost estimate approved by the Department; DE, the design life exhausted (by solid waste disposal unit), is the period of time between the initial receipt of waste and the account audit date; DL, the design life (by solid waste disposal unit), is the period of time between initial receipt of waste and end of receipt of waste; and E, all documented closure expenditures to date (by solid waste disposal unit), are expenses identified by the fiscal year end audit(s) as being incurred closing or maintaining the landfill identified in the closure plan. The choice of use of this formula requires the continued use throughout the remaining design life of the landfill or phase. In the event the fiscal year end audited account balance exceeds the required balance, the owner or operator may remove the excess funds upon written authorization from the Department.

2. For government-owned landfills, the owner or operator shall deposit into the escrow account, at the time of closing and each year thereafter, sufficient funds to cover the following year's long-term care costs. In addition, the owner or operator must document specifically how it intends to finance the long-term care of the landfill as part of its closure plan.

3. For landfills not owned by a governmental agency, the long-term care costs shall be included in the closing cost estimates as specified in subparagraph 1. above; long-term care costs must be fully funded when the landfill closes.

4. The owner or operator may accelerate payments into the landfill management escrow account or may deposit the full amount of the current closure cost estimate at the time that the account is established.

(e) The owner or operator may make expenditures from the account and its accumulated interest only for the purpose of landfill closing and long-term care and, if such expenditures do not deplete the fund to the detriment of eventual closing and long-term care as described under the certification procedure in subsection (4) of this section, for planning and construction of resource recovery or landfill facilities. If the owner or operator does not operate a landfill, any funds remaining in the account after paying for proper and complete closing and long-term care, as determined by the Department, shall be deposited by the owner or operator into the general fund of the local government of jurisdiction.

(f) The revenue generated under this subsection and any accumulated interest thereon may be applied to the payment of, or pledged as security for, the payment of revenue bonds issued in whole or in part for the purpose of complying with state landfill closing and long-term care requirements. Such application or pledge may be made directly in the proceedings authorizing such bonds or in an agreement with an insurer of bonds to assure such insurer of additional security therefore.

(6) Alternate proof of financial assurance.

(a) An owner or operator may establish proof of financial assurance with the Department in lieu of, or in combination with, the requirements of subsection (5) of this section. Such proof may include surety bonds, certificates of deposit, securities, letters of credit, trust fund agreements, closure insurance or financial tests and corporate guarantees showing that the owner or operator has sufficient financial resources to cover, at a minimum, the costs of complying with all state landfill closing and long-term care requirements. If such proof of financial assurance is surety bonds, letters of credit, trust fund agreements, closure insurance or financial tests and corporate guarantees, such proof shall be submitted on forms provided by the Department in accordance with the requirements of paragraphs (b) through (d) of this subsection. If proof of financial assurance is securities or certificates of deposit, these instruments must be used in conjunction with a trust fund and shall be submitted directly to the trustee. The owner or operator shall estimate such costs pursuant to subsection (3) of this section.

(b) 40 CFR Part 264 Subpart H which contains EPA's rules on financial requirements for owners and operators of hazardous waste facilities are hereby adopted as financial requirements for purposes of this section incorporated by reference as those rules appear in 40 CFR Part 264, revised as of July 1, 2000, except:

1. The following sections of 40 CFR Part 264, Subpart H are specifically not adopted as part of this rule:

a. 264.140(a); 264.140(b); 264.140(d); 264.141(a); 264.141(e); 264.142(b); 264.142(c); 264.144(b); 264.144(c); 264.147; 264.149; 264.150; and 264.151.

b. All references to 40 CFR Part 265.

c. All references to sections or subparts of 40 CFR Part 264 not contained in Subpart H.

d. All references to EPA Regions.

e. All references to RCRA.

2. References to 40 CFR 264.143 (f) (1) and 264.145 (f) (1) shall mean Rule 62-701.630 (6) (c), F.A.C. References in 40 CFR Part 264, Subpart H to the United States Environmental Protection Agency (EPA) shall mean the State of Florida Department of Environmental Protection (DEP); to Regional Administrator shall mean the Secretary of the Department; or the Secretary's written designee, to RCRA permits shall mean solid waste management permits; to Post-Closure Care/Post-Closure Cost Estimate shall mean Long -Term Care/Long-Term Care Cost Estimate; to EPA identification number shall mean the Department identification number; to hazardous waste shall mean solid waste; to hazardous waste treatment, storage or disposal facilities shall mean landfills; to Section 3008 of RCRA shall mean FDEP Agency Action; and to one or more states shall mean in the State of Florida.

(c) An owner or operator may satisfy the requirements of this subsection by passing a financial test using Form 62-701.900(5)(e). To pass this test the owner or operator must meet the criteria of either subparagraph 1. or 2. as follows:

1. The owner or operator must have:

a. One of the two following ratios: A ratio of less than 1.5 comparing total liabilities to net worth; or a ratio of greater than 0.10 comparing the sum of net income plus depreciation, depletion and amortization, minus $10 million, to total liabilities;

b. Net working capital of at least three times the sum of the required action;

c. Tangible net worth greater than the sum of the required action plus $10 million, or at least three times the sum of the required action, whichever is greater; and

d. Assets located in the United States amounting to at least three times the sum of the required action.

2. The owner or operator must have:

a. A bond issuance, secured or unsecured, having a redemption date with at least five years remaining. An unsecured bond rating must maintain a rating of BBB or better as issued by Standard and Poor's bond rating service or Baa2 or better as issued by Moody's bond rating service. A facility using an insured or secured bond must demonstrate to the Department the bond rating as assigned by Standard and Poor's would be BBB or better, or as assigned by Moody's would be Baa2 or better, if the bond was not an insured or backed security but a bond debenture;

b. Tangible net worth greater than the sum of the required action plus $10 million, or at least three times the sum of the required action, whichever is greater; and

c. Assets located in the United States amounting to at least three times the sum of the required action.

(d) Government-owned facilities providing proof of financial assurance using a financial test, must send updated information outlined in 40 CFR 264.143(f)(5) and 264.145(f)(5) to the Department within 180 days after the close of each succeeding fiscal year.

(e) Form 62-701.900(5) shall be used, and originally signed duplicates submitted, when demonstrating proof of financial assurance under this section.

(7) Cost estimates for corrective action. An owner or operator of a landfill required to establish financial assurance for a corrective action program pursuant to paragraph (2)(d) of this section shall have a detailed written estimate in current dollars, estimated and certified by a professional engineer, of the cost of hiring a third party to perform the corrective action in accordance with Rule 62-701.510(7), F.A.C. The corrective action cost estimate must account for the total cost of corrective action activities as described in the corrective action plan for the entire corrective action period. The owner or operator shall submit the estimate, together with all necessary justification, to the Department for approval along with proof of financial assurance.

(8) Cost adjustments for corrective action.

(a) The owner or operator shall annually adjust the estimate for inflation and changes in the corrective action plan until the corrective action program is completed in accordance with Rule 62-701.510(7), F.A.C. The adjustment shall be made either by:

1. Recalculating the maximum cost of corrective action, in current dollars, as specified in subsection (7) of this section; or

2. By using an inflation factor derived from the most recent Implicit Price Deflator for Gross National Product published by the U.S. Department of Commerce in its Survey of Current Business as specified in subparagraphs a. and b. as follows. The inflation factor is the result of dividing the latest published annual Deflator by the Deflator for the previous year.

a. The first adjustment is made by multiplying the corrective action cost estimate by the inflation factor. The result is the adjusted corrective action cost estimate. Inflation adjusted estimates shall be submitted along with annual closing and/or long-term care cost estimates.

b. Subsequent adjustments are made by multiplying the latest adjusted corrective action cost estimate by the latest inflation factor.

(b) If the corrective action plan is modified during the corrective action period, the owner or operator shall revise the corrective action cost estimate. Revisions shall be made and submitted as specified in subparagraph (8)(a)1. of this section.

(c) The owner or operator shall keep the latest corrective action cost estimate and, when this estimate has been adjusted in accordance with paragraph (8)(a) of this section, the latest adjusted corrective action cost estimate at the facility until the corrective action is complete.

(9) Financial assurance for corrective action.

(a) For government owned landfills, the owner or operator shall demonstrate proof of financial assurance for corrective action with the Department by establishing an escrow account or by using one of the approved alternate mechanisms specified in subsection (6) of this section. Payments into the landfill management escrow account shall be made by the owner or operator according to one of the following methods:

1. The owner or operator shall deposit into the landfill management escrow the full cost associated with the corrective action remedy within 120 days after the corrective action remedy has been selected; or

2. If the local government can document a specific non-general revenue source adequate to cover the total corrective action cost, then only that portion of the corrective action to be undertaken the following year need be funded.

(b) For privately owned landfills, the owner or operator shall demonstrate proof of financial assurance for corrective action with the Department by establishing an escrow account or by using one of the approved alternate mechanisms specified in subsection (6) of this section. The escrow account shall be funded for the full cost associated with the corrective action remedy within 120 days after the corrective action remedy has been selected. If a trust fund is used, the first payment into the trust must be at least equal to one-half of the current cost estimate for corrective action. The amount of subsequent payments must be determined by the following formula: Next payment = [RB – CV]/Y, where RB is the most recent estimate of the required trust fund balance for corrective action, CV is the current value of the trust fund, and Y is the number of years remaining in the pay-in period. The pay-in period is one-half of the estimated length of the corrective action program.

Specific Authority 403.704, FS.
Law Implemented 403.704, 403.707, FS.
History -- New 7-1-85, Formerly 17-7.076, Amended 11-28-89, Formerly 17-701.076, Amended 1-6-93, 1-2-94, 5-19-94, Formerly 17-701.630, Amended 5-27-01.

62-701.640 Closure of Existing Landfills.

Specific Authority 403.704, FS.
Law Implemented 403.704, 403.707, FS.
History -- New 1-2-94, Amended 5-19-94, Formerly 17-701.640, Repealed 5-27-01.

62-701.700 Materials Recovery Facilities.

Specific Authority 403.061, 403.704, FS.
Law Implemented 403.702, 403.704, 403.707, FS.
History -- New 1-6-93, Amended 5-19-94, Formerly 17-701.700, Repealed 5-27-01.

62-701.710 Waste Processing Facilities.

(1) Applicability.

(a) This rule applies to solid waste management facilities which do not dispose of solid waste on-site. This includes materials recovery facilities, transfer stations, and volume reduction facilities, but does not include used oil processing facilities, waste tire processing facilities, soil treatment facilities, yard trash processing facilities that meet the registration requirements of Rule 62-709.320, F.A.C., incinerators or combustors, or solid waste composting facilities, each of which is regulated under separate rules. However, in accordance with Rule 62-701.320(5)(c), F.A.C., owners or operators of facilities which manage several different types of wastes, including used oil, waste tires, contaminated soil, or compost, may apply for a single permit which addresses all applicable requirements.

(b) No person shall construct or operate a waste processing facility without a permit issued by the Department. Persons operating waste processing facilities under a permit (including a general permit) issued by the Department prior to May 27, 2001, may continue to operate that facility under the terms of their existing permit until it expires. Persons who submitted a complete application for a materials recovery facility, and persons who submitted a general permit notification for a transfer station at least 30 days prior to May 27, 2001, which the Department has not denied, are not subject to this rule until the time for renewal of that permit, if issued. All modifications or renewals of existing permits, and all new construction or operation permits issued on or after May 27, 2001, for waste processing facilities, shall comply with this rule.

(c) For facilities operating under a general permit, a timely and sufficient application for an individual permit will be considered a renewal application for purposes of Section 120.60(4), F.S.

(d) A waste processing facility which ceases accepting waste prior to the expiration of its permit shall close in accordance with the provisions of that permit.

(e) This rule shall not apply to the following:

1. Green boxes, compactor units, permanent dumpsters, and other containers from which such wastes are transported to a landfill or other solid waste management facility, which do not accept waste from commercial waste haulers that accept waste from multiple generators, and which are not causing a sanitary nuisance;

2. Facilities owned or operated by local governments which serve as drop-off points for household waste, provided:

a. The facility accepts only household waste, which may include yard trash;

b. All putrescible waste, household garbage, yard trash, or other waste which may produce leachate is containerized; and

c. The facility does not accept waste from commercial waste haulers that collect municipal solid waste from multiple generators;

3. Household hazardous waste collection centers operated by or exclusively on behalf of a local government; and

4. Facilities at industrial operations where waste is stored prior to shipment to a solid waste management facility, or where industrial byproducts are segregated and managed, provided that the industrial operation is regulated under another Department permit or certification.

(2) Application. A permit application for a waste processing facility shall be submitted on Form 62-701.900(4). The form shall indicate whether the facility will operate as a materials recovery facility, transfer station, volume reduction plant, or some combination thereof, shall be signed and sealed by a professional engineer, and shall include the information required in Rules 62-701.320(5), (6), (7), and (8)(a), F.A.C., specifically including:

(a) A description of the solid waste that is proposed to be collected, stored, processed or disposed of by the facility, a projection of those waste types and quantities expected in future years, and the assumptions used to make the projections;

(b) A site plan, of a scale not greater than 200 feet to the inch, which shows the facility location, total acreage of the site, and any other relevant features such as water bodies or wetlands on or within 200 feet of the site, potable water wells on or within 500 feet of the site, and wells serving community water supplies on or within 1000 feet of the site;

(c) A description of the operation and functions of all processing equipment that will be used, with design criteria and expected performance. The description shall show the flow of solid waste and associated operations in detail, and shall include:

1. Regular facility operations as they are expected to occur;

2. Procedures for start up operations, and scheduled and unscheduled shut down operations; and

3. Potential safety hazards and control methods, including fire detection and control;

(d) A description of loading, unloading, storage, and processing areas;

(e) Identification and capacity of any on-site storage areas for recyclable materials, non-processable wastes, unauthorized wastes, and residues;

(f) A plan for disposal of unmarketable recyclable materials and residue, and for waste handling capability in the event of breakdowns in the operations or equipment;

(g) A boundary survey, legal description, and topographic survey of the property;

(h) An operation plan which describes how the applicant will comply with Rule 62-701.710(4), F.A.C.;

(i) A closure plan which describes generally how the applicant will comply with Rule 62-701.710(6), F.A.C.; and

(j) The financial assurance documentation required by Rule 62-701.710(7), F.A.C.

(3) Design requirements. Minimum design requirements for waste processing facilities are as follows:

(a) Tipping, processing, sorting, storage and compaction areas that are in an enclosed building or covered area shall have ventilation systems. The areas that are not enclosed shall be equipped with litter control devices and visual screening.

(b) The facility shall be designed with a leachate control system to prevent discharge of leachate and mixing of leachate with stormwater, and to minimize the presence of standing water.

(c) Provisions shall be made for evaluating the quantity of all incoming solid waste and recovered materials. Storage areas shall be designed to hold the expected volume of materials until they are transferred for disposal or recycling.

(4) Operational requirements.

(a) A permit application for a waste processing facility shall include the following operational requirements:

1. An operation and maintenance manual describing the facility operations, the persons responsible for the operations, and types of equipment that will be used. All activities at the facility shall be performed in accordance with the manual and plans for the facility. Manuals and plans shall be updated as operations change but no less frequently than upon renewal of the operation permit;

2. A plan to inspect the wastes received by the facility, that specifies inspection procedures and procedures to handle unauthorized wastes; and

3. A contingency plan to cover operational interruptions and emergencies such as fires, explosions, or natural disasters.

(b) Stored putrescible wastes shall not be allowed to remain unprocessed for more than 48 hours; however, if the operation plan includes provisions to control vectors and odors, putrescible wastes may be stored for up to seven days. Areas where waste is stored or processed shall be cleaned at least weekly to prevent odor or vector problems, and all drains and leachate conveyances shall be kept clean so that leachate flow is not impeded.

(c) Operators and spotters shall be trained in accordance with Rule 62-701.320(15), F.A.C.

1. A trained operator shall be on duty whenever the facility is operating. Operating hours shall be posted at the facility.

2. At least one trained spotter shall be on duty at all times that waste is received at the site to inspect the incoming waste. Any prohibited material shall be removed from the waste stream and placed into appropriate containers for disposal at a permitted facility in accordance with a schedule submitted as part of the operation plan.

(d) The facility shall be operated to control objectionable odors in accordance with Rule 62-296.320(2), F.A.C.

(e) Adequate fire protection shall be available at all times.

(f) Access to the facility shall be controlled during the active life of the facility by fencing or other effective barriers to prevent disposal of unauthorized solid waste.

(5) Certification. Certification of construction completion shall be done in accordance with Rule 62-701.320(9)(a), F.A.C.

(6) Closure requirements.

(a) The permit application shall include a closure plan that identifies the steps needed to close the facility.

(b) The owner or operator shall notify the Department in writing prior to ceasing operations, and shall specify a closing date. No waste shall be received by the facility after the closing date.

(c) Within 30 days after receiving the final solid waste shipment, the owner or operator shall remove or otherwise dispose of all solid waste or residue in accordance with the approved closure plan. Stored putrescible wastes shall continue to be managed in accordance with Rule 62-701.710(4)(b), F.A.C.

(d) Closure must be completed within 180 days after receiving the final solid waste shipment. Closure will include removal of all recovered materials from the site. When closure is completed, the owner or operator shall certify in writing to the Department that closure is complete. The Department will make an inspection within 30 days to verify the closure and advise the owner or operator of the closure status.

(7) Financial assurance.

(a) The owner or operator of a waste processing facility shall provide the Department with proof of financial assurance issued in favor of the State of Florida in the amount of the closing cost estimates for the facility. This proof, along with the closing cost estimates, shall be submitted to the Department as part of the permit application for the facility. Proof of financial assurance shall consist of one or more of the following financial instruments which comply with the requirements of Rule 62-701.630(6), F.A.C.: trust fund; surety bond guaranteeing payment; surety bond guaranteeing performance; irrevocable letter of credit; insurance; and financial test and corporate guarantee. If the owner or operator of the facility is a local government, an escrow account which complies with the requirements of Rule 62-701.630(5), F.A.C., may be used to provide proof of financial assurance. Financial documents shall be submitted on Form 62-701.900(5)(a), (b), (c), (d), (e), (f), (g), or (h), as appropriate.

(b) Closure cost estimates and annual updates thereof shall comply with the provisions of Rules 62-701.630(3) and (4), F.A.C., except that long-term care costs need not be included, and the costs shall be based upon compliance with this section.

(c) If a local government requires financial assurance for closure, which is at least as stringent as that required by this rule, the Department will attempt to establish a cooperative mechanism with the local government and thereby avoid duplicative financial requirements.

(8) Stormwater. Stormwater shall be controlled in accordance with Part IV of Chapter 373, F.S., and the rules promulgated thereunder. A copy of any permit for stormwater control issued by the Department, or documentation that no such permit is required, shall be submitted to the Department and construction authorized by that permit shall be completed before the facility receives waste. Applicants should be aware that other government agencies may also regulate stormwater management and may require separate permits.

(9) Recordkeeping.

(a) Operational records shall be maintained to include a daily log of the quantity of solid waste received, processed, stored, and removed from the site for recycling or disposal, and the county of origin of the waste, if known. These records shall include each type of solid waste, recovered materials, residuals, and unacceptable waste which is processed, recycled, and disposed. Such records shall be compiled on a monthly basis and shall be available for inspection by the Department. Records shall be retained at the facility for three years.

(b) The owner or operator of any facility which recycles construction and demolition debris shall submit an annual report to the Department on Form 62-701.900(7). This report shall include a summary of the amounts and types of wastes disposed of or recycled. The county of origin of materials which are recycled, or a statement that the county of origin is unknown, shall be included in the report. The report shall be submitted no later than April 1 of each year, and shall cover the preceding calendar year.

(10) Special requirements for facility types.

(a) Transfer stations which accept primarily household waste, commercial waste, or recovered materials, which manage waste on a first-in, first-out basis, and which store waste for no greater than 7 days are exempt from the requirement to provide financial assurance set forth in subsection (7) of this section.

(b) Waste processing facilities which accept only construction and demolition debris are exempt from the requirement to provide a leachate control system set forth in paragraph (3)(b) of this section, provided that all areas where waste is stored or processed are covered by a ground water monitoring system which meets the requirements of Rule 62-701.730(4)(b), F.A.C.

(11) Alternate procedures. The owner or operator of a facility may request alternate procedures and requirements in accordance with Rule 62-701.310, F.A.C. However, if such request is based upon the nature of the waste accepted at the facility (for example, if a facility accepts only segregated wastes which are expected to have a minimal environmental impact), the request will be submitted to and acted on by the appropriate District office of the Department as part of a permit application or modification, and need not be accompanied by any additional fee.
Specific Authority 403.061, 403.704, FS.
Law Implemented 403.702, 403.704, 403.707, FS.
History -- New 5-27-01.

62-701.720 Industrial Solid Waste Disposal.
Specific Authority 403.061, 403.704, FS.
Law Implemented 403.702, 403.704, 403.707, FS.
History -- New 1-6-93, Amended 5-19-94, Formerly 17-701.720, Repealed 12-23-96.

62-701.730 Construction and Demolition Debris Disposal and Recycling.

(1) Applicability.

(a) No person shall construct or operate an off-site construction and demolition debris disposal facility without a permit issued by the Department. Except as otherwise specifically provided in this rule, such facilities which were constructed or operated in accordance with a general permit issued by the Department on or before June 1, 1996, may continue to operate in accordance with that general permit in accordance with the following schedule:

1. Owners or operators of facilities operating under a general permit issued prior to May 1, 1992, shall submit a timely and sufficient permit application that complies with this section by March 1, 1997.

2. Owners or operators of facilities operating under a general permit issued between May 1, 1992 and April 1, 1993, shall submit a timely and sufficient permit application that complies with this section at least 60 days prior to the expiration date of that general permit. A complete permit application shall be submitted no later than April 1, 1998.

3. Owners or operators of facilities operating under a general permit issued after April 1, 1993, shall, by April 1, 1998, either submit a complete permit application that complies with this section, or shall:

a. Submit a ground water monitoring plan that complies with the requirements of Paragraph (4)(b) of this section, and a hydrogeological investigation which complies with the requirements of Subparagraph (2)(a)3 of this section, along with a $500 processing fee as required by Rule 62-701.315(10). The plan shall be implemented within 90 days of submittal;

b. Submit a notification of intent to modify a general permit as provided in Subparagraph (1)(a)4 of this section; and

c. Submit financial assurance documentation that complies with the requirements of Subsection (11) of this section.

4. For owners or operators of facilities operating under a general permit issued after April 1, 1993, a modification to that general permit is hereby granted under the following conditions:

a. A person wishing to continue to operate the facility in accordance with a modified general permit shall notify the Department.

b. The notification shall include documentation which demonstrates how the applicant is complying or will comply with the requirements of Subsections (6) through (10) of this section. Information which was submitted to the Department to support the existing general permit and which is still valid does not need to be re-submitted. Instead, the notification shall list the information and reaffirm that it is still valid.

c. The notification shall include a $250 processing fee.

d. The modification to the general permit shall have the effect of allowing the applicant to continue to operate under that general permit, but shall not have the effect of changing the expiration date of that general permit. At least 60 days prior to the expiration date, the applicant shall submit a timely and sufficient permit application that complies with the requirements of this section.

5. Notwithstanding the compliance deadlines specified above, the operation requirements in subsection (7) of this section and the training requirements in subsection (8) of this section shall be complied with no later than May 1, 1997.

6. Notwithstanding the compliance deadlines specified above, the annual report required in subsection (12) of this section shall be submitted no later than April 1, 1998.

(b) After the applicable compliance deadline specified above, facilities shall operate only in accordance with the provisions of this section. However, disposal units which were constructed and operated under a general permit, and which received a significant amount of waste in accordance with that general permit prior to the applicable compliance deadline, are not required to comply with any siting or construction design requirements of this chapter which were not in effect prior to the applicable compliance deadline. For purposes of this subsection:

1. A "significant amount of waste" means that the disposal area has received sufficient waste for disposal, in accordance with its normal operational plan, so that it is impractical to remove that waste or to relocate or reconstruct the disposal area.

2. "Siting or construction design requirements" do not include the hydrogeological investigation required by Rule 62-701.730(2)(a)3., F.A.C., or the ground water monitoring plan required by Rule 62-701.730(4)(b), F.A.C.

(c) A disposal facility which ceases accepting waste prior to the compliance deadline specified above shall close in accordance with the provisions of its general permit.

(d) A permit application which complies with the provisions of this section is required for any lateral expansion of a construction and demolition debris disposal unit after June 1, 1996, notwithstanding the compliance schedule above.

(e) No person shall construct or operate a facility which accepts construction and demolition debris for recycling without a permit issued by the Department. Persons operating materials recovery facilities which accept construction and demolition debris may continue to operate under their existing permits. At the time of renewal of that permit, the requirements of this section shall be complied with.

(f) The provisions of Rule 62-701.320(8)(b), F.A.C., do not apply to construction and demolition debris disposal facility applications. Instead, the Department will provide notice to local governments in accordance with Section 403.707(12)(i), F.S.

(2) Application. A permit application for an off-site construction and demolition debris disposal facility, disposal unit, or lateral expansion shall be submitted on Form 62-701.900(6) and shall include the information required in Rules 62-701.320(5), (6), (7), and (8)(a), F.A.C., specifically including:

(a) An engineering report, signed and sealed by a professional engineer, that includes:

1. A site plan, of a scale not greater than 200 feet to the inch, which shows the project location and identifies the proposed disposal units, total acreage of the site and of the proposed disposal units, and any other relevant features such as water bodies or wetlands on or within 200 feet of the site, potable water wells on or within 500 feet of the site, and community water systems on or within 1000 feet of the site;

2. A geotechnical investigation which meets the criteria of Rule 62-701.410, F.A.C.

3. A hydrogeological investigation which meets the criteria of Rules 62-701.410(1)(a) and (c), F.A.C.; and

4. An estimate of the planned active life of the facility, the design of the disposal areas, and the design height of the facility;

(b) A boundary survey, legal description, and topographic survey of the property;

(c) An operation plan which describes how the applicant will comply with Rule 62-701.730(7), F.A.C.;

(d) A closure plan which describes generally how the applicant will comply with Rules 62-701.730(9) and (10), F.A.C.; and

(e) The financial assurance documentation required by Rule 62-701.730(11), F.A.C.

(3) Certification. Certification of construction completion shall be done in accordance with Rule 62-701.320(9)(a), F.A.C.

(4) Other requirements. Except as specified in this section, the requirements of Rules 62-701.330 through 62-701.630, F.A.C., do not apply to construction and demolition debris disposal facilities.

(a) The Department shall not require liners and leachate collection systems at individual facilities unless it demonstrates based upon the types of waste received, methods for controlling the types of waste disposed of, the proximity of ground water and surface water, and the results of the hydrogeological and geotechnical investigations that operation of the facility is reasonably expected to result in violations of ground water standards and criteria otherwise. If the Department determines that a liner and leachate control system may be required, it shall notify the applicant within 30 days of receipt of the information which forms the basis for such a determination. The applicant may either submit additional information, redesign the facility to include a liner and leachate collection system, or demand that the Department process the application without such additional information or redesign.

(b) A ground water monitoring plan which meets the criteria set forth in Rule 62-701.510 and Chapter 62-522, F.A.C., shall be included with the permit application, and shall be implemented and maintained by the owner or operator, with the following exceptions:

1. If no disposal unit is constructed with a liner and leachate collection system, then leachate sampling is not required.

2. Unless a disposal unit is constructed or operated within 200 feet of a surface water body, or unless site-specific conditions could reasonably be expected to result in contaminants entering a surface water body, surface water sampling is not required. For purposes of this subparagraph, a surface water body does not include a body of water contained completely within the property boundaries of the disposal site that does not discharge from the site to surface waters.

3. The well spacing requirements of Rule 62-701.510(3)(d)3., F.A.C., do not apply. A minimum of one upgradient and two downgradient wells is required, as specified in Chapter 62-522, F.A.C.

4. Detection wells shall be sampled and analyzed at least semi-annually for the following parameters:

Field Parameters	Laboratory Parameters
pH	Aluminum
Turbidity	Chlorides
Temperature	Nitrate
Specific conductivity	Sulfate
Dissolved oxygen	Total dissolved solids
Water elevations	Iron
Colors and sheens (by observation	Sodium
	Arsenic
	Cadmium
	Chromium
	Lead
	Mercury
	Total ammonia – N
	Phenols
	Those parameters listed in EPA Methods 601 and 602

5. Background water quality shall be established in accordance with the provisions of Rule 62-701.510(6)(b), F.A.C., except that sulfate, aluminum and phenols shall also be analyzed

for. In addition, all background and detection wells shall be sampled and analyzed at least once prior to permit renewal for those parameters listed in Rule 62-701.510(8)(a), F.A.C., as well as sulfate, aluminum and phenols.

6. The owner or operator of the facility may request a permit modification from the appropriate District Office of the Department to delete specific laboratory parameters or field parameters from routine analyses of detection wells and surface water. The Department will grant a request for a permit modification upon a demonstration that these parameters are not reasonably expected to be in or derived from the waste which was received or disposed of at the facility.

(c) Putrescible household waste shall not be disposed of at a construction and demolition debris disposal facility.

(d) Waste material from a waste processing facility which is mixed with Class I or Class III waste, either before or after processing, is not considered construction and demolition debris and may not be accepted for disposal at a construction and demolition debris disposal facility.

(5) Stormwater. Stormwater shall be controlled in accordance with Part IV of Chapter 373, F.S., and the rules promulgated thereunder. A copy of any permit for stormwater control issued by the Department, or documentation that no such permit is required, shall be submitted to the Department before the facility receives waste for disposal or recycling. Applicants should be aware that other government agencies may also regulate stormwater management and may require separate permits.

(6) Temporary storage. The owner or operator shall make arrangements or shall have equipment for temporary storage, handling and transport to an authorized disposal or recycling facility for solid waste, other than construction and demolition debris, which is inadvertently accepted by the facility. Such solid waste which is accepted by the facility shall be segregated and disposed of in accordance with Department rules. Unless an alternate schedule is included in an operation plan submitted with the permit application, which provides for the control of odors and vectors, putrescible waste shall not be stored for longer than 48 hours and non-putrescible waste shall not be stored for longer than 30 days. Any hazardous waste which is received by the facility shall be managed in accordance with the provisions of Chapter 62-730, F.A.C.

(7) Operation requirements. Owners and operators of construction and demolition debris disposal facilities shall comply with the following requirements by May 1, 1997, or at the time of permit issuance, whichever is sooner:

(a) An operation plan describing the facility operations and maintenance, emergency and contingency plans, and types of equipment that will be used shall be kept at the facility at all times and made available for inspection. All activities at the facility shall be performed in accordance with this plan and the permit conditions. The plan shall be updated as operations change but no less frequently than upon renewal of the permit. The Department shall be notified of changes to the plan other than those required for routine maintenance.

(b) Construction and demolition debris shall be compacted and sloped as necessary to assure that the requirements of subsection (9) of this section can be met. A schedule for compaction and grading shall be included in the operation plan.

(c) Access to the disposal facility shall be controlled during the active life of the facility by fencing or other effective barriers to prevent disposal of solid waste other than construction and demolition debris.

(d) A trained operator shall be on duty at the facility at all times that the facility is operating. In addition, a sufficient number of spotters shall be on duty at the working face to inspect the incoming waste at all times waste is being accepted at the site. Waste shall be inspected after it is removed from the transport vehicle and prior to placement for final disposal. Any prohibited material shall be removed from the waste stream and placed into appropriate containers or secure storage areas for disposal or recycling at a facility authorized by the Department to receive such waste.

(e) The facility shall be operated to control objectionable odors in accordance with Rule 62-296.320(2), F.A.C. If objectionable odors are detected off-site, the owner or operator shall comply with the requirements of Rule 62-701.530(3)(b), F.A.C.

(f) Fuels, solvents, lubricants, and other maintenance materials shall be stored in secure areas separate from the disposal or sorting areas.

(g) Plastic buckets may not be accepted at the facility unless they are empty when they arrive.

(h) Carpet remnants which are from a construction or demolition project may be accepted at the facility.

(8) Training. Operators and spotters employed at the facility shall be properly trained in accordance with Rule 62-701.320(15), F.A.C.

(9) Closure.

(a) At least 90 days prior to the date when wastes will no longer be accepted, the owner or operator of the construction and demolition debris disposal facility shall submit an updated closure plan to the Department to reflect any changes in the closure plan due to actual operational conditions at the facility.

(b) Final cover and seeding or planting of vegetative cover shall be placed on each disposal unit within 180 days after it has reached its final grade. Final cover shall consist of a 24-inch-thick soil layer, the upper six inches of which shall be capable of supporting vegetation, and shall be graded and compacted as necessary to eliminate ponding, promote drainage, and minimize erosion. The side slopes of all above-grade disposal units shall be no greater than three feet horizontal to one foot vertical rise. If the disposal unit is lined, the closure design shall include a barrier layer or other measures to ensure that the design leachate head over the liner is not exceeded after closure.

(c) The owner or operator shall provide a certification of closure construction completion to the Department within 30 days after closing, covering, and seeding the disposal unit. The owner or operator shall also provide a final survey report done by a professional surveyor, in accordance with Rule 62-701.610(3), F.A.C., if disposal operations have raised the final elevations higher than 20 feet above the natural land surface.

(d) Upon receipt of the documents required in paragraph (c) of this subsection, the Department shall, within 30 days, acknowledge by letter that notice of termination of operations and closing of the facility has been received. The date of this letter shall be the official date of landfill closing for the purpose of determining the long-term care period, in accordance with Rule 62-701.610(6), F.A.C.

(10) Long-term care. The owner or operator of the construction and demolition debris disposal facility shall continue to monitor and maintain the facility for five years from the date of closing. This time period shall be extended if assessment monitoring or corrective action has been initiated in accordance with Rule 62-701.510(7), F.A.C., or if site-specific conditions make it likely that any contamination which may emanate from the disposal area would not be detected within five years.

(11) Financial assurance.

(a) The owner or operator of an off-site construction and demolition debris disposal facility shall provide the Department with proof of financial assurance issued in favor of the State of Florida in the amount of the closing and long-term care cost estimates for the facility. This proof, along with the closing and long-term care cost estimates, shall be submitted to the Department as part of the permit application for the facility. Proof of financial assurance shall consist of one or more of the following financial instruments which comply with the requirements of Rule 62-701.630(6), F.A.C.: trust fund; surety bond guaranteeing payment; surety bond guaranteeing performance; irrevocable letter of credit; insurance; and financial test and corporate guarantee. If the owner or operator of the facility is a local government, an escrow account which complies with the requirements of Rule 62-701.630(5), F.A.C., may be used to provide proof of financial assurance. Financial documents shall be submitted on Form 62-701.900(5)(a), (b), (c), (d), (e), (f), (g), or (h), as appropriate.

(b) Closure cost estimates and annual updates thereof shall comply with the provisions of Rules 62-701.630(3) and (4)(a) through (d), F.A.C., except that the cost of long-term care shall be based upon a five-year period, and the costs shall be based upon compliance with this section.

(c) If a local government requires financial assurance for closure, which is at least as stringent as that required by this rule, the Department will attempt to establish a cooperative mechanism with the local government and thereby avoid duplicative financial requirements.

(12) Annual Reports. The owner or operator of the facility shall submit an annual report to the Department on Form 62-701.900(7). This report shall include a summary of the amounts and types of wastes disposed of or recycled. The county of origin of materials which are recycled, or a statement that the county of origin is unknown, shall be included in the report. The report shall be submitted no later than April 1 of each year beginning in 1998, and shall cover the preceding calendar year. This provision applies to all facilities regardless of the compliance schedules in Rule 62-701.730(1), F.A.C.

(13) Recycling.

(a) The owner or operator of a facility which accepts construction and demolition debris for disposal and which also recovers materials from the construction and demolition debris waste stream for purposes of recycling shall meet the requirements of this section as well as the requirements of Rule 62-701.710, F.A.C. If there is a conflict between this section and Rule 62-701.710, F.A.C., this section shall govern. It is not necessary for the owner or operator to apply for a separate permit as a waste processing facility or to pay an additional fee.

(b) The owner or operator of a facility which recovers materials from the construction and demolition debris waste stream for purposes of recycling but which does not dispose of any wastes on-site shall apply for a permit on Form 62-701.900(4), and shall comply with the provisions of Rule 62-701.710, F.A.C.

(c) In order to reuse recovered fines or screened materials other than clean debris from the construction and demolition debris waste stream, an owner or operator shall demonstrate that this material will be managed and reused in a manner that will pose no significant threat to public health or the environment. In making this demonstration, the owner or operator may consider background levels of receiving soils, whether the material will be blended with other materials, and the likelihood that the material may have unlimited distribution or come into direct contact with the public. Examples of management practices which would not require analysis for health-based criteria include permanent encapsulation, use as initial or intermediate cover or subsurface construction at a permitted landfill, or use under at least two feet of clean cover material.

(14) Incineration. A facility which employs an air curtain incinerator and which also stores or disposes of construction and demolition debris at the site shall meet the permitting requirements of Rule 62-256.500, F.A.C., as well as this section.

(15) Clean debris. Clean debris may be used as fill or raw material in any area, including waters of the State, subject to receipt of an environmental resource permit from the Department where applicable. Clean debris used as fill material is not solid waste, and such use does not require a solid waste permit under this rule.

(16) Landfill disposal. Construction and demolition debris may be disposed of in a permitted landfill. However, each county must maintain segregated disposal areas for construction and demolition debris. The cover requirements for a segregated construction and demolition debris disposal area within a permitted landfill shall be those in subsection (9) of this section. Landfills permitted in accordance with Rule 62-701.330, F.A.C., which have construction and demolition debris disposal units or recycling facilities included as part of their permit conditions, are not required to submit separate permit applications or financial assurance documents under this section.

(17) On-site disposal. Construction and demolition debris which is disposed of on the property where it is generated, or on property which is adjacent or contiguous to and under common ownership and control as that property where the waste is generated, is exempt from the permitting requirements of this section and Rule 62-701.330, F.A.C. However, such disposal is subject to the prohibitions of Rule 62-701.300, F.A.C. All waste shall be inspected by the generator or a spotter prior to disposal, either at the point of generation or at the disposal site, to ensure that any prohibited material is removed from the waste stream prior to disposal and managed in accordance with Department rules. Final cover and seeding or planting of vegetative cover shall be placed on each disposal unit within 180 days after final receipt of waste. Final cover shall consist of a 24-inch-thick soil layer, the upper six inches of which shall be capable of supporting vegetation, and shall be graded and compacted as necessary to eliminate ponding, promote drainage, and minimize erosion. The side slopes of all above-grade disposal areas shall be no greater than three feet horizontal to one foot vertical rise.

(18) Disposal restrictions. Construction and demolition debris may be disposed of only in accordance with one of the methods authorized above. In addition, disposal areas shall be operated so that adverse environmental and public health impacts, such as blowing litter and vectors, are minimized.

(19) Asbestos waste disposal. Asbestos-containing waste materials regulated pursuant to 40 CFR Part 61, Subpart M, shall not be disposed of in a construction and demolition debris disposal unit.

(20) Alternate procedures. The owner or operator of a facility may request alternate procedures and requirements in accordance with Rule 62-701.310, F.A.C. However, if such request is based upon the nature of the construction and demolition debris accepted at the facility (for example, if a facility accepts only segregated wastes which are expected to have a minimal environmental impact), the request will be submitted to and acted on by the appropriate District office of the Department, and need not be accompanied by any additional fee.

Specific Authority 403.0877, 403.704, 403.707, FS.
Law Implemented 403.0877, 403.706, 403.707, FS.

History New 8-2-89, Formerly 17-701.061, Amended 1-6-93, Formerly 17-701.730, Amended 12-23-96, 4-23-97, 5-27-01.

62-701.801 General Permit for Solid Waste Transfer Station.
Specific Authority 403.814(1), FS.
Law Implemented 403.061, 403.087, 403.088, 403.702-403.73, 403.814, FS.
History -- New 7-8-82, Formerly 17-4.61, 17-4.610, 17-7.801, Amended 1-6-93, 5-19-94, Formerly 17-701.801, Repealed 5-27-01.

62-701.802 General Permit for Land Application of Grade II Domestic Wastewater Treatment Sludge.
Specific Authority 403.814, FS.
Law Implemented 403.061, 403.087, 403.702, through 403.715, 403.814, FS.
History -- New 6-16-84, Formerly 17-4.64, 17-4.640, 17-7.802, 17-701.802, Repealed 12-23-96.

62-701.803 General Permit for Off-site Disposal of Land Clearing Debris.

(1) Notification. Notwithstanding the provisions of Rule 62-701.730, F.A.C., facilities which accept for disposal only land clearing debris may operate under a general permit pursuant to Part III of Rule 62-4, F.A.C., and this section. The owner or operator of the land clearing debris disposal facility shall notify the Department in writing on Form 62-701.900(3) of the intent to use this general permit. Owners or operators of solid waste management facilities which have a permit under Chapter 62-701, F.A.C., to receive land clearing debris are exempt from this requirement. The notification shall include:

(a) A site plan, of a scale not greater than 200 feet to the inch, which shows the project location and identifies the proposed disposal areas, total acreage of the site and of the proposed disposal area, and any other relevant features such as water bodies, wetlands, or potable water wells on or within 200 feet of the site;

(b) Identification of ground water levels at the site, including the seasonal high ground water level if known;

(c) A general description of the facility operations, including equipment and personnel planned for the operation and closure of the facility, and a training plan which complies with the requirements of Rule 62-701.320(15), F.A.C.;

(d) A boundary survey, legal description, and topographic survey of the property;

(e) The planned active life of the facility, and the design height of the facility;

(f) Closure plans and cross section details of the final cover;

(g) The mailing address and phone number of the owner and operator; and

(h) Documentation that the applicant either owns the land or has legal authorization from the landowner to use the land for a disposal facility.

(2) Certification. Certification of construction completion shall be done in accordance with Rule 62-701.320(9)(a), F.A.C.

(3) Other requirements. The requirements of Rules 62-701.330 through 62-701.630, F.A.C., do not apply to land clearing debris disposal facilities, provided that none of the prohibitions contained in Rule 62-701.300, F.A.C., shall be violated.

(4) Stormwater. Stormwater shall be controlled in accordance with Part IV of Chapter 373, F.S., and the rules promulgated thereunder. A copy of any permit for stormwater control issued by the Department, or documentation that no such permit is required, shall be submitted to

the Department before the facility receives waste for disposal. Applicants should be aware that other government agencies may also regulate stormwater management and may require separate permits.

(5) Temporary storage. The owner or operator shall make arrangements or shall have equipment for temporary storage, handling and transport to an authorized disposal or recycling facility for solid waste, other than land clearing debris, which is inadvertently accepted by the facility. Such solid waste which is accepted by the facility shall be segregated and disposed of in accordance with Department rules. Unless an alternate schedule is included in an operation plan submitted with the permit application, which provides for the control of odors and vectors, putrescible waste shall not be stored for longer than 48 hours and non-putrescible waste shall not be stored for longer than 30 days. Any hazardous waste which is received by the facility shall be managed in accordance with the provision of Chapter 62-730, F.A.C.

(6) Compaction. Land clearing debris shall be compacted and sloped as necessary to assure that the requirements of subsection (10) of this section can be met.

(7) Access. Access to the disposal facility shall be controlled during the active life of the facility by fencing or other effective barriers to prevent disposal of solid waste other than land clearing debris.

(8) Inspection of waste. At least one spotter shall be on duty at the working face at all times that the site is operating to inspect the incoming waste. Any material other than land clearing debris shall be removed from the waste stream and placed into appropriate containers for disposal at a permitted facility. Spotters shall be trained in accordance with Rule 62-701.320(15), F.A.C.

(9) Inspections. Operation of a facility under a general permit constitutes consent for Department personnel to inspect the site and such records as are required by this section during normal business hours for compliance with Department rules.

(10) Closure. Final cover and seeding or planting of vegetative cover shall be placed on each disposal unit within 180 days after final receipt of wastes. Final cover shall consist of a 24-inch-thick soil layer, the upper six inches of which shall be capable of supporting vegetation and shall be graded to eliminate ponding, promote drainage, and minimize erosion. The side slopes of all above-grade disposal areas shall be no greater than three feet horizontal to one foot vertical rise.

(11) Notification of closure. The owner or operator shall notify the Department within 30 days after closing, covering, and seeding the facility as required in subsection (10) of this section.

(12) Incineration. A facility which employs an air curtain incinerator and which also stores or disposes of land clearing debris at the site shall meet the permitting requirements of Rule 62-256.500, F.A.C., as well as this section.

(13) A general permit issued under this section shall be valid for five years.

Specific Authority 403.704, 403.707, 403.814, FS.
Law Implemented 403.707, 403.814, FS.
History New 8-2-89, Amended 1-6-93, 1-2-94, 5-19-94, Formerly 17-701.803, Amended 12-23-96, 4-23-97, 5-27-01.

62-701.900 Forms. The forms used by the Department in the solid waste management program are adopted and incorporated by reference in this section. The form is listed by rule number, which is also the form number, and with the subject, title and effective date. Copies of forms may be obtained from a local District Office or by writing to the Florida Department of Environmental Protection, DEP Library, 2600 Blair Stone Road, Tallahassee, Florida 32399-2400.

(1) Application to Construct, Operate, Modify, or Close a Solid Waste Management Facility, effective May 27, 2001.

(2) Certification of Construction Completion of a Solid Waste Management Facility, effective May 19, 1994.

(3) Notification of Intent to Use a General Permit for a Land Clearing Debris Disposal Facility, effective 5-27-01.

(4) Application to Construct, Operate, or Modify a Waste Processing Facility, effective 5-27-01.

(5) Financial mechanisms for solid waste management facilities requiring closure and/or long-term care, effective 5-27-01.

(a) Solid Waste Facility Irrevocable Letter of Credit.

(b) Solid Waste Facility Financial Guarantee Bond.

(c) Solid Waste Facility Performance Bond.

(d) Solid Waste Facility Closure/Long-Term Care Insurance Certificate.

(e) Solid Waste Facility Financial Test.

(f) Solid Waste Facility Corporate Guarantee.

(g) Solid Waste Facility Trust Fund Agreement to Demonstrate Closure and/or Long-Term Care Financial Assurance.

(h) Solid Waste Facility Standby Trust Fund Agreement.

(6) Application to Construct, Operate, or Modify a Construction and Demolition Debris Disposal or Disposal with Recycling Facility, effective 5-27-01.

(7) Annual Report for a Construction and Demolition Debris Facility, effective 5-27-01.

(8) Permit Transfer Form, effective 5-27-01.

(9) Application for Preliminary Examination and Final Examination and Certification of Resource Recovery Equipment, effective 12-23-96.

(10) Application for a Permit to Construct/Operate a Solid Waste Management Facility for the Production of Compost, effective 12-23-96.

(11) Annual Report for a Solid Waste Management Facility Producing Compost Made from Solid Waste, effective 12-23-96.

(12) Application for Registration Used Oil and Used Oil Filter Handlers, effective 12-23-96.

(13) Used Oil and Used Oil Filter Record Keeping Form, effective 12-23-96.

(14) Annual Report by Used Oil and Used Oil Filter Handlers, effective 12-23-96.

(15) Certificate of Liability Insurance Used Oil Handlers, effective 12-23-96.

(16) Used Oil Processing Facility General Permit Notification, effective 12-23-96.

(17) Public Used Oil Collection Center Notification and Annual Report, effective 12-23-96.

(18) Waste Tire Collector Registration Application, effective 12-23-96.

(19) Waste Tire General Permit Application, effective 12-23-96.

(20) Waste Tire Site Notification, effective 12-23-96.

(21) Waste Tire Processing Facility Quarterly Report, effective 12-23-96.

(22) Waste Tire Collector Annual Report, effective 12-23-96.

(23) Waste Tire Processing Facility Permit Application, effective 12-23-96.

(24) Waste Tire Small Processing Facility Permit Application, effective 12-23-96.
(25) Waste Tire Collection Center Permit Application, effective 12-23-96.
(26) Application for Recovered Materials Certification, effective 5-27-01.
(27) Reporting Form for Recovered Materials, effective 5-27-01.
(28) Financial Assurance Cost Estimating Form, effective 5-27-01.

Specific Authority 403.704, FS.
Law Implemented 403.707, FS.
History -- New 8-2-89; Amended 1-6-93, 5-19-94, Formerly 17-701.900, Amended 12-23-96, 4-23-97, 5-27-01.

Adobe Acrobat

You can fill out this form in Acrobat Reader and then print the form with the data from the Reader. Note that you can NOT use the Save or Save As function with Acrobat Reader. If you want a copy for your records, please print an extra copy of the form.

To fill out a form:

(1) Select the hand tool . 

(2) Position the pointer inside a form field, and click. The I-beam pointer allows you to type text. The arrow pointer allows you to select a button, a check box, a radio button, or an item from a list.

(3) After entering text or selecting an item, check box, or radio button, do one of the following:

-- Press **Tab** to go to the next form field.

-- Press **Shift+Tab** to go to the previous form field.

-- In a multi-line text form field, **Enter** or **Return** goes to the next line in the same form field. You can use **Enter** on the keypad to accept a change and deselect the current form field.

-- Press **Escape** to reject the form field change and deselect the current form field.

-- If you are in Full Screen mode, pressing **Escape** a second time causes you to exit Full Screen mode.

(4) Once you have filled in the appropriate form fields, do the following:

-- Select the print tool  for a copy of the form for mailing or to keep for your records.

To clear a form in a browser window:

Exit the Acrobat viewer and start again.
Important: There is no undo for this action.

Florida Department of Environmental Protection
Twin Towers Office Bldg. • 2600 Blair Stone Road • Tallahassee, FL 32399-2400

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

SOLID WASTE MANAGEMENT FACILITY PERMIT

APPLICATION INSTRUCTIONS AND FORMS

Northwest District
160 Governmental Center
Pensacola, FL 32501-5794
850-595-8360

Northeast District
7825 Baymeadows Way, Ste. B200
Jacksonville, FL 32256-7590
904-448-4300

Central District
3319 Maguire Blvd., Ste. 232
Orlando, FL 32803-3767
407-894-7555

Southwest District
3804 Coconut Palm Dr.
Tampa, FL 33619
813-744-6100

South District
2295 Victoria Ave., Ste. 364
Fort Myers, FL 33901-3881
941-332-6975

Southeast District
400 North Congress Ave.
West Palm Beach, FL 33401
561-681-6600

INSTRUCTIONS TO APPLY FOR A SOLID WASTE MANAGEMENT PERMIT

I. General

Solid Waste Management Facilities shall be permitted pursuant to Section 403.707, Florida Statutes,(FS) and in accordance with Florida Administrative Code (FAC) Chapter 62-701. A minimum of six copies of the application shall be submitted to the Department District Office having jurisdiction over the facility. The appropriate fee in accordance with Chapter 62-4, FAC, and Rule 62-701.320(5)(c), FAC, shall be submitted with the application by check made payable to the Department of Environmental Regulation (DEP).

Complete appropriate sections for the type of facility for which application is made. Entries shall be typed or printed in ink. All blanks shall be filled in or marked "not applicable" or "no substantial change". Information provided in support of the application shall be marked "submitted" and the location of this information in the application package indicated. The application shall include all information, drawings, and reports necessary to evaluate the facility. Information required to complete the application is listed on the attached pages of this form.

II. Application Parts Required for Construction and Operation Permits

A. Landfills and Ash Monofills - Submit parts A,B, D through R, and T
B. Asbestos Monofills - Submit parts A,B,D,E,F,I,K, M through Q, and T
C. Industrial Solid Waste Facilities - Submit parts A,B, D through Q, and T
D. Volume Reduction Facilities - Submit parts A,C,D,S, and T
E. Materials Recovery Facilities - Submit parts A,C,D,S, and T

NOTE: Portions of some parts may not be applicable.

NOTE: For facilities that have been satisfactorily constructed in accordance with their construction permit, the information required for A,B,C,D, and E type facilities does not have to be resubmitted for an operation permit if the information has not substantially changed during the construction period. The appropriate portion of the form should be marked "no substantial change".

III. Application Parts Required for Closure Permits

A. Landfills and Ash Monofills - Submit parts A,B, N through R, and T
B. Asbestos Monofills - Submit parts A,B, M through Q, and T
C. Industrial Solid Waste Facilities - Submit parts A,B, N through Q, and T
D. Volume Reduction Facilities - Submit parts A,C,S, and T
E. Materials Recovery Facilities - Submit parts A,C,S, and T

NOTE: Portions of some parts may not be applicable.

IV. Permit Renewals

The above information shall be submitted at time of permit renewal in support of the new permit. However, facility information that was submitted to the Department to support the expiring permit, and which is still valid, does not need to be re-submitted for permit renewal. Portions of the application not re-submitted shall be marked "no substantial change" on the application form.

V. Application Codes

S	-	Submitted
LOCATION	-	Physical location of information in application
N/A	-	Not Applicable
N/C	-	No Substantial Change

VI. LISTING OF APPLICATION PARTS

PART A- GENERAL INFORMATION

PART B- DISPOSAL FACILITY GENERAL INFORMATION

PART C- MATERIALS RECOVERY / VOLUME REDUCTION FACILITY GENERAL INFORMATION

PART D- SOLID WASTE MANAGEMENT FACILITY PERMIT GENERAL REQUIREMENTS

PART E- LANDFILL PERMIT GENERAL REQUIREMENTS

PART F- GENERAL CRITERIA FOR LANDFILLS

PART G- LANDFILL CONSTRUCTION REQUIREMENTS

PART H- HYDROGEOLOGICAL INVESTIGATION REQUIREMENTS

PART I- GEOTECHNICAL INVESTIGATION REQUIREMENTS

PART J- VERTICAL EXPANSION OF LANDFILLS

PART K- LANDFILL OPERATION REQUIREMENTS

PART L- WATER QUALITY AND LEACHATE MONITORING REQUIREMENTS

PART M- SPECIAL WASTE HANDLING REQUIREMENTS

PART N- LANDFILL CLOSURE REQUIREMENTS

PART O- CLOSURE PROCEDURES

PART P- LONG TERM CARE REQUIREMENTS

PART Q- FINANCIAL RESPONSIBILITY REQUIREMENTS

PART R- CLOSURE OF EXISTING LANDFILL REQUIREMENTS

PART S- MATERIALS RECOVERY FACILITY REQUIREMENTS

PART T- CERTIFICATION BY APPLICANT AND ENGINEER OR PUBLIC OFFICER

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
APPLICATION FOR PERMIT TO CONSTRUCT, OPERATE, MODIFY OR CLOSE
A SOLID WASTE MANAGEMENT FACILITY

Please Type or Print

A. GENERAL INFORMATION

1. Type of facility:

Disposal [ ]

Class I Landfill	[ ]	Ash Monofill	[ ]
Class II Landfill	[ ]	Asbestos Monofill	[ ]
Class III Landfill	[ ]	Industrial Solid Waste	[ ]
Other	[ ] ______________________		

Volume Reduction [ ]

Incinerator	[ ]	Pulverizer / Shredder	[ ]
Composting	[ ]	Compactor / Baling Plant	[ ]
Materials Recovery	[ ]	Energy Recovery	[ ]
Other	[ ] ______________________		

2. Type of application:

Construction	[ ]	Construction/Operation	[ ]
Operation	[ ]	Closure	[ ]

3. Classification of application:

New	[ ]	Substantial Modification	[ ]
Renewal	[ ]	Minor Modification	[ ]

4. Facility name: ______________________

5. DEP ID number: ______________ County: ______________

6. Facility location (main entrance): ______________________

____

7. Location coordinates:

Section: _____ Township: _____ Range: _____

UTMs: Zone _______ _______ km E _______ km N

Latitude: ____ ° ____ ' ____ " Longitude: ____ ° ____ ' ____ "

8. Applicant name (operating authority): ______________________________

Mailing address: ______________________________
Street or P.O. Box City State Zip

Contact person: ______________________ Telephone: (___) __________

Title: ______________________________

9. Authorized agent/Consultant: ______________________________

Mailing address: ______________________________
Street or P.O. Box City State Zip

Contact person: ______________________ Telephone: (___) __________

Title: ______________________________

10. Landowner(if different than applicant): ______________________________

Mailing address: ______________________________
Street or P.O. Box City State Zip

Contact person: ______________________ Telephone: (___) __________

11. Cities, towns and areas to be served: ______________________________

____

12. Population to be served:

Current: ______________ Five-Year Projection: ______________

13. Volume of solid waste to be received: __________ yds^3/day tons/day gallons/day

14. Date site will be ready to be inspected for completion: __________

15. Estimated life of facility: __________ years

16. Estimated costs:

Total Construction: $__________ Closing Costs: $__________

17. Anticipated construction starting and completion dates:

From: __________ To: __________

B. DISPOSAL FACILITY GENERAL INFORMATION

1. Provide brief description of disposal facility design and operations planned by this application:

____

____

____

____

2. Facility site supervisor: ______________________________

Title: ____________________ Telephone: (___)____________________

3. Disposal area: Total _____ acres; Used _____ acres; Available _____ acres

4. Weighing scales used: Yes [ ] No [ ]

5. Security to prevent unauthorized use: Yes [ ] No [ ]

6. Charge for waste received: ________ $/yds^3 ________ $/ton

7. Surrounding land use, zoning:

Residential	[ ]	Industrial	[ ]
Agricultural	[ ]	None	[ ]
Commercial	[ ]	Other	[ ] ____________

8. Types of waste received:

Residential	[ ]	C & D debris	[ ]
Commercial	[ ]	Shredded/cut tires	[ ]
Incinerator / WTE ash	[ ]	Yard trash	[ ]
Treated biohazardous	[ ]	Septic tank	[ ]
Water treatment sludge	[ ]	Industrial	[ ]
Air treatment sludge	[ ]	Industrial sludge	[ ]
Agricultural	[ ]	Domestic sludge	[ ]
Asbestos	[ ]		
Other	[ ] ______________________		

9. Salvaging permitted: Yes [ ] No [ ]

10. Attendant: Yes [ ] No [ ] Trained operator: Yes [ ] No [ ]

11. Spotters: Yes [ ] No [ ] Number of spotters used: ____

12. Site located in: Floodplain [ ] Wetlands [ ] Other [ ] ____________

13. Property recorded as a Disposal Site in County Land Records: Yes [ ] No [ ]

14. Days of operation: ______________________________

15. Hours of operation: ______________________________

16. Days Working Face covered: ______________________________

17. Elevation of water table: ______ Ft. NGVD

18. Number of monitoring wells: ______________________________

19. Number of surface monitoring points: ______________________________

20. Gas controls used: Yes [ ] No [ ] Type controls: Active [ ] Passive [ ]

Gas flaring: Yes [ ] No [ ] Gas recovery: Yes [ ] No [ ]

21. Landfill Unit - liner type:

Natural soils	[ ]	Double geomembrane	[ ]
Single clay liner	[ ]	Geomembrane & composite	[ ]
Single geomembrane	[ ]	Double composite	[ ]
Single composite	[ ]	None	[ ]
Slurry wall	[ ]		
Other	[ ]	______________________	

22. Leachate collection method:

Collection pipes	[ ]	Sand layer	[ ]
Geonets	[ ]	Gravel layer	[ ]
Well points	[ ]	Interceptor trench	[ ]
Perimeter ditch	[ ]	None	[ ]
Other	[ ]	______________________	

23. Leachate storage method:

Tanks	[ ]	Surface impoundments	[ ]
Other	[ ]	______________________	

24. Leachate treatment method:

Oxidation	[ ]	Chemical treatment	[ ]
Secondary	[ ]	Settling	[ ]
Advanced	[ ]	None	[ ]
Other	[ ]	______________________	

25. Leachate disposal method:

Recirculated	[ ]	Pumped to WWTP	[ ]
Transported to WWTP	[ ]	Discharged to surface water	[ ]
Injection well	[ ]	Evaporation (ie: Perc Pond)	[ ]
Other	[ ]	______________________	

26. For leachate discharged to surface waters:

Name and Class of receiving water: ______________________

27. Storm Water: Collected: Yes [ ] No [ ] Type of treatment: ______________

Name and Class of receiving water: ______________________

28. Management and Storage of Surface Waters (MSSW) Permit number or status: ________

____

C. MATERIALS RECOVERY / VOLUME REDUCTION FACILITY GENERAL INFORMATION

1. Provide brief description of materials recovery / volume reduction facility design and operations planned by this application:

____

____

____

2. Facility site supervisor: ____

   Title: ____________________ Telephone: (___)____________________

3. Disposal area: Total _____ acres; Used _____ acres; Available _____ acres

4. Security to prevent unauthorized use: Yes [ ] No [ ]

5. Site located in: Floodplain [ ] Wetlands [ ] Other [ ] ____________

6. Days of operation: ____

7. Hours of operation: ____

8. Number of operating staff: ____________

9. Expected useful life: _____ Years

10. Weighing scales used: Yes [ ] No [ ]

11. Normal processing rate: _____ yd^3/day _____ tons/day _____ gal/day

12. Maximum processing rate: _____ yd^3/day _____ tons/day _____ gal/day

13. Charge for waste received: ____

14. Type of facility (check one or more):

Incinerator	[ ]	Composting	[ ]
Pulverizer / shredder	[ ]	Materials recovery	[ ]
Compactor / baling	[ ]	Energy recovery	[ ]
Sludge concentration	[ ]	Pyrolysis	[ ]
Other	[ ]	____________________	

15. Material recovered, tons/week:

_____	Paper	_____	Glass
_____	Ferrous metals	_____	Non-ferrous metals
_____	Aluminum	_____	Plastics
_____	Other:	____________________	

16. Energy recovery, in units shown:

______	High pressure steam, lb/hr	______	Chilled water, gal/hr
______	Low pressure steam, lb/hr	______	Oil, gal/hr
______	Electricity, kw/hr	______	Oil, BTU/hr
______	Gas, ft^3/hr	______	Gas, BTU/hr
______	Other: ______________________________		

17. Process water management:

Recycled: Yes [ ] No [ ]

Treatment method used: ______________________________

Discharged to: Surface waters [ ] Underground [ ] Other [ ]

Name and Class of receiving water: ______________________________

18. Storm Water:

Collected: Yes [ ] No [ ] Type of treatment: ______________________________

Name and Class of receiving water: ______________________________

19. ERP Permit number or status: ______________________________

20. Final residue produced:

______ % of normal processing rate

______ % of maximum processing rate

Disposed of at (Site name): ______________________________

21. Supplemental fuel used:

Type: ______________________________ Quantity used/hour: ______________________________

22. Costs:

Estimated operating costs (material-energy revenue): $ ______________________________

Total cost/ton: $ ______________ Net cost/ton: $ ______________________________

23. State pollution control bond financing amount: $ ______________________________

24. Estimated amount of tax exemptions that will be requested: $ ______________________________

D. SOLID WASTE MANAGEMENT FACILITY PERMIT GENERAL REQUIREMENTS (62-701.320, FAC)

S	LOCATION	N/A	N/C		
___	___________	___	___	1.	Six copies, at minimum, of the completed application form, all supporting data and reports; (62-701.320(5)(a),FAC)
___	___________	___	___	2.	Engineering and/or professional certification (signature, date and seal) provided on the applications and all engineering plans, reports and supporting information for the application; (62-701.320(6),FAC)
___	___________	___	___	3.	A letter of transmittal to the Department; (62-701.320(7)(a),FAC)
___	___________	___	___	4.	A completed application form dated and signed by the applicant; (62-701.320(7)(b),FAC)
___	___________	___	___	5.	Permit fee specified in Rule 62-4.050, FAC and Rule 62-701.320(5)(c), FAC in check or money order, payable to the Department; (62-701.320(7)(c),FAC)
___	___________	___	___	6.	An engineering report addressing the requirements of this rule and with the following format: a cover sheet, text printed on 8 1/2 inch by 11 inch consecutively numbered pages, a table of contents or index, the body of the report and all appendices including an operation plan, contingency plan, illustrative charts and graphs, records or logs of tests and investigations, engineering calculations; (62-701.320(7)(d),FAC))
___	___________	___	___	7.	Operation Plan; (62-701.320(7)(e)1,FAC)
___	___________	___	___	8.	Contingency Plan; (62-701.320(7)(e)2,FAC)
				9.	Plans or drawings for the solid waste management facilities in appropriate format (including sheet size restrictions, cover sheet, legends, north arrow, horizontal and vertical scales, elevations referenced to NGVD) showing; (62-702.320(7)(f),FAC)
___	___________	___	___		a. A regional map or plan with the project location;
___	___________	___	___		b. A vicinity map or aerial photograph no more than 1 year old;
___	___________	___	___		c. A site plan showing all property boundaries certified by a registered Florida land surveyor;

S	LOCATION	N/A	N/C		
___	___________	___	___	d.	Other necessary details to support the engineering report.
___	___________	___	___	10.	Proof of property ownership or a copy of appropriate agreements between the facility operator and property owner authorizing use of property; (62-701.320(7)(g),FAC)
___	___________	___	___	11.	For facilities owned or operated by a county, provide a description of how, if any, the facilities covered in this application will contribute to the county's achievement of recycling goals contained in Section 403.706,FS; (62-701.320(7)(h),FAC)
___	___________	___	___	12.	Provide a history and description of any enforcement actions taken by the Department against the applicant for violations of applicable statutes, rules, orders or permit conditions relating to the operation of any solid waste management facility in this state; (62-701.320(7)(i),FAC)
___	___________	___	___	13.	Proof of publication in a newspaper of general circulation of notice of application for a permit to construct or substantially modify a solid waste management facility; (62-702.320(8),FAC)
___	___________	___	___	14.	Provide a description of how the requirements for airport safety will be achieved including proof of required notices if applicable; (62-701.320(12),FAC)

E. LANDFILL PERMIT GENERAL REQUIREMENTS (62-701.330, FAC)

S	LOCATION	N/A	N/C		
				1.	Vicinity map or aerial photograph no more than 1 year old and of appropriate scale showing land use and local zoning within one mile of the landfill and of sufficient scale to show all homes or other structures, water bodies, and roads other significant features of the vicinity. All significant features shall be labeled; (62-701.330(4)(a),FAC)
				2.	Vicinity map or aerial photograph no more than 1 year old showing all airports that are located within five miles of the proposed landfill; (62-701.330(4)(b),FAC)
				3.	Plot plan with a scale not greater than 200 feet to the inch showing; (62-701.330(4)(c),FAC)
					a. Dimensions;
					b. Locations of proposed and existing water quality monitoring wells;
					c. Locations of soil borings;
					d. Proposed plan of trenching or disposal areas;
					e. Cross sections showing original elevations and proposed final contours which shall be included either on the plot plan or on separate sheets;
					f. Any previously filled waste disposal areas;
					g. Fencing or other measures to restrict access.
				4.	Topographic maps with a scale not greater than 200 feet to the inch with 5-foot contour intervals showing; (62-701.330(4)(d),FAC):
					a. Proposed fill areas;
					b. Borrow areas;
					c. Access roads;
					d. Grades required for proper drainage;
					e. Cross sections of lifts;

S	LOCATION	N/A	N/C		
___	___	___	___		f. Special drainage devices if necessary;
___	___	___	___		g. Fencing;
___	___	___	___		h. Equipment facilities.
				5.	A report on the landfill describing the following; (62-701.330(4)(e),FAC)
___	___	___	___		a. The current and projected population and area to be served by the proposed site;
___	___	___	___		b. The anticipated type, annual quantity, and source of solid waste, expressed in tons;
___	___	___	___		c. The anticipated facility life;
___	___	___	___		d. The source and type of cover material used for the landfill.
___	___	___	___	6.	Provide evidence that an approved laboratory shall conduct water quality monitoring for the facility in accordance with Rule 62-160,FAC; (62-701.330(4)(h),FAC)
___	___	___	___	7.	Provide a statement of how the applicant will demonstrate financial responsibility for the closing and long-term care of the landfill; (62-701.330(4)(i),FAC)

F. GENERAL CRITERIA FOR LANDFILLS (62-701.340,FAC)

___	___	___	___	1.	Describe (and show on a Federal Insurance Administration flood map, if available) how the landfill or solid waste disposal unit shall not be located in the 100-year floodplain where it will restrict the flow of the 100-year flood, reduce the temporary water storage capacity of the floodplain unless compensating storage is provided, or result is a washout of solid waste; (62-701.340(4)(b),FAC)
___	___	___	___	2.	Describe how the minimum horizontal separation between waste deposits in the landfill and the landfill property boundary shall be 100 feet, measured from the toe of the proposed final cover slope; (62-701.340(4)(c),FAC)
___	___	___	___	3.	Describe what methods shall be taken to screen the landfill from public view where such screening can practically be provided; (62-701.340(4)(d),FAC)

G. LANDFILL CONSTRUCTION REQUIREMENTS (62-701.400,FAC)

S	LOCATION	N/A	N/C	
___	___	___	___	1. Describe how the landfill shall be designed so that solid waste disposal units will be constructed and closed at planned intervals throughout the design period of the landfill; (62-701.400(2),FAC)
				2. Landfill liner requirements; (62-701.400(3),FAC)
				a. General construction requirements; (62-701.400(3)(a),FAC):
___	___	___	___	(1) Provide test information and documentation to ensure the liner will be constructed of materials that have appropriate physical, chemical, and mechanical properties to prevent failure;
___	___	___	___	(2) Document foundation is adequate to prevent liner failure;
___	___	___	___	(3) Constructed so bottom liner will not be adversely impacted by fluctuations of the ground water;
___	___	___	___	(4) Designed to resist hydrostatic uplift if bottom liner located below seasonal high ground water table;
___	___	___	___	(5) Installed to cover all surrounding earth which could come into contact with the waste or leachate.
				b. Composite liners; (62-701.400(3)(b),FAC)
___	___	___	___	(1) Upper geomembrane thickness and properties;
___	___	___	___	(2) Design leachate head for primary LCRS including leachate recirculation if appropriate;
___	___	___	___	(3) Design thickness in accordance with Table A and number of lifts planned for lower soil component.

S	LOCATION	N/A	N/C	
				c. Double liners; (62-701.400(3)(c),FAC)
___	___	___	___	(1) Upper and lower geomembrane thicknesses and properties;
___	___	___	___	(2) Design leachate head for primary LCRS to limit the head to one foot above the liner;
___	___	___	___	(3) Lower geomembrane sub-base design;
___	___	___	___	(4) Leak detection and secondary leachate collection system minimum design criteria (k $\geq$ 1 cm/sec, head on lower liner $\leq$ 1 inch, head not to exceed thickness of drainage layer);
				d. Standards for geomembranes; (62-701.400(3)(d),FAC)
___	___	___	___	(1) Field seam test methods to ensure all field seams are at least 90 percent of the yield strength for the lining material;
___	___	___	___	(2) Design of 24-inch-thick protective layer above upper geomembrane liner;
___	___	___	___	(3) Describe operational plans to protect the liner and leachate collection system when placing the first layer of waste above 24-inch-thick protective layer.
				e. Geosynthetic specification requirements; (62-701.400(3)(e),FAC)
___	___	___	___	(1) Definition and qualifications of the designer, manufacturer, installer, QA consultant and laboratory, and QA program;
___	___	___	___	(2) Material specifications for geomembranes, geotextiles, geogrids, and geonets;

S	LOCATION	N/A	N/C	
___	___	___	___	(3) Manufacturing and fabrication specifications including geomembrane raw material and roll QA, fabrication personnel qualifications, seaming equipment and procedures, overlaps, trial seams, destructive and nondestructive seam testing, seam testing location, frequency, procedure, sample size and geomembrane repairs;
___	___	___	___	(4) Geomembrane installation specifications including earthwork, conformance testing, geomembrane placement, installation personnel qualifications, field seaming and testing, overlapping and repairs, materials in contact with geomembrane and procedures for lining system acceptance;
___	___	___	___	(5) Geotextile and geogrid specifications including handling and placement, conformance testing, seams and overlaps, repair, and placement of soil materials;
___	___	___	___	(6) Geonet specifications including handling and placement, conformance testing, stacking and joining, repair, and placement of soil materials;
				f. Standards for soil components (62-710.400(3)(f),FAC):
___	___	___	___	(1) Description of construction procedures including overexcavation and backfilling to preclude structural inconsistencies and procedures for placing and compacting soil component in layers;
___	___	___	___	(2) Demonstration of compatibility of the soil component with actual or simulated leachate in accordance with EPA Test Method 9100 or an equivalent test method;
___	___	___	___	(3) Procedures for testing in-situ soils to demonstrate they meet the specifications for soil liners;

S	LOCATION	N/A	N/C

(4) Specifications for soil component of liner including at a minimum:

(a) Allowable particle size distribution, Atterberg limits, shrinkage limit;

(b) Placement moisture and dry density criteria;

(c) Maximum laboratory-determined saturated hydraulic conductivity using simulated leachate;

(d) Minimum thickness of soil liner;

(e) Lift thickness;

(f) Surface preparation (scarification);

(g) Type and percentage of clay mineral within the soil component;

(5) Procedures for constructing and using a field test section to document the desired saturated hydraulic conductivity and thickness can be achieved in the field.

3. Leachate collection and removal system (LCRS); (62-701.400(4),FAC)

a. The primary and secondary LCRS requirements; (62-701.400(4)(a),FAC)

(1) Constructed of materials chemically resistant to the waste and leachate;

(2) Have sufficient mechanical properties to prevent collapse under pressure;

(3) Have granular material or synthetic geotextile to prevent clogging;

(4) Have method for testing and cleaning clogged pipes or contingent designs for rerouting leachate around failed areas;

S	LOCATION	N/A	N/C

b. Primary LCRS requirements; (62-701.400(4)(b),FAC)

| ___ | ___________ | ___ | ___ | (1) Bottom 12 inches having hydraulic conductivity $\geq 1 \times 10^{-3}$ cm/sec;

| ___ | ___________ | ___ | ___ | (2) Total thickness of 24 inches of material chemically resistant to the waste and leachate;

| ___ | ___________ | ___ | ___ | (3) Bottom slope design to accomodate for predicted settlement;

| ___ | ___________ | ___ | ___ | (4) Demonstration that synthetic drainage material, if used, is equivalent or better than granular material in chemical compatibility, flow under load and protection of geomembrane liner.

4. Leachate recirculation; (62-701.400(5),FAC)

| ___ | ___________ | ___ | ___ | a. Describe general procedures for recirculating leachate;

| ___ | ___________ | ___ | ___ | b. Describe procedures for controlling leachate runoff and minimizing mixing of leachate runoff with storm water;

| ___ | ___________ | ___ | ___ | c. Describe procedures for preventing perched water conditions and gas buildup;

| ___ | ___________ | ___ | ___ | d. Describe alternate methods for leachate management when it cannot be recirculated due to weather or runoff conditions, surface seeps, wind-blown spray, or elevated levels of leachate head on the liner;

| ___ | ___________ | ___ | ___ | e. Describe methods of gas management to control odors and migration of methane;

| ___ | ___________ | ___ | ___ | f. If leachate irrigation is proposed, describe treatment methods and standards for leachate treatment prior to irrigation over final cover and provide documentation that irrigation does not contribute significantly to leachate generation.

S	LOCATION	N/A	N/C	
				5. Leachate storage tanks and leachate surface impoundments; (62-701.400(6),FAC)
				a. Surface impoundment requirements; (62-701.400(6)(b),FAC)
___	___	___	___	(1) Documentation that the design of the bottom liner will not be adversely impacted by fluctuations of the ground water;
___	___	___	___	(2) Designed in segments to allow for inspection and repair as needed without interruption of service;
				(3) General design requirements;
___	___	___	___	(a) Double liner system consisting of an upper and lower 60-mil minimum thickness geomembrane;
___	___	___	___	(b) Leak detection and collection system with hydraulic conductivity $\geq$ 1 cm/sec;
___	___	___	___	(c) Lower geomembrane placed on subbase $\geq$ 6 inches thick with k $\leq$ $1x10^{-5}$cm/sec;
___	___	___	___	(d) Design calculation to predict potential leakage through the upper liner;
___	___	___	___	(e) Daily inspection requirements and notification and corrective action requirements if leakage rates exceed that predicted by design calculations;
___	___	___	___	(4) Description of procedures to prevent uplift, if applicable;
___	___	___	___	(5) Design calculations to demonstrate minimum two feet of freeboard will be maintained;
___	___	___	___	(6) Procedures for controlling vectors and off-site odors.

S **LOCATION** **N/A** **N/C**

b. Above-ground leachate storage tanks; (62-701.400(6)(c),FAC)

___ ______ ___ ___ (1) Describe tank materials of construction and ensure foundation is sufficient to support tank;

___ ______ ___ ___ (2) Describe procedures for cathodic protection if needed for the tank;

___ ______ ___ ___ (3) Describe exterior painting and interior lining of the tank to protect it from the weather and the leachate stored;

___ ______ ___ ___ (4) Describe secondary containment design to ensure adequate capacity will be provided and compatibility of materials of construction;

___ ______ ___ ___ (5) Describe design to remove and dispose of stormwater from the secondary containment system;

___ ______ ___ ___ (6) Describe an overfill prevention system such as level sensors, gauges, alarms and shutoff controls to prevent overfilling;

(7) Inspections, corrective action and reporting requirements;

___ ______ ___ ___ (a) Overfill prevention system weekly;

___ ______ ___ ___ (b) Exposed tank exteriors weekly;

___ ______ ___ ___ (c) Tank interiors when tank is drained or at least every three years;

___ ______ ___ ___ (d) Procedures for immediate corrective action if failures detected;

___ ______ ___ ___ (e) Inspection reports available for department review.

c. Underground leachate storage tanks; (62-701.400(6)(d),FAC)

___ ______ ___ ___ (1) Describe materials of construction;

___ ______ ___ ___ (2) A double-walled tank design system to be used with the following requirements;

S	LOCATION	N/A	N/C

(a) Interstitial space monitoring at least weekly;

(b) Corrosion protection provided for primary tank interior and external surface of outer shell;

(c) Interior tank coatings compatible with stored leachate;

(d) Cathodic protection inspected weekly and repaired as needed;

(3) Describe an overfill prevention system such as level sensors, gauges, alarms and shutoff controls to prevent overfilling and provide for weekly inspections;

(4) Inspection reports available for department review.

d. Schedule provided for routine maintenance of LCRS; (62-701.400(6)(e),FAC)

6. Liner systems construction quality assurance (CQA): (62-701.400(7),FAC)

a. Provide CQA Plan including:

(1) Specifications and construction requirements for liner system;

(2) Detailed description of quality control testing procedures and frequencies;

(3) Identification of supervising professional engineer;

(4) Identify responsibility and authority of all appropriate organizations and key personnel involved in the construction project;

(5) State qualifications of CQA professional engineer and support personnel;

(6) Description of CQA reporting forms and documents;

S	LOCATION	N/A	N/C

b. An independent laboratory experienced in the testing of geosynthetics to perform required testing;

7. Soil Liner CQA (62-701.400(8)FAC)

a. Documentation that an adequate borrow source has been located with test results or description of the field exploration and laboratory testing program to define a suitable borrow source;

b. Description of field test section construction and test methods to be implemented prior to liner installation;

c. Description of field test methods including rejection criteria and corrective measures to insure proper liner installation.

8. Surface water management systems; (62-701.400(9),FAC)

a. Design of surface water management system to isolate surface water from waste filled areas and to control stormwater run-off;

b. Details of stormwater control design including retention ponds, detention ponds, and drainage ways;

9. Gas control systems; (62-701.400(10),FAC)

a. Design details for gas control system including collection pipes and vents, and passive venting or vacuum extraction details;

b. Documentation that the gas control system will not impact the liner or leachate control system;

c. Proposed methods of odor control including flaring designs in accordance with Chapter 62-296, FAC;

d. Description of a routine gas monitoring program to ensure gas control system is operating properly including:

(1) Location of monitoring points;

S	LOCATION	N/A	N/C	
___	___	___	___	(2) Requirements for quarterly sampling of all monitoring points;
___	___	___	___	(3) Description of corrective measures to be completed within 60 days of detection of elevated levels of explosive gases;
___	___	___	___	e. Description of condensate collection and disposal methods.
				10. Landfill gas recovery facilities; (62-701.400(11),FAC)
___	___	___	___	a. Information required in Rules 62-701.320(7) and 62-701.330(4), FAC supplied;
___	___	___	___	b. Information required in Rule 62-701.600(4), FAC supplied where relevant and practical;
___	___	___	___	c. Estimate of current and expected gas generation rates and description of condensate disposal methods provided;
___	___	___	___	d. Description of procedures for condensate sampling, analyzing and data reporting provided;
___	___	___	___	e. Closure plan provided describing methods to control gas after rêcovery facility ceases operation;
___	___	___	___	f. Performance bond provided to cover closure costs if not already included in other landfill closure costs.
___	___	___	___	11. For landfills designed in ground water, provide documentation that the landfill will provide a degree of protection equivalent to landfills designed with bottom liners not in contact with ground water; (62-701.400(12),FAC)

H. **HYDROGEOLOGICAL INVESTIGATION REQUIREMENTS** (62-701.410(1), FAC)

S	LOCATION	N/A	N/C		
				1.	Submit a hydrogeological investigation and site report including at least the following information:
___	___________	___	___	a.	Regional and site specific geology and hydrogeology;
___	___________	___	___	b.	Direction and rate of ground water and surface water flow including seasonal variations;
___	___________	___	___	c.	Background quality of ground water and surface water;
___	___________	___	___	d.	Any on-site hydraulic connections between aquifers;
___	___________	___	___	e.	Site stratigraphy and aquifer characteristics for confining layers, semi-confining layers, and all aquifers below the landfill site that may be affected by the landfill;
___	___________	___	___	f.	Site topography and soil characteristics;
___	___________	___	___	g.	Inventory of all public and private water wells within a one-mile radius of the landfill including well top of casing and bottom elevations, name of owner, age and usage of each well, stratigraphic unit screened, well construction technique and static water level;
___	___________	___	___	h.	Description of topography, soil types and surface water drainage systems;
___	___________	___	___	i.	An inventory of all public and private water wells within one mile of the landfill.
___	___________	___	___	j.	Existing contaminated areas on landfill site.
___	___________	___	___	2.	Report signed, sealed and dated by PE or PG.

I. GEOTECHNICAL INVESTIGATION REQUIREMENTS (62-701.410(2),FAC)

S	LOCATION	N/A	N/C	
				1. Submit a geotechnical site investigation report defining the engineering properties of the site including at least the following:
___	___	___	___	a. Description of subsurface conditions including soil stratigraphy and ground water table conditions;
___	___	___	___	b. Investigate for the presence of muck, previously filled areas, soft ground, lineaments and sink holes;
___	___	___	___	c. Estimates of average and maximum high water table across the site;
				d. Foundation analysis including:
___	___	___	___	(1) Foundation bearing capacity analysis;
___	___	___	___	(2) Total and differential subgrade settlement analysis;
___	___	___	___	(3) Slope stability analysis;
___	___	___	___	e. Description of methods used in the investigation and includes soil boring logs, laboratory results, analytical calculations, cross sections, interpretations and conclusions;
___	___	___	___	f. An evaluation of fault areas, seismic impact zones, and unstable areas as described in 40 CFR 258.13, 40 CFR 258.14 and 40 CFR 258.15.
___	___	___	___	2. Report signed, sealed and dated by PE or PG.

J. **VERTICAL EXPANSION OF LANDFILLS** (62-701.430,FAC)

S	LOCATION	N/A	N/C		
___	___	___	___	1.	Describe how the vertical expansion shall not cause or contribute to leachate leakage from the existing landfill or adversely affect the closure design of the existing landfill;
___	___	___	___	2.	Describe how the vertical expansion over unlined landfills will meet the requirements of Rule 62-701.400, FAC with the exceptions of Rule 62-701.430(1)(c),FAC;
___	___	___	___	3.	Provide foundation and settlement analysis for the vertical expansion;
___	___	___	___	4.	Provide total settlement calculations demonstrating that the final elevations of the lining system, that gravity drainage, and that no other component of the design will be adversely affected;
___	___	___	___	5.	Minimum stability safety factor of 1.5 for the lining system component interface stability and deep stability;
___	___	___	___	6.	Provide documentation to show the surface water management system will not be adversely affected by the vertical expansion;
___	___	___	___	7.	Provide gas control designs to prevent accumulation of gas under the new liner for the vertical expansion.

K. **LANDFILL OPERATION REQUIREMENTS** (62-701.500,FAC)

___	___	___	___	1.	Provide documentation that landfill will have at least one trained operator during operation and at least one trained spotter at each working face; (62-701.500(1),FAC)
				2.	Provide a landfill operation plan including procedures for: (62-701.500(2), FAC)
___	___	___	___		a. Designating responsible operating and maintenance personnel;
___	___	___	___		b. Contingency operations for emergencies;
___	___	___	___		c. Controlling types of waste received at the landfill;

S | LOCATION | N/A | N/C

d. Weighing incoming waste;

e. Vehicle traffic control and unloading;

f. Method and sequence of filling waste;

g. Waste compaction and application of cover;

h. Operations of gas, leachate, and stormwater controls;

i. Water quality monitoring.

3. Provide a description of the landfill operation record to be used at the landfill; details as to location of where various operational records will be kept (i.e. FDEP permit, engineering drawings, water quality records, etc.) (62-701.500(3),FAC)

4. Describe the waste records that will be compiled monthly and provided to the Department quarterly; (62-701.500(4),FAC)

5. Describe methods of access control; (62-701.500(5),FAC)

6. Describe load checking program to be implemented at the landfill to discourage disposal of unauthorized wastes at the landfill; (62-701.500(6),FAC)

7. Describe procedures for spreading and compacting waste at the landfill that include: (62-701.500(7),FAC)

a. Waste layer thickness and compaction frequencies;

b. Special considerations for first layer of waste placed above liner and leachate collection system;

c. Slopes of cell working face and side grades above land surface, planned lift depths during operation;

d. Maximum width of working face;

S	LOCATION	N/A	N/C

e. Description of type of initial cover to be used at the facility that controls:

(1) Disease vector breeding/animal attraction

(2) Fires

(3) Odors

(4) Blowing litter

(5) Moisture infiltration

f. Procedures for applying initial cover including minimum cover frequencies;

g. Procedures for applying intermediate cover;

h. Time frames for applying final cover;

i. Description of litter policing methods;

j. Erosion control procedures.

8. Describe operational procedures for leachate management including; (62-701.500(8),FAC)

a. Leachate level monitoring, sampling, analysis and data results submitted to the Department;

b. Operation and maintenance of leachate collection and removal system, and treatment as required;

c. Procedures for managing leachate if it becomes regulated as a hazardous waste;

d. Agreements for off-site discharge and treatment of leachate;

e. Contingency plan for managing leachate during emergencies or equipment problems;

f. Procedures for recording quantities of leachate generated in gal/day;

g. Procedures for comparing precipitation experienced at the landfill with leachate generation rates.

S	LOCATION	N/A	N/C	
___	___________	___	___	9. Describe routine gas monitoring program for the landfill as required by Rule 62-701.400(10),FAC; (62-701.500(9),FAC)
___	___________	___	___	10. Describe procedures for operating and maintaining the landfill stormwater management system to comply with the standards of Chapters 62-3, 62-302 and 62-25, FAC; (62-701.500(10),FAC)
				11. Equipment and operation feature requirements; (62-701.500(11),FAC)
___	___________	___	___	a. Sufficient equipment for excavating, spreading, compacting and covering waste;
___	___________	___	___	b. Reserve equipment or arrangements to obtain additional equipment within 24 hours of breakdown;
___	___________	___	___	c. Communications equipment;
___	___________	___	___	d. Personnel shelter and sanitary facilities, first aid equipment;
___	___________	___	___	e. Dust control methods;
___	___________	___	___	f. Fire protection capabilities and procedures for notifying local fire department authorities in emergencies;
___	___________	___	___	g. Litter control devices;
___	___________	___	___	h. Signs indicating operating authority, traffic flow, hours of operation, disposal restrictions.
___	___________	___	___	12. Provide a description of all-weather access road, inside perimeter road and other roads necessary for access which shall be provided at the landfill; (62-701.500(12),FAC)

S	LOCATION	N/A	N/C

13. Additional record keeping and reporting requirements; (62-701.500(13),FAC)

S	LOCATION	N/A	N/C	
___	___________	___	___	a. Records used for developing permit applications and supplemental information maintained for the design period of the landfill;
___	___________	___	___	b. Monitoring information, calibration and maintenance records, copies of reports required by permit maintained for at least 10 years;
___	___________	___	___	c. Background water quality records shall be maintained for the design period of the landfill;
___	___________	___	___	d. Maintain annual estimates of the remaining life of constructed landfills and of other permitted areas not yet constructed and submit this estimate annually to the Department.

L. WATER QUALITY AND LEACHATE MONITORING REQUIREMENTS (62-701.510, FAC)

S	LOCATION	N/A	N/C		
___	___	___	___	1.	Water quality and leachate monitoring plan shall be submitted describing the proposed ground water, surface water and leachate monitoring systems and shall meet at least the following requirements;
___	___	___	___	a.	Based on the information obtained in the hydrogeological investigation and signed, dated and sealed by the PG or PE who prepared it; (62-701.510(2)(a),FAC)
___	___	___	___	b.	All sampling and analysis preformed by organizations having Department approved Comprehensive Quality Assurance Plans; (62-701.510(2)(b),FAC)
				c.	Ground water monitoring requirements; (62-701.510(3),FAC)
___	___	___	___	(1)	Detection wells located downgradient from and within 50 feet of disposal units;
___	___	___	___	(2)	Downgradient compliance wells as required;
___	___	___	___	(3)	Background wells screened in all aquifers below the landfill that may be affected by the landfill;
___	___	___	___	(4)	Location information for each monitoring well;
___	___	___	___	(5)	Well spacing no greater than 500 feet apart for downgradient wells and no greater than 1500 feet apart for upgradient wells unless site specific conditions justify alternate well spacings;
___	___	___	___	(6)	Well screen locations properly selected;
___	___	___	___	(7)	Procedures for properly abandoning monitoring wells;
___	___	___	___	(8)	Detailed description of detection sensors if proposed.

S	LOCATION	N/A	N/C	
				d. Surface water monitoring requirements; (62-701.510(4),FAC)
___	___________	___	___	(1) Location of and justification for all proposed surface water monitoring points;
___	___________	___	___	(2) Each monitoring location to be marked and its position determined by a registered Florida land surveyor;
___	___________	___	___	e. Leachate sampling locations proposed;(62-701.510(5),FAC)
				f. Routine sampling frequency and requirements; (62-701.510(6),FAC)
___	___________	___	___	(1) Background ground water and surface water sampling and analysis requirements;
___	___________	___	___	(2) Leachate semi-annual and annual sampling and analysis requirements;
___	___________	___	___	(3) Detection well semi-annual sampling and analysis requirements;
___	___________	___	___	(4) Compliance well sampling and analysis requirements;
___	___________	___	___	(5) Surface water sampling and analysis requirements.
___	___________	___	___	g. Describe procedures for implementing assessment monitoring and corrective action as required; (62-701.510(7),FAC)
___	___________	___	___	h. Water quality monitoring report requirements; (62-701.510(9),FAC)
___	___________	___	___	(1) Semi-annual report requirements;
___	___________	___	___	(2) Bi-annual report requirements signed, dated and sealed by PG or PE.

M. SPECIAL WASTE HANDLING REQUIREMENTS (62-701.520, FAC)

S	LOCATION	N/A	N/C		
___	___	___	___	1.	Describe procedures for managing motor vehicles; (62-701.520(1),FAC)
___	___	___	___	2.	Describe procedures for landfilling shredded waste; (62-701.520(3),FAC)
___	___	___	___	3.	Describe procedures for asbestos waste disposal; (62-701.520(4),FAC)
___	___	___	___	4.	Describe procedures for contaminated soil disposal; (62-701.520(5), FAC)

N. LANDFILL FINAL CLOSURE REQUIREMENTS (62-701.600,FAC)

S	LOCATION	N/A	N/C		
				1.	Closure schedule requirements; (62-701.600(2),FAC)
___	___	___	___	a.	Documentation that a written notice including a schedule for closure will be provided to the Department at least one year prior to final receipt of wastes;
___	___	___	___	b.	Notice to user requirements within 120 days of final receipt of wastes;
___	___	___	___	c.	Notice to public requirements within 10 days of final receipt of wastes.
				2.	Closure permit general requirements; (62-701.600(3),FAC)
___	___	___	___	a.	Application submitted to Department at least 90 days prior to final receipt of wastes;
				b.	Closure plan shall include the following:
___	___	___	___	(1)	Closure report;
___	___	___	___	(2)	Closure design plan;
___	___	___	___	(3)	Closure operation plan;
___	___	___	___	(4)	Closure procedures;
___	___	___	___	(5)	Plan for long term care;

S	LOCATION	N/A	N/C

(6) A demonstration that proof of financial responsibility for long term care will be provided.

3. Closure report requirements; (62-701.600(4),FAC)

a. General information requirements;

(1) Identification of landfill;

(2) Location, description and vicinity map;

(3) Total acres of disposal areas and landfill property;

(4) Legal property description;

(5) History of landfill;

(6) Identification of types of waste disposed of at the landfill.

b. Geotechnical investigation report and water quality monitoring plan required by Rule 62-701.330(4),FAC;

c. Land use information report indicating: identification of adjacent landowners; zoning; present land uses; and roads, highways right-of-way, or easements.

d. Report on actual or potential gas migration at landfills containing biodegradable wastes including detailed description of test and investigation methods used;

e. Report assessing the effectiveness of the landfill design and operation including results of geotechnical investigations, surface water and storm water management, gas migration and concentrations, condition of existing cover, and nature of waste disposed of at the landfill;

4. Closure design requirements to be included in the closure design plan: (62-701.600(5),FAC)

a. Plan sheet showing phases of site closing;

S	LOCATION	N/A	N/C	
___	___	___	___	b. Drawings showing existing topography and proposed final grades;
___	___	___	___	c. Provisions to close units when they reach approved design dimensions;
___	___	___	___	d. Final elevations before settlement;
___	___	___	___	e. Side slope design including benches, terraces, down slope drainage ways, energy dissipators and discussion of expected precipitation effects;
				f. Final cover installation plans including:
___	___	___	___	(1) CQA plan for installing and testing final cover;
___	___	___	___	(2) Schedule for installing final cover after final receipt of waste;
___	___	___	___	(3) Description of drought-resistant species to be used in the vegetative cover;
___	___	___	___	(4) Top gradient design to maximize runoff and minimize erosion;
___	___	___	___	(5) Provisions for cover material to be used for final cover maintenance.
				g. Final cover design requirements:
___	___	___	___	(1) Protective soil layer design;
___	___	___	___	(2) Barrier soil layer design;
___	___	___	___	(3) Erosion control vegetation;
___	___	___	___	(4) Geomembrane barrier layer design.
___	___	___	___	h. Proposed method of stormwater control;
___	___	___	___	i. Proposed method of access control;
___	___	___	___	j. Description of proposed final use of the closed landfill, if any;

S	LOCATION	N/A	N/C	
				5. Closure operation plan shall include: (62-701.600(6),FAC)
___	___	___	___	a. Detailed description of actions which will be taken to close the landfill;
___	___	___	___	b. Time schedule for completion of closing and long term care;
___	___	___	___	c. Describe proposed method for demonstrating financial responsibility;
___	___	___	___	d. Indicate any additional equipment and personnel needed to complete closure.
___	___	___	___	e. Development and implementation of the water quality monitoring plan required in Rule 62-701.510, FAC.
___	___	___	___	f. Development and implementation of routine gas monitoring program required in Rule 62-701.400(10)(c), FAC.
___	___	___	___	6. Justification for and detailed description of procedures to be followed for temporary closure of the landfill, if desired; (62-701.600(7),FAC)

O. CLOSURE PROCEDURES (62-701.610,FAC)

S	LOCATION	N/A	N/C		
___	___	___	___	1.	Survey monuments; (62-701.610(2),FAC)
___	___	___	___	2.	Final survey report; (62-701.610(3),FAC)
___	___	___	___	3.	Certification of closure construction completion; (62-701.610(4),FAC)
___	___	___	___	4.	Declaration to the public; (62-701.610(5),FAC)
___	___	___	___	5.	Official date of closing; (62-701.610(6),FAC)
___	___	___	___	6.	Use of closed landfill areas; (62-701.610(7),FAC)

P. LONG TERM CARE REQUIREMENTS (62-701.620,FAC)

___	___	___	___	1.	Right of property access requirements; (62-701.620(4),FAC)
___	___	___	___	2.	Successors of interest requirements; (62-701.620(5),FAC)
___	___	___	___	3.	Requirements for replacement of monitoring devices; (62-701.620(7),FAC)
___	___	___	___	4.	Completion of long term care signed and sealed by professional engineer (62-701.620(8), FAC).

Q. FINANCIAL RESPONSIBILITY REQUIREMENTS (62-701.630,FAC)

___	___	___	___	1.	Provide cost estimates for closing, long term care, and corrective action costs estimated by a PE for a third party performing the work, on a per unit basis, with the source of estimates indicated; (62-701.630(3)&(7), FAC).
___	___	___	___	2.	Describe procedures for providing annual cost adjustments to the Department based on inflation and changes in the closing, long-term care, and corrective action plans; (62-701.630(4)&(8), FAC).
___	___	___	___	3.	Describe funding mechanisms for providing proof of financial assurance and include appropriate financial assurance forms; (62-701.630(5),(6),&(9), FAC).

R. CLOSURE OF EXISTING LANDFILLS (62-701.640, FAC)

S	LOCATION	N/A	N/C		
___	___________	___	___	1.	Demonstration that facility does not pose a bird hazard to aircraft as specified in Rule 62-701.320(12)(b), FAC.
___	___________	___	___	2.	Demonstration that facility does not restrict the flow of the 100-year flood, reduce water storage capacity or result in wash-out of solid waste as specified in Rule 62-701.340(4)(b), FAC.
___	___________	___	___	3.	Demonstration that facility is not located in a fault area, seismic zone or unstable area as specified in Rule 62-701.410(2)(c), FAC.
				4.	Request for extension of closure criteria as specified in Rule 62-701.640(2)(a) & (2)(b), FAC.
___	___________	___	___		a. Demonstration of no alternative disposal capacity.
___	___________	___	___		b. Demonstration of no threat to human health or the environment.

S. MATERIALS RECOVERY FACILITY REQUIREMENTS (62-701.700,FAC)

___	___________	___	___	1.	Demonstration of financial assurance to cover closing costs, if required; (62-701.700(4),FAC)
___	___________	___	___	2.	Materials recovery facility requirements; (62-701.700,FAC)
___	___________	___	___		a. Submit information required in Rule 62-701.320,FAC
___	___________	___	___		b. Submit an engineering report including the following:
___	___________	___	___		(1) Description of the solid waste proposed to be collected, stored, processed or disposed;
___	___________	___	___		(2) Projection with assumptions for waste types and quantities expected in future years;

S	LOCATION	N/A	N/C

(3) Description of operation and functions of all processing equipment with design criteria and expected performance;

(4) Description of flow of solid waste, expected regular facility operations, procedures for start up and shut down, potential safety hazards and control methods including fire protection;

(5) Description of loading, unloading, and processing areas;

(6) Identification and capacity of temporary on-site storage areas for materials handled and provisions for solid waste and leachate containment;

(7) Identification of potential ground water and surface water contamination;

(8) Plan for disposal of unmarketable recyclables and residue and contingencies for waste handling during breakdowns.

c. Submit the following operational information:

(1) Operation and maintenance manual;

(2) Waste control plan to manage unauthorized wastes;

(3) Contingency plan for emergencies;

(4) Closure plan including the following:

(a) Notification to Department 180 days prior to closure;

(b) Procedures for removal of all waste within 30 days of receipt of final waste;

(c) Completion of closure activities within 180 days of receipt of final waste and notification to the Department that closure is complete.

T. CERTIFICATION BY APPLICANT AND ENGINEER OR PUBLIC OFFICER

A. Applicant

The undersigned applicant or authorized representative of ________________________________ is aware that statements made in this form and attached information are an application for a ______________________________ Permit from the Florida Department of Environmental Regulation and certifies that the information in this application is true, correct and complete to the best of his knowledge and belief. Further, the undersigned agrees to comply with the provisions of Chapter 403, Florida Statutes, and all rules and regulations of the Department. It is understood that the Permit is not transferable, and the Department will be notified prior to the sale or legal transfer of the permitted facility.

____
Signature of Applicant or Agent

____
Name and Title

Date: ________________________

Attach letter of authorization if agent is not a governmental official, owner, or corporate officer.

B. Professional Engineer Registered in Florida or Public Officer as required in Section 403.707 and 403.707(5), Florida Statutes.

This is to certify that the engineering features of this solid waste management facility have been designed/examined by me and found to conform to engineering principals applicable to such facilities. In my professional judgement, this facility, when properly maintained and operated, will comply with all applicable statutes of the State of Florida and rules of the Department. It is agreed that the undersigned will provide the applicant with a set of instructions of proper maintenance and operation of the facility.

____________________ Signature	____________________ Mailing Address
____________________ Name and Title (please type)	____________________ City, State, Zip Code
____________________ Florida Registration Number (please affix seal)	(___) ____________________ Telephone Number

• Date: ____________________________

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Florida Department of Environmental Protection
Twin Towers Office Bldg. • 2600 Blair Stone Road • Tallahassee, FL 32399-2400

DEP Form # 62-701.900(4)
Form Title Transfer Station General Permit
Effective Date May 19, 1994

DEP Application No. ____________
(Filled by DEP)

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

NOTIFICATION OF INTENT TO USE A GENERAL PERMIT TO CONSTRUCT AND OPERATE A SOLID WASTE TRANSFER STATION

GENERAL REQUIREMENT: Solid waste transfer stations are permitted in accordance with Florida Administrative Code (F.A.C.) Rule 62-701.801. The permit applicant, by completing, signing and sending this notice with the required information to the Department of Environmental Protection, agrees to the conditions for a solid waste transfer station and is hereby granted a permit by rule provided Rule conditions are fulfilled. Send two copies of this notice with appropriate fee made payable to the Department of Environmental Protection and all supporting documentation by certified mail to the District Office of the Department in which the facility is located. Complete all entries by typing or printing in ink.

A. GENERAL INFORMATION

1. Applicant name (operating authority): ____________________

   Mailing address: ____________________
   Street or P.O. Box City State Zip

   Contact person: ____________________ Telephone: (___)____________

   Title: ____________________

2. Facility name (if different): ____________________

   Location (main entrance): ____________________

   ____

   City: ____________________ County: ____________________

3. Facility location coordinates:

   Section: _____ Township: _____ Range: _____

   UTMs: Zone_________ _________km E ________ km N

   Latitude: ____ ° ____ ' ____ " Longitude: ____ ° ____ ' ____ "

4. Landowner(if different than applicant): ____________________

   Mailing address: ____________________
   Street or P.O. Box City State Zip

   Contact person: ____________________ Telephone: (___)____________

5. Acres within property boundary: ______________________________

6. Facilities used for waste disposal: ______________________________

____

7. Planned active life of the facility: ______________________________

B. SUPPORTING DOCUMENTATION

1. If the property owner is different from applicant, attach evidence of authorization to use property as a solid waste transfer station (e.g., contract, lease, or signed letter).

2. Attach a regional map which delineates the service area of the proposed transfer station.

3. Attach a site plan signed, sealed and dated by a professional engineer which shows:

   a. Site conditions and projected use including buildings, fences, gates, entrances and exits, parking areas, roadways, and signs;

   b. Property boundaries, access roads, surface water bodies, and the location of 100-year flood plain boundaries;

   c. Proposed structures and areas designated for unloading, sorting, storage, and loading including dimensions, elevations, floor plans, and the general process flow;

   d. Adjacent properties including location of public and private wells on adjacent properties.

   e. Relevant geological features such as water bodies, wetlands, excavated pits, or areas which may not provide support for solid waste or the proposed structures.

   f. A copy of any valid permit for stormwater control or documentation that no permit is required, shall be submitted to the Department before the facility receives waste.

4. Attach an engineering report which includes:

   a. A description of a general operation plan for the facility including origin, composition, and expected weight/volume of solid waste to be accepted by the facility, maximum waste storage times, waste disposal facilites, operating capacity, operating hours, expected life, and how any other operational requirements included in Rule 62-701.801(4), F.A.C. will be achieved at the facility;

   b. A description of the machinery and equipment to be used, including the design capacity;

   c. A transfer plan specifying the transfer route, the number and type of transfer vehicles to be used, and how often solid waste will be transferred to the disposal site;

   d. A description of the facility's drainage system and water supply system;

e. A plan for hiring and training equipment operators and other personnel concerned with facility operation;

f. A contingency plan describing alternate solid waste handling procedures for periods of inoperation, emergencies, or delays in transporting solid waste;

g. A description how the minimum design requirements included in Rule 62-701.801(3), F.A.C. will be achieved by the proposed transfer station.

C. CERTIFICATION BY APPLICANT AND PROFESSIONAL ENGINEER

1. Applicant

I, ______________________________, the undersigned applicant, hereby certify that I will operate, maintain and close this facility in accordance with applicable rules of the Florida Administrative Code, and that I either own the land or have legal authorization from the land owner to use the land for a solid waste transfer station. I also agree that Department personnel may enter onto the property to inspect the facility during normal business hours.

____
Signature of Applicant

____
Name and Title

Date: ______________________________

2. Professional Engineer Registered in Florida (if applicable)

This is to certify that the engineering features of this solid waste transfer station have been designed/examined by me and found to conform to engineering principals applicable to such facilities. In my professional judgement, this facility, when properly maintained and operated, will comply with all applicable statutes of the State of Florida and rules of the Department.

____
Signature

____
Mailing Address

____
Name and Title (please type)

____
City, State, Zip Code

____
Florida Registration Number
(please affix seal)

(___)______________________________
Telephone Number

Date: ______________________________

Leffler, William

From: Butera, Robert
Sent: Wednesday, May 02, 2001 3:18 PM
To: Leffler, William
Cc: Ford, Kim
Subject: Conrad Yelvington

Due to powers above me I have been instructed not to follow up relating to the permitting of the transfer station for the ash taken from TECO until we receive the sampling analysis of the ash from TECO which we anticipate within the next few weeks. There is some question as to whether the ash is treated as an industrial by-product or a waste once it leaves the TECO facility at Big Bend. I believe Bill Kutash (my supervisor) wants to have some analyticals to better back our position on whether they require a permit. As far as the sand-blast grit is concerned they (Conrad Yelvington) have informed us they no longer accept such material and based on our last visit to the site it was all removed or containerized in roll-offs ready to be removed. Hope this assists you with an update. Sorry for not getting back to you sooner.

Bill Kutash 512 1042 353

Brooks & Associates, Inc.
Engineering and Environmental Consulting

May 25, 2001

William Leffler, P.E.
Permit Engineer
Department of Environmental Protection
Division of Air Resources Management
3900 Commonwealth Boulevard
Tallahassee, Florida 32399-3000

Re: Response to "Second Incompleteness Letter" dated

Dear Mr. Leffler:

This will respond to your "second incompleteness letter" of May 14, 2001 regarding Conrad Yelvington Distributor Inc.'s (CYDI's) request for an air construction permit for a relocatable portable screening device knows as the "Powerscreen Chieftain 510" Transportable Scalping/Screening Unit. The Department initially issued an Intent to Issue and draft permit for the screening unit to be used for crushed stone, sand and gravel. Subsequently in October 2000 CYDI requested a modification of the draft Intent to Issue and permit in order to allow the screening unit to be used for spent Abrasive Blasting Media ("ABM"). On October 16, 2000, the Department requested additional information, and CYDI provided its response to this request on February 28, 2001, which response was engineer certified and re-submitted on April 6, 2001.

The Department's "second incompleteness letter" of May 14, 2001, did not number the specific items of requested information. In order to provide a clear response to all of the information requested, we have responded to each of the issues raised in your letter as follows:

1. **Information Requested:** *"The abrasive blast media… is not sufficiently consistent in its composition, nor have you submitted adequate sampling and material handling protocols to (sic) reasonable assurance that there will not be excessive dust emissions from the screener, that the dust from the screener, and from the associated materials stockpiles, will not contain unsafe levels of heavy metals."*

Response: CYDI believes that it has provided reasonable assurance of the characteristics of the ABM to be screened. CYDI has also proposed a specific testing protocol to ensure that no hazardous or toxic materials are accepted by CYDI. Finally, CYDI has provided calculations of the minimal emissions expected from this emission source. Specifically:

a. CYDI previously provided to you the calculated emission estimates for the ABM Materials. (Copy attached and highlighted.) Further assurances on emission

5068 NW 85th Rd. Coral Springs, FL 33067
Phone: (954) 796-1987 Fax: (954) 796-1984

limiting factors are provided in response to Item 2 below in the form of limitations on material volumes, throughput rates, and hours of operation.

b. We previously submitted laboratory data from representative samples of the ABM material. This data was included in our prior submission dated February 28, 2001. (Copy attached and highlighted)

c. The laboratory data submitted by CYDI is consistent with other reported technical literature on ABM materials including:

i. "Technical Memorandum TM-2178-ENV RECYLING AND REUSE OPTIONS FOR SPENT ABRASIVE BLASTING MEDIA AND SIMILAR WASTES. (1996);

ii. "Leaching Characteristics and Assessment of Abrasive Blasting Waste from Ship Maintenance Facilities and Sandblasting Sites" (Jenna Jambeck Carlson, University of Florida, 1998);

iii. "Best Management Practices for Waste Abrasive Blast Media (Tim Townsend, Florida Center for Solid and Hazardous Waste Research, 1998).

Together, these reports indicate the range of total metals, as well as TCLP metals detected in typical samples of ABM.

d. In order to provide additional assurances that no hazardous or toxic materials will be accepted at CYDI, a sampling and testing protocol has been proposed. Each source of material will be tested prior to being transported to a CYDI facility. CYDI will not accept any waste that is characteristically hazardous for toxicity using the TCLP analysis. (This protocol for testing of individual source materials was included in the February 28, 2001 response to your first incompleteness letter.)

2. **Information Requested:** *"Additionally, data from industrial studies is predominately based on TCLP data which provides some insight as to the leaching characteristics of this material if placed in a landfill, but very little data on the gross analysis of spent abrasive blast media nor the gross analysis of the dust that will be emitted as uncontrolled particulate emissions."*

Response: The literature and lab data referenced above includes both total metals and TCLP metals analysis for ABM materials. The relatively low concentrations of total metals found in these materials, combined with the low emission rates described above, provide reasonable assurance that the emissions from this source will not result in any violation of air quality standards. As further assurance, CYDI also proposes the following conditions on the available volume of ABM material for processing, a throughput rate for screening ABM, and limited hours of operations for screening of ABM materials:

> Available Volume shall not exceed 23000 tons per year of ABM.
>
> The throughput rate for ABM materials shall not exceed 80 per hour.
>
> The hours of operation will be limited to 200 hrs/year.

Information Requested: *"Without the solid waste permit application, which you represented as forthcoming in your March 6 response, I do not have sufficient information to assess the impact of the screener with proposed materials, at this location."*

Response: CYDI is seeking an air permit for its proposed portable screening unit to be used at CYDI's terminals as well as possible other locations (shipyards) throughout the state. Review of this permit application should not be dependent upon other permits that may be required at various locations where the screening unit may be used. CYDI has previously indicated that it will also comply with any applicable solid waste regulations applicable to its operations.

The Department's Tampa District office has expressed some concerns over the issue of management of coal "bottom ash" at the CYDI Tampa terminal. This bottom ash material will not be screened with the portable screening unit sought through this permit application. The bottom ash material qualifies for an exemption from solid waste regulation as an industrial byproduct, and will be managed accordingly.

The materials that will be screened using the portable screening unit include crushed stone, sand, and gravel which are raw materials and are not subject to DEP solid waste regulations. Additionally, ABM materials will be screened and will be managed as an industrial byproduct subject to exemption from solid waste regulation. The ABM materials will be managed according to appropriate Best Management Practices required for such reuse materials.

3. **Information Requested:** *"Please advise as your intention to provide information to questions 3, 4, 5, 6, 7, 8, 9 and 10 of the October 6, 2000 request for additional information, and whether CYDI intends to publish the public notice attached to the Department's Intent to Issue Air Construction of August 10, 2000."*

Response: We have previously responded to each of the items requested in the October 16, 2001 Request for Information. The information requested for Item 7 concerning emission-estimating protocols, was included in the emission estimates set forth in the Response to Item No. 4. Please let us know if there is a specific response that you believe was inadequate so that we may address it directly. Once the Department finalizes its review, and issues a modified Intent, CYDI will publish the required public notice.

Conclusion: We trust that this additional response, which has been sealed by the permit engineer of record, adequately provides you with information to provide sufficient assurances to issue the permit as requested. The proposed activity will generate only minimal particulate emissions, has sufficient emission limiting conditions, and is not likely to cause any violation of any applicable air emission standard. The de minimus nature of the type of activity proposed is indicated by the fact that the Department has proposed a categorical exemption for portable screening devices. While the proposed activity may ultimately qualify for such an exemption, CYDI has provided reasonable assurances that the proposed permit should be issued. Please let us know whether you require any additional information.

Sincerely,

Stephanie S. Brooks, P.E.
Brooks & Associates

cc: Clair Fancy, DARM
Gary Yelvington, CYDI
William C. Thomas, CYDI
Alex Padva, Ph.D
Geoffrey D. Smith, Esq.

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Printed Postage History

Date	Mail Class	Postage ($)	Weight	Recipient	Reference	Special Services
4/6/01 12:27:02 PM	First-Class Mail	$0.34	0lb 1oz	Mr. William Leffler PE, Permitting Engineer, Division of Air Resources Management, Dept of Environmental Protection, 3900 Commonwealth BLVD, Tallahassee FL 32399-3000	<None>	
3/1/01 2:17:09 PM	Priority Mail	$5.55	2lb 1oz	Mr William Leffler PE, DEP-DARM, 3900 Commonwealth BLVD, Tallahassee FL 32399-6575	<None>	Delivery Confirmation

Emission Factor Documentation for AP-42
Section 13.2.6

Abrasive Blasting

Final Report

For U. S. Environmental Protection Agency
Office of Air Quality Planning and Standards
Emission Factor and Inventory Group

EPA Contract 68-D2-0159
Work Assignment No. 4-02

MRI Project No. 4604-02

September 1997

Emission Factor Documentation for AP-42
Section 13.2.6

Abrasive Blasting

Final Report

For U. S. Environmental Protection Agency
Office of Air Quality Planning and Standards
Emission Factor and Inventory Group
Research Triangle Park, NC 27711

Attn: Mr. Ron Myers (MD-14)

EPA Contract 68-D2-0159
Work Assignment No. 4-02

MRI Project No. 4604-02

September 1997

NOTICE

The information in this document has been funded wholly or in part by the United States Environmental Protection Agency under Contract No. 68-D2-0159 to Midwest Research Institute. It has been reviewed by the Office of Air Quality Planning and Standards, U. S. Environmental Protection Agency, and has been approved for publication. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

PREFACE

This report was prepared by Midwest Research Institute (MRI) for the Office of Air Quality Planning and Standards (OAQPS), U. S. Environmental Protection Agency (EPA), under Contract No. 68-D2-0159, Work Assignment Nos. 2-01 and 4-02. Mr. Ron Myers was the requester of the work.

Approved for:

MIDWEST RESEARCH INSTITUTE

Roy Neulicht
Program Manager
Environmental Engineering Department

Jeff Shular
Director, Environmental Engineering
Department

September, 1997

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1. INTRODUCTION

The document *Compilation of Air Pollutant Emission Factors* (AP-42) has been published by the U. S. Environmental Protection Agency (EPA) since 1972. Supplements to AP-42 are issued to add new emission source categories and to update existing emission factors. The EPA also routinely updates AP-42 in response to the needs of Federal, State, and local air pollution control programs and industry.

An emission factor relates the quantity (weight) of pollutants emitted to a unit of source activity. Emission factors reported in AP-42 are used to:

1. Estimate areawide emissions.
2. Estimate emissions for a specific facility.
3. Evaluate emissions relative to ambient air quality.

This report provides background information from test reports and other information to support preparation of a new AP-42 section for abrasive blasting. The information in the proposed AP-42 section is based on a review of the available literature for particulate phase air pollutants produced by abrasive blasting operations.

This report contains five sections. Following the introduction, Section 2 describes abrasive blasting equipment, practices, and allied processes. Section 3 describes data collection and rating procedures, and Section 4 describes the emission factor development. Section 5 presents the proposed AP-42 section.

2. INDUSTRY AND PROCESS DESCRIPTION

2.1 INDUSTRY CHARACTERIZATION[1]

Abrasive blasting is used for a variety of surface cleaning and texturing operations, mostly involving metallic target materials. Sand is the most widely used blasting abrasive. Other abrasive materials include coal slag, smelter slags, mineral abrasives, metallic abrasives, and synthetic abrasives. Industries that use abrasive blasting include the shipbuilding industry, automotive industry, and other industries that involve surface preparation and painting. The majority of shipyards no longer use sand for abrasive blasting because of concerns about silicosis, a condition caused by respiratory exposure to crystalline silica. In 1991, about 4.5 million tons of abrasives, including 2.5 million tons of sand, 1 million tons of coal slag, 500 thousand tons of smelter slag, and 500 thousand tons of other abrasives, were used for domestic abrasive blasting operations.

2.2 PROCESS DESCRIPTION[1-8]

The following sections briefly describe the types of abrasives, blasting methods, and dust control techniques commonly used in outdoor abrasive blasting.

2.2.1 Types of Abrasives[1-2]

Abrasive materials are generally classified as: sand, slag, metallic shot or grit, synthetic, or other. The cost and properties associated with the abrasive material dictate its application. The following discusses the general classes of common abrasives.

Silica sand is commonly used for abrasive blasting where reclaiming is not feasible, such as in unconfined abrasive blasting operations. Sand has a rather high breakdown rate, which can result in substantial dust generation. Worker exposure to free crystalline silica is of concern when silica sand is used for abrasive blasting.

Coal and smelter slags are commonly used for abrasive blasting at shipyards. Black Beauty™, which consists of crushed slag from coal-fired utility boilers, is a commonly used slag. Slags have the advantage of low silica content, but have been documented to release other contaminants, including hazardous air pollutants (HAP), into the air.

Metallic abrasives include cast iron shot, cast iron grit, and steel shot. Cast iron shot is hard and brittle and is produced by spraying molten cast iron into a water bath. Cast iron grit is produced by crushing oversized and irregular particles formed during the manufacture of cast iron shot. Steel shot is produced by blowing molten steel. Steel shot is not as hard as cast iron shot, but is much more durable. These materials typically are reclaimed and reused.

Synthetic abrasives, such as silicon carbide and aluminum oxide, are becoming popular substitutes for sand. These abrasives are more durable and create less dust than sand. These materials typically are reclaimed and reused.

Other abrasives include mineral abrasives (such as garnet, olivine, and staurolite), cut plastic, glass beads, crushed glass, and nutshells. As with metallic and synthetic abrasives, these other abrasives are generally used in operations where the material is reclaimed. Mineral abrasives are reported to create significantly less dust than sand and slag abrasives.

The type of abrasive used in a particular application is usually specific to the blasting method. Dry abrasive blasting is usually done with sand, aluminum oxide, silica carbide, metallic grit, or shot. Wet blasting is usually done with sand, glass beads, or any materials that will remain suspended in water. Table 2-1 lists common abrasive materials and their applications.

TABLE 2-1. MEDIA COMMONLY USED IN ABRASIVE BLASTING[2]

Type of medium	Sizes normally available	Applications
Glass beads	8 to 10 sizes from 30- to 440-mesh; also many special gradations	Decorative blending; light deburring; peening; general cleaning; texturing; noncontaminating
Aluminum oxide	10 to 12 sizes from 24- to 325-mesh	Fast cutting; matte finishes; descaling and cleaning of coarse and sharp textures
Garnet	6 to 8 sizes (wide-band screening) from 16- to 325-mesh	Noncritical cleaning and cutting; texturing; noncontaminating for brazing steel and stainless steel
Crushed glass	5 sizes (wide-band screening) from 30- to 400-mesh	Fast cutting; low cost; short life; abrasive; noncontaminating
Steel shot	12 or more sizes (close gradation) from 8- to 200-mesh	General-purpose rough cleaning (foundry operation, etc.); peening
Steel grit	12 or more sizes (close gradation) from 10- to 325-mesh	Rough cleaning; coarse textures; foundry welding applications; some texturing
Cut plastic	3 sizes (fine, medium, coarse); definite-size particles	Deflashing of thermoset plastics; cleaning; light deburring
Crushed nutshells	6 sizes (wide-band screening)	Deflashing of plastics; cleaning; very light deburring; fragile parts

2.2.2 Blasting Methods[2-8]

Abrasive blasting systems typically include three basic components: an abrasive container (i.e., blasting pot), a propelling device, and an abrasive blasting nozzle(s). The exact equipment used depends on the application.

The three propelling methods used in abrasive blasting systems are: centrifugal wheels, air pressure, or water pressure. Centrifugal wheel systems use centrifugal and inertial forces to mechanically propel the abrasive media.[3] Air blast systems use compressed air to propel the abrasive to the surface being cleaned.[4] Finally, the water blast method uses either compressed air or high pressure water.[5]

The compressed air suction, the compressed air pressure, and the wet abrasive blasting systems utilize the air blast method. Hydraulic blasting systems utilize the water blast method.

In compressed air suction systems, two rubber hoses are connected to a blasting gun. One hose is connected to the compressed-air supply and the other is connected to the bottom of the abrasive supply tank or "pot." The gun (Figure 2-1a) consists of an air nozzle that discharges into a larger nozzle. The high velocity air jet (expanding into the larger nozzle) creates a partial vacuum in the chamber. This vacuum draws the abrasive into the outer nozzle and expels it through the discharge opening. Figure 2-1b shows a typical suction type blasting machine.

The compressed air pressure system consists of a pressure tank (pot) in which the abrasive is contained. The use of a pressure tank forces abrasive through the blast hose rather than siphoning it as described above. The compressed air line is connected to both the top and bottom of the pressure tank. This allows the abrasive to flow by gravity into the discharge hose without loss of pressure (see Figure 2-2).

Finally, wet abrasive blasting systems (Figure 2-3a) use a specially designed pressure tank. The mixture of abrasive and water is propelled by compressed air. An alternate method uses a pressure tank and a modified abrasive blasting nozzle. This modified abrasive blasting nozzle is shown in Figure 2-3b.

Hydraulic blasting incorporates a nozzle similar to that described above for air suction systems, except that high pressure water is used as the propelling media instead of compressed air. A diagram of this type of nozzle is shown in Figure 2-4.

Pressure blast systems generally give a faster, more uniform finish than suction blast systems. They also produce high abrasive velocities with less air consumption than suction systems. Pressure blast systems can operate at pressures as low as 1 psig to blast delicate parts and up to 125 psig to handle the most demanding cleaning and finishing operations.[2]

Suction blast systems are generally selected for light-to-medium production requirements, limited space, and moderate budgets. These systems can blast continuously without stopping for abrasive changes and refills.[2]

The amount of sand used during blasting operations can be estimated using Table 2-2. By knowing the inside diameter of the nozzle (inches) and the air pressure supplied (psig), the sand flow rate is provided. For different abrasives and nozzle diameters, Equation 2-1 can be used.[2]

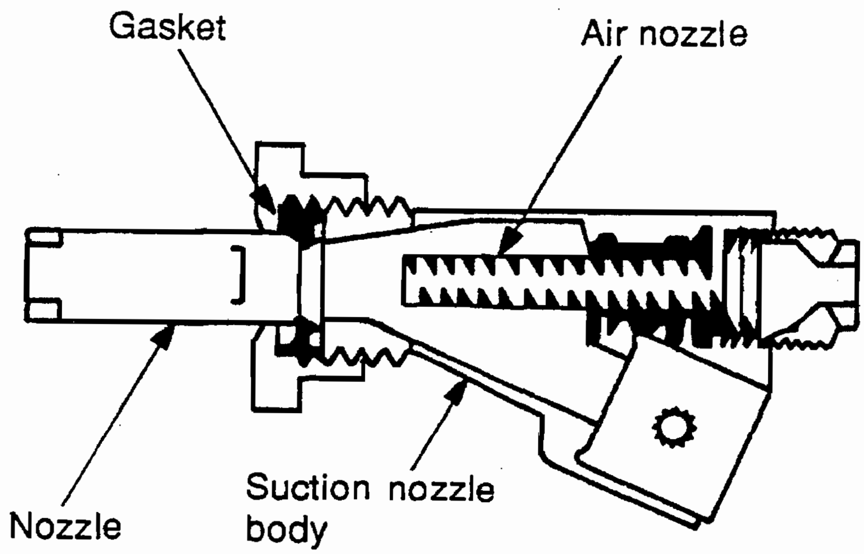

Figure 2-1a. Suction blast nozzle assembly.

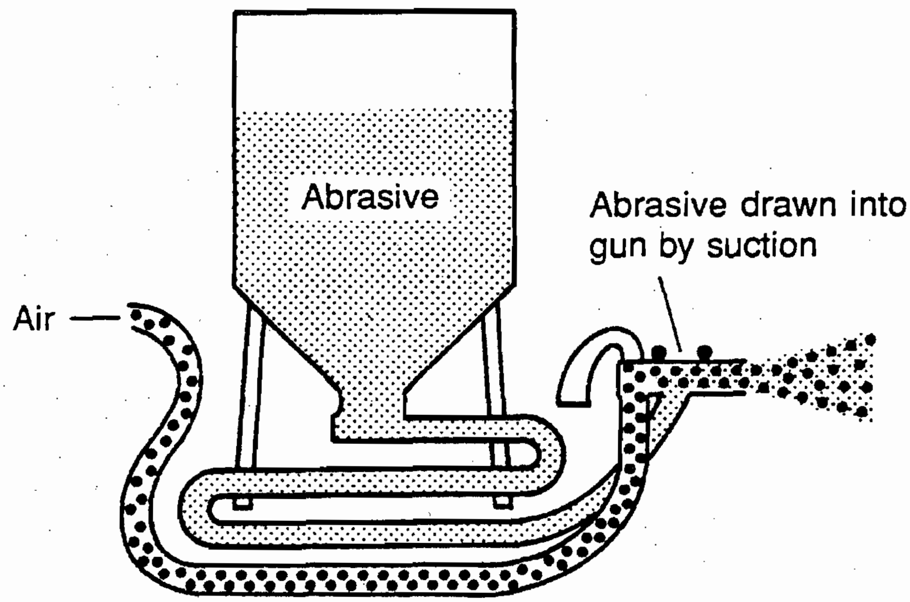

Figure 2-1b. Suction-tape blasting machine.

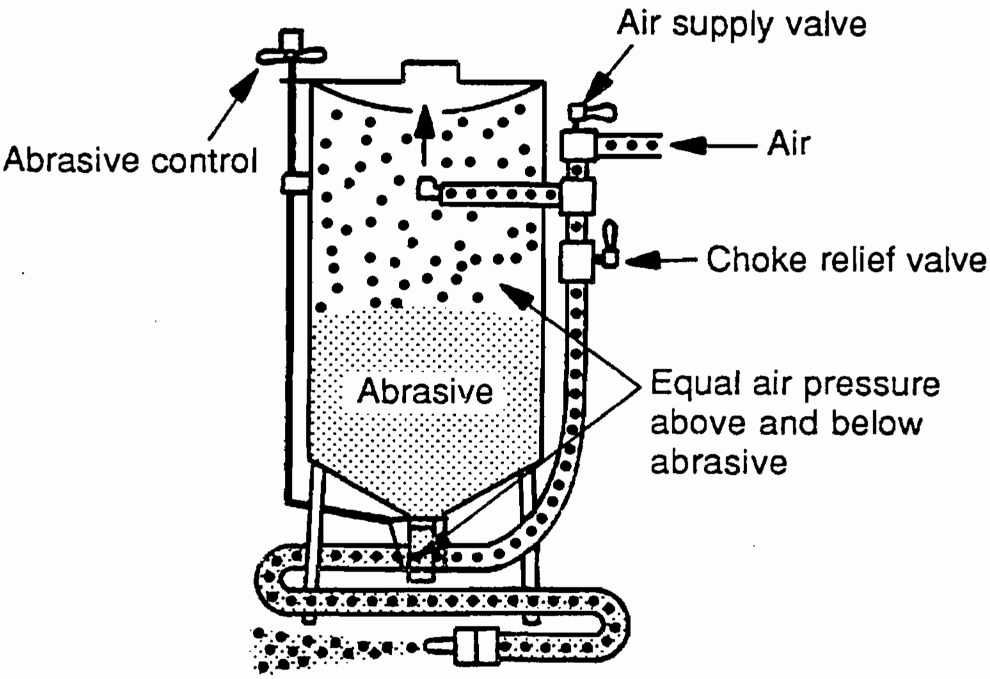

Figure 2-2. Pressure-type blasting machine.

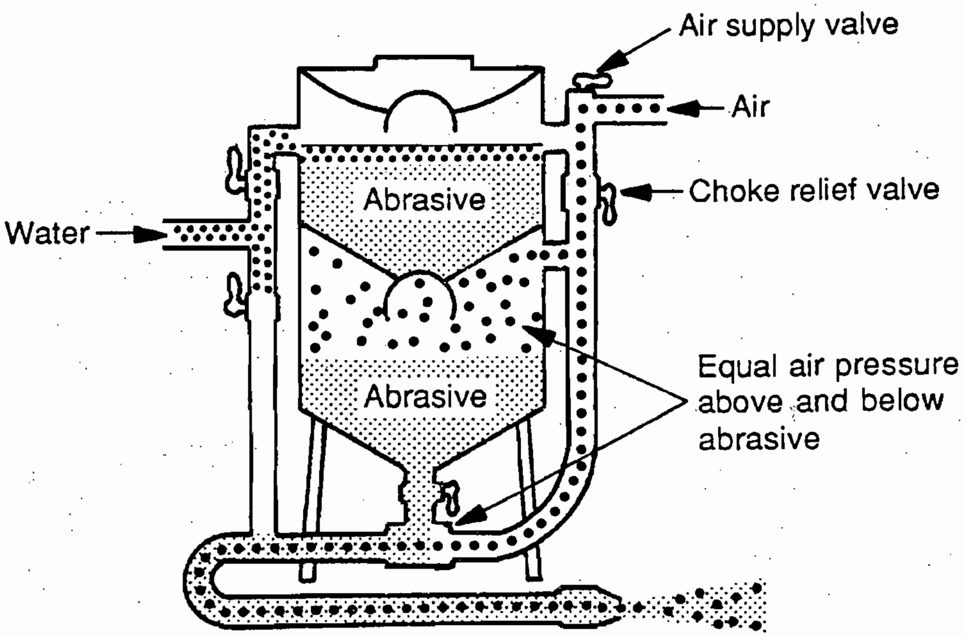

Figure 2-3a. Wet blasting machine.

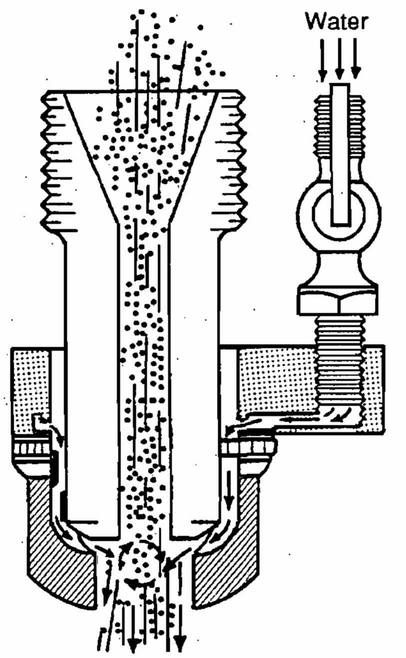

Figure 2-3b. Adapter nozzle converting a dry blasting unit to a wet blasting unit.

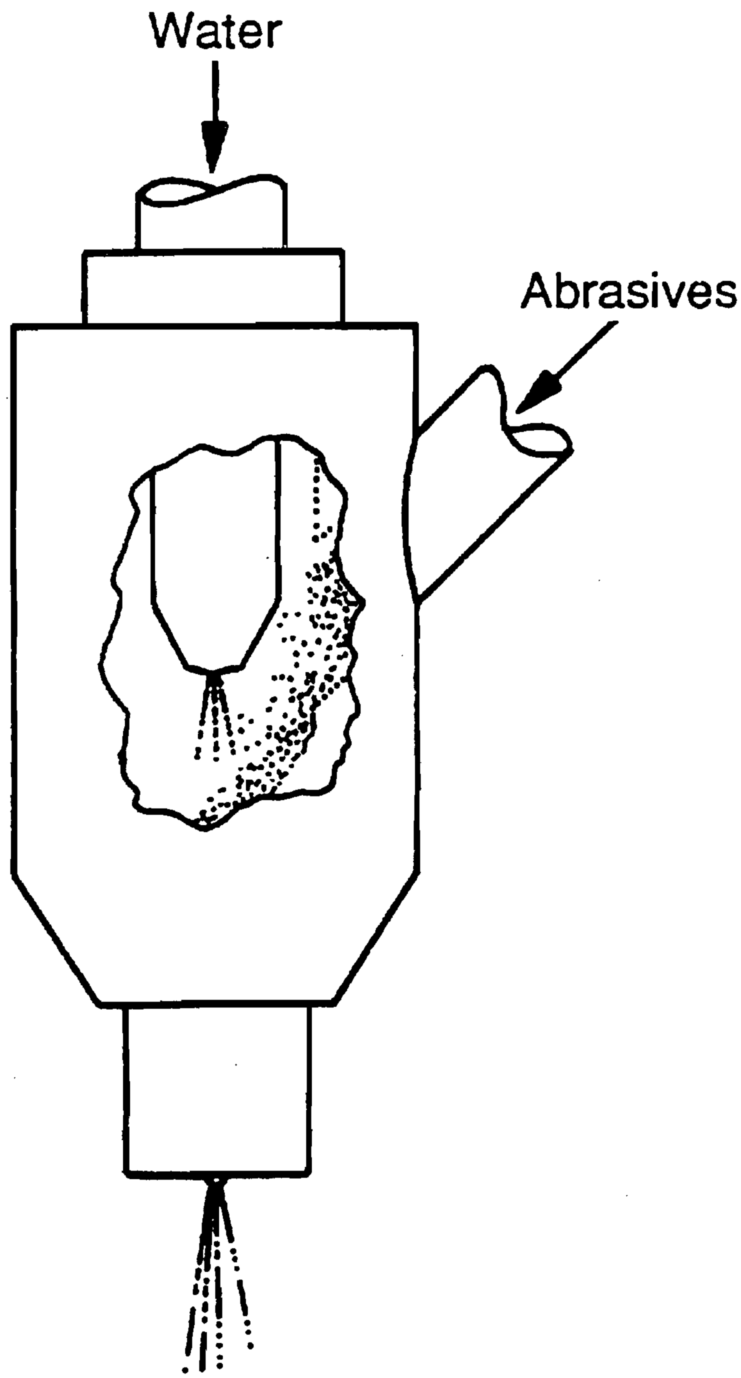

Figure 2-4. Hydraulic blasting nozzle.

$$\dot{m}_a = \dot{m}_s \times \frac{(D_a)^2}{(D_s)^2} \times \frac{\rho_a}{\rho_s} \qquad (2\text{-}1)$$

where:

$\dot{m}_a$ = mass flow rate (lb/hr) of abrasive with nozzle internal diameter D_a

$\dot{m}_s$ = mass flow rate (lb/hr) of sand with nozzle internal diameter D_s from Table 2-2

D_a = actual nozzle internal diameter (in.)

D_s = nozzle internal diameter (in.) from Table 2-2

ρ_s = bulk density of sand (lb/ft^3)

ρ_a = bulk density of abrasive (lb/ft^3)

TABLE 2-2. FLOW RATE OF SAND THROUGH A BLASTING NOZZLE AS A FUNCTION OF NOZZLE PRESSURE AND INTERNAL DIAMETER[2]

Nozzle internal diameter, in.	Sand flow rate through nozzle, lb/hr							
	Nozzle pressure, psig							
	30	40	50	60	70	80	90	100
1/8	28	35	42	49	55	63	70	77
3/16	65	80	94	107	122	135	149	165
1/4	109	138	168	195	221	255	280	309
5/16	205	247	292	354	377	420	462	507
3/8	285	355	417	477	540	600	657	720
7/16	385	472	560	645	755	820	905	940
1/2	503	615	725	835	945	1,050	1,160	1,265
5/8	820	990	1,170	1,336	1,510	1,680	1,850	2,030
3/4	1,140	1,420	1,670	1,915	2,160	2,400	2,630	2,880
1	2,030	2,460	2,900	3,340	3,780	4,200	4,640	4,060

The densities of several different abrasives are shown in Table 2-3.

TABLE 2-3. BULK DENSITY OF COMMON ABRASIVES[2]

Type of abrasive	Density, lb/ft^3
Aluminum oxides	160
Sand	99
Steel	487

2.3 DUST CONTROL TECHNIQUES[2,4,6,7]

A variety of techniques have been used to contain and recover the debris generated during abrasive cleaning operations. These techniques may be categorized into the following: blast enclosures, vacuum blasters, drapes, water curtains, wet blasters, and centrifugal blasters. Brief descriptions of each are provided below. A more detailed discussion of each method can be found in Reference 6.

2.3.1 Blast Enclosures

Blast enclosures are designed to completely enclose one or more abrasive blast operations, thereby confining the blast debris. The enclosure floor is usually equipped with funnels to divert the captured debris into adjacent trucks. In one design, a ventilation system is used to remove the airborne dust from the enclosure with the particles removed from the effluent airstream by a wet scrubber. The enclosures are moved as the work progresses.

Blast enclosures can be very effective in containing and recovering abrasive blast debris. However, they are specifically designed for a particular application, relatively expensive, and tend to slow down the overall cleaning rate due to the time required to move the enclosure as the work progresses.

Some leakage of abrasive and paint debris can occur at the joints between the blast enclosure and the structure being cleaned. Although attempts have been made to seal the joints with canvas, this is usually not very effective, particularly when the blast is directed into these areas. A better method to minimize leakage from enclosure joints is to fasten a flexible seal made of rubber, plastic, or thin metal to the inside edges of the enclosure walls. The end of the flexible seal rests on the structure being cleaned, thus reducing the escape of airborne dust.

2.3.2 Vacuum Blasters

Vacuum blasters are designed to remove paint and other surface coatings by abrasive blasting and simultaneously collect and recover the spent abrasive and paint debris with a capture and collection system surrounding the blast nozzle (Figure 2-5). In this type of system, the abrasive is automatically reclaimed and reused as work progresses. Vacuum blasters are made in a variety of sizes but even the smaller units are comparatively heavy and awkward to use. Furthermore, the production rates of the small units are low, and costs are relatively high.

2.3.3 Drapes

Porous drapes (or curtains) on both sides of a truss-type structure (e.g., bridge) have been used to divert debris downward into a barge or lined net under the blasting operation. The top of the drapes are tied to the top of the structure. This technique is relatively inexpensive but also not very effective because dust penetrates the porous drape and spillage occurs due to wind effects.

2.3.4 Water Curtains

In this technique, a water header with a series of nozzles is installed along the edges of the structure being blasted. The water spray from the nozzles is directed downward creating a water curtain to collect debris from abrasive blasting performed below the header. The debris is subsequently washed down to the ground. This technique is relatively inexpensive and does reduce the amount of airborne dust.

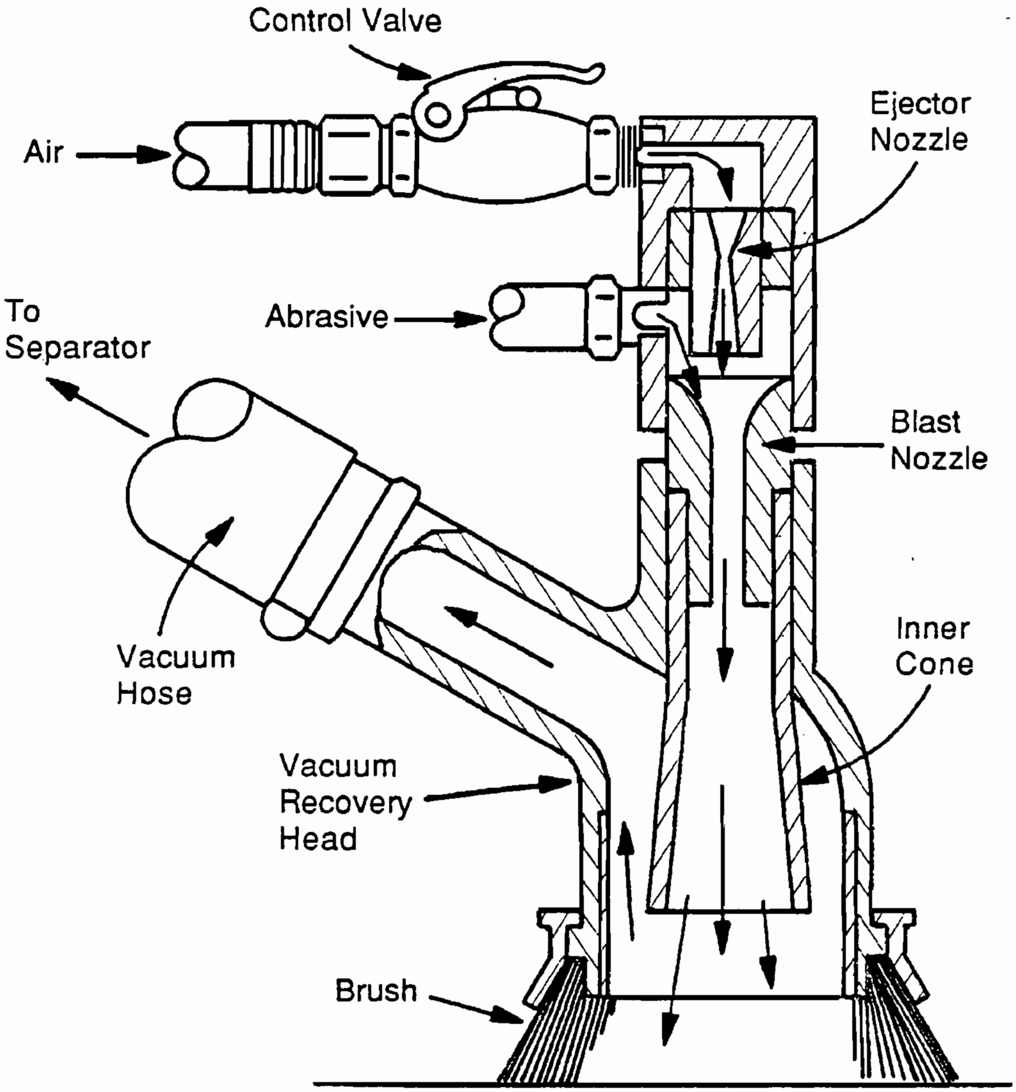

Figure 2-5. Schematic of vacuum blaster head.

However, one disadvantage is that the debris-laden water spills onto the ground (or into the water under a bridge) creating additional contamination and clean-up problems.

One method used to solve the spillage problem associated with water curtains involves the placement of troughs under the spray pattern to catch the water/abrasive mixture and divert it to an appropriate container (e.g., tank truck) for disposal. For low structures, the troughs can be placed on the ground. For high structures, the troughs can be supported from the structure itself. To minimize wind effects, porous drapes can be added, extending from the blast area down to the troughs.

2.3.5 Wet Blasting

Wet blasting techniques include: wet abrasive blasting; high-pressure water blasting; high-pressure water and abrasive blasting; and air and water abrasive blasting. The type of wet blasting method used depends on the application.

Wet abrasive blasting is accomplished by adding water to conventional abrasive blasting nozzles as shown in Figure 2-6. High-pressure water blast systems include an engine-driven, high-pressure pump, high-pressure hose, and a gun equipped with a spray nozzle. If abrasives are introduced to this type of system, high-pressure water and abrasive blasting is provided. Finally, in air and water abrasive blasting systems, each of the three materials can be varied over a wide range, making them very versatile. Compared to dry blasting, all wet blasting techniques produce substantially lower dust emissions.

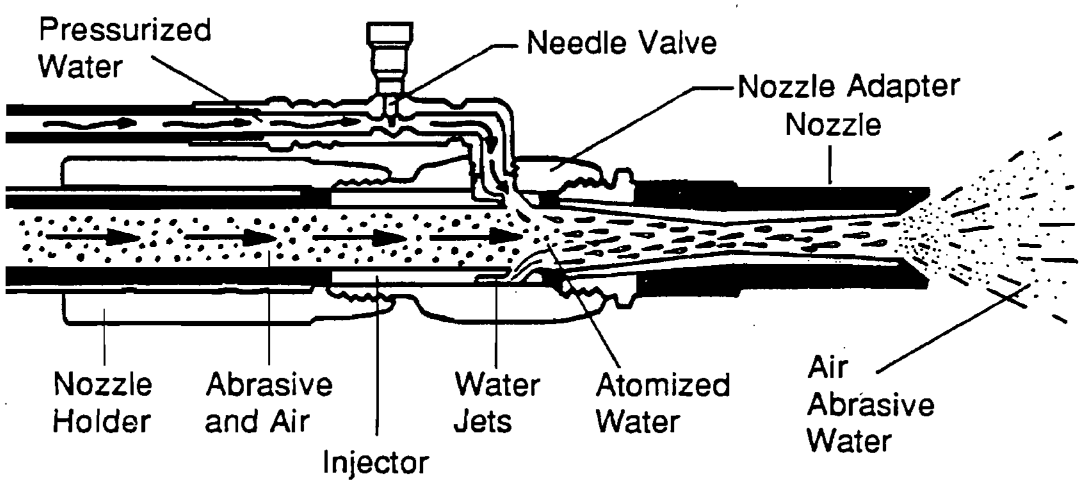

Figure 2-6. Nozzle for air abrasive wet blast.

Most wet abrasive blasters mix the water with the abrasive prior to impact on the surface. This interaction can cause the rate of surface cleaning to be lower than with dry abrasive blasting. To solve this problem, a retrofit device (design to minimize premixing of the water with the abrasive blast) has been developed to fit over the end of conventional abrasive blast nozzles. This device is shown in Figure 2-7.

The two principal parts of the device (Figure 2-7) are a swirl chamber and an exit nozzle. The swirl chamber is equipped with a tangential water inlet. The incoming water swirls around the inside of the chamber and then out the exit nozzle. Centrifugal force causes the water to form a hollow cone pattern

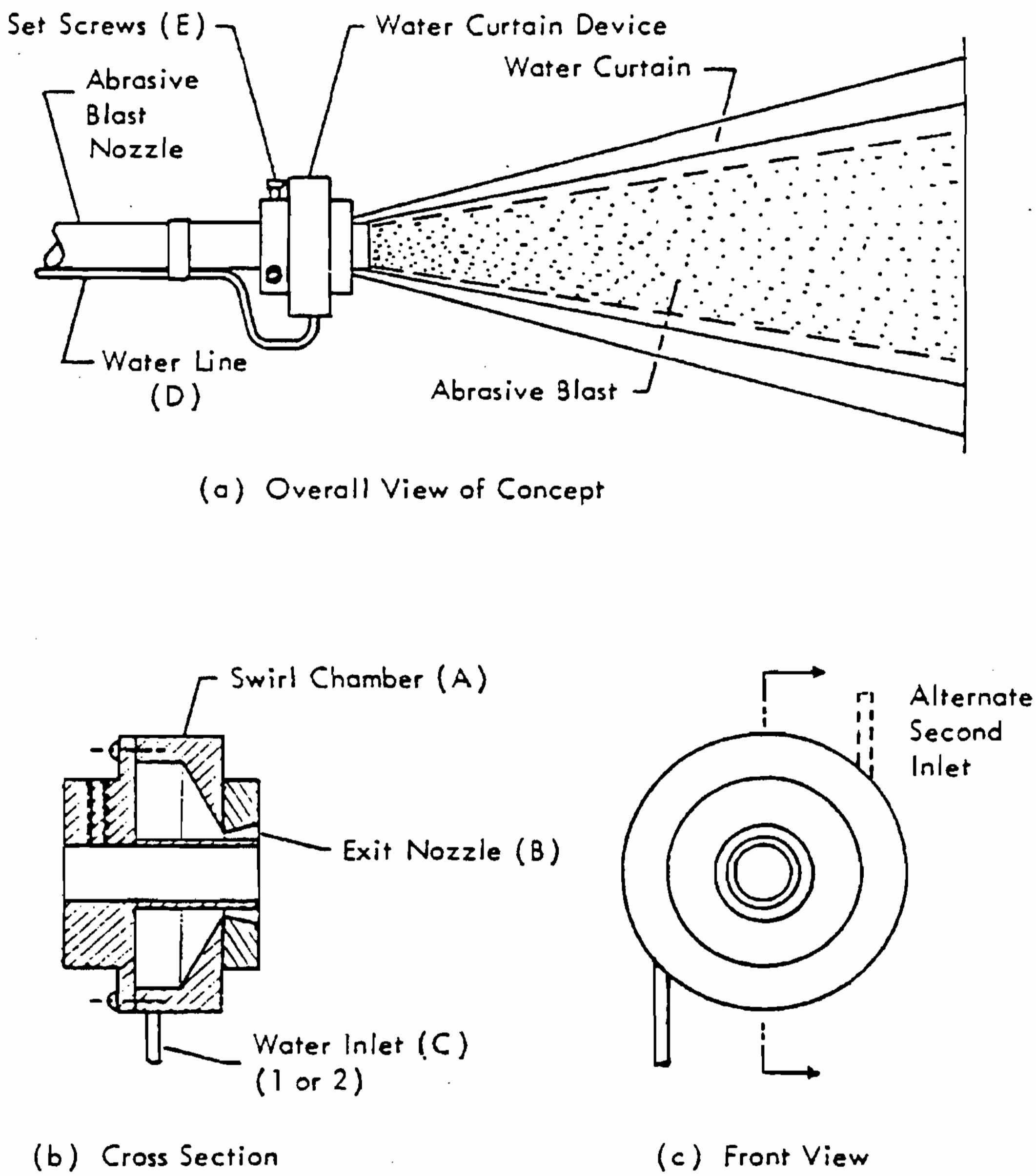

Figure 2-7. Water curtain device for abrasive blast nozzle.

around the abrasive blast stream. The angle of the water cone is controlled principally by the shape of the exit nozzle and centrifugal forces.

The above device is expected to be an improvement over traditional wet abrasive blasting. The modified water nozzle design provides a water curtail around the abrasive/airstream. Thus, the cleaning effectiveness of the abrasive/airstream should not be substantially affected. The device is simple to install and operate with conventional abrasive blasting equipment.

2.3.6 Centrifugal Blasters

Finally, centrifugal blasters use high-speed rotating blades to propel the abrasive against the surface to be cleaned. These blasters also retrieve and recycle the abrasive by the use of a capture and collection system which allows little abrasive or paint debris to escape. Present centrifugal blasters are designed primarily for large, flat, horizontal surfaces such as ship decks. Some have been designed for use on large vertical surfaces such as ship hulls and storage tanks. Some effort has been made to develop small hand-held units for use on bridges and similar structures.

2.4 REFERENCES FOR SECTION 2

1. Written communication from J. D. Hansink, Barton Mines Corporation, Golden, CO, to Attendees of the American Waterways Shipyard Conference, Pedido Beach, AL, October 28, 1991.

2. South Coast Air Quality Management District, *Section 2: Unconfined Abrasive Blasting,* Draft Document, El Monte, CA, September 8, 1988.

3. A. W. Mallory, "Guidelines for Centrifugal Blast Cleaning," *J. Protective Coatings and Linings, 1(1)*, June 1984.

4. B. Baldwin, "Methods of Dust-free Abrasive Blast Clearing," *Plant Engineering, 32(4)*, February 16, 1978.

5. B. R Appleman and J. A. Bruno, Jr., "Evaluation of Wet Blast Cleaning Units," *J. Protective Coatings and Linings, 2(8)*, August 1985.

6. M. K. Snyder and D. Bendersky, *Removal of Lead-based Bridge Paints*, NCHRP Report 265, Transportation Research Board, Washington, DC, December 1983.

7. J. A. Bruno, "Evaluation of Wet Abrasive Blasting Equipment," *Proceedings of the 2nd Annual International Bridge Conference*, Pittsburgh, PA, June 17-19, 1985.

8. J. S. Kinsey, *Assessment of Outdoor Abrasive Blasting*, Interim Report, EPA Contract No. 68-02-4395, Work Assignment No. 29, U. S, Environmental Protection Agency, Research Triangle Park, NC, September 11, 1989.

3. GENERAL DATA REVIEW AND ANALYSIS

3.1 LITERATURE SEARCH AND SCREENING

The first step of this investigation was a search of the available literature relating to the particulate emissions associated with open abrasive blasting. This search included data contained in the open literature (e.g., National Technical Information Service); source test reports and background documents located in the files of the EPA's Office of Air Quality Planning and Standards (OAQPS); data base searches (e.g., SPECIATE); and MRI's own files (Kansas City and North Carolina). The search was an update of the extensive information collection effort performed in 1989 as reported in Reference 1.

To evaluate candidate documents for acceptability as sources of emission data, the following general criteria were used:

1. Emissions data must be taken only from a primary reference:

a. Source testing data must be obtained directly from a referenced study that does not reiterate information from previous studies.

b. The document must constitute the original source (or publication) of the test data.

2. The report must contain sufficient data to evaluate the testing procedures and source operating conditions.

A final set of reference materials was compiled after a thorough review of the pertinent reports, documents, and information according to the above criteria. This set of documents was further analyzed to derive candidate emission factors for abrasive blasting operations.

3.2 DATA QUALITY RATING SYSTEM

As part of MRI's analysis, the final set of reference documents was evaluated as to the quantity and quality of data. The following data were always excluded from consideration:

1. Test series averages reported in units that cannot be converted to the selected reporting units.

2. Test series representing incompatible test methods.

3. Test series in which the control device (or equipment) is not specified.

4. Test series in which the abrasive blasting process is not clearly identified and described.

5. Test series in which it is not clear whether the emissions were measured before or after the control device.

If there was no reason to exclude a particular data set, each was assigned a rating as to its quality. The rating system used was that specified by the EPA's Office of Air Quality Planning and Standards (OAQPS) for the preparation of AP-42 Sections.[2] The data were rated as follows:

A—Multiple tests performed on the same source using sound methodology and reported in enough detail for adequate validation. These tests do not necessarily have to conform to the methodology specified by EPA reference test methods, although such were certainly used as a guide.

B—Tests that are performed by a generally sound methodology, but they lack enough detail for adequate validation.

C—Tests that are based on an untested or new methodology or that lack a significant amount of background data.

D—Tests that are based on a generally unacceptable method, but the method may provide an order-of-magnitude value for the source.

The following criteria were used to evaluate source test reports for sound methodology and adequate detail:

1. Source operation. The manner in which the source was operated is well documented in the report. The source was operating within typical parameters during the test.

2. Sampling procedures. The sampling procedures conformed to a generally accepted methodology. If actual procedures deviated from accepted methods, the deviations were well documented.

3. Sampling and process data. Adequate sampling and process data were documented in the report. Many variations may be unnoticed and occur without warning during testing. Such variations can induce wide deviations in sampling results. If a large spread between test results cannot be explained by information contained in the test report, the data are suspect and were given a lower rating.

4. Analysis and calculations. The test reports contain original raw data sheets. The nomenclature and equations used were compared to those specified by EPA (if any) to establish equivalency. The depth of review of the calculations was dictated by the reviewer's confidence in the ability and conscientiousness of the tester, which in turn was based on factors such as consistency of results and completeness of other areas of the test report.

3.3 EMISSION FACTOR QUALITY RATING SYSTEM

The quality of the emission factors developed from analysis of the test data was rated utilizing the following general criteria:

<u>A—Excellent</u>: Developed from A- and B-rated source test data taken from many randomly chosen facilities in the industry population. The source category is specific enough so that variability within the source category population may be minimized.

<u>B—Above average</u>: Developed only from A- or B-rated test data from a reasonable number of facilities. Although no specific bias is evident, it is not clear if the facilities tested represent a random sample of the industries. The source category is specific enough so that variability within the source category population may be minimized.

<u>C—Average</u>: Developed only from A-, B- and/or C-rated test data from a reasonable number of facilities. Although no specific bias is evident, it is not clear if the facilities tested represent a random sample

of the industry. In addition, the source category is specific enough so that variability within the source category population may be minimized.

D—Below average: The emission factor was developed only from A-, B-, and/or C-rated test data from a small number of facilities, and there is reason to suspect that these facilities do not represent a random sample of the industry. There also may be evidence of variability within the source category population. Limitations on the use of the emission factor are noted in the emission factor table.

E—Poor: The emission factor was developed from C- and D-rated test data, and there is reason to suspect that the facilities tested do not represent a random sample of the industry. There also may be evidence of variability within the source category population. Limitations on the use of these factors are footnoted.

The use of these criteria is somewhat subjective and depends to an extent upon the individual reviewer. Details of the rating of each candidate emission factor are provided in Section 4.

3.4 REFERENCES FOR SECTION 3

1. J. S. Kinsey, *Assessment of Outdoor Abrasive Blasting*, Interim Report, EPA Contract No. 68-02 4395, Work Assignment No. 29, U. S. Environmental Protection Agency, Research Triangle Park, NC, September 11, 1989.

2. *Procedures for Preparing Emission Factor Documents*, EPA-454/R-95-015, Office of Air Quality Planning and Standards, U. S. Environmental Protection Agency, Research Triangle Park, NC, May 1997.

4. EMISSION FACTOR DEVELOPMENT

4.1 REVIEW OF SPECIFIC DATA SETS

In the prior information search of the literature for documents on the subject of abrasive blasting, 37 individual documents were identified for further evaluation.[1] Upon subsequent review of these documents, 15 were determined to contain some type of applicable air monitoring data. Of these 15 documents, only 9 contained data which were found to be potentially useful in the development of candidate emission factors. Those documents are listed in Table 4-1.

TABLE 4-1. REFERENCE DOCUMENTS REVIEWED DURING LITERATURE SEARCH

Samimi, B., "Silica Dust in Sandblasting Operations," Ph.D. Thesis, Tulane University, 1973.
Samimi, B., et al., "Dust Sampling Results at a Sandblasting Yard Using Stan-Blast in the New Orleans Region: A Preliminary Report," NIOSH-00036278, New Orleans, LA, 1974.
Samimi, B., et al., "The Efficiency of Protective Hoods Used by Sandblasters to Reduce Silica Dust Exposure," *Am. Indus. Hyg. Assn. J.*, 36(2), February 1975.
Landrigan, P. J., et al., "Health Hazard Evaluation Report on the Tobin-Mystic River Bridge," TA80-099-859, NIOSH Report to City Boston Department of Health and Hospitals, Boston, MA, July 25, 1980.
Bareford, P. E., and F. A. Record, "Air Monitoring at the Bourne Bridge Cape Cod Canal, Massachusetts," Final Report, Contract No. DACW 33-79-C-0126, U.S. Army Corps of Engineers, New England Division, Waltham, MA, January 1982.
Beddows, N. A., "Lead Hazards and How to Control Them," *Natl. Safety News,* 128(6), December 1983.
Lehner, E., et al., Memo to D. M. Moline, Department of Public Utilities, Division of Environmental Services, City of Toledo, OH, January 31, 1985.
WhiteMetal, Inc., "Protecting Our Environment with the Jet Stripper," Houston, TX, June 1987.
South Coast Air Quality Management District, "Section 2: Unconfined Abrasive Blasting," Draft Document, El Monte, CA, September 8, 1988.

Besides the documents listed in Table 4-1, the ongoing literature search yielded seven additional test reports, as listed below.

1. Kinsey, J. S., et al., "Development of Particulate Emission Factors for Uncontrolled Abrasive Blasting Operations," U. S. Environmental Protection Agency, Research Triangle Park, NC, February 1995.
2. *NEESA 2-161. Particulate and Chromium Emission Testing at Plastic Media Blasting Facility, BLDG 25, Naval Aviation Depot, Naval Air Station, Alameda, CA*, Naval Energy and Environmental Support Activity, Port Hueneme, CA, May 1990.
3. *Determination of Particulate Emission Rates & Baghouse Removal Efficiency, Hamilton Foundry, Harrison, Ohio*, K&B Design, Inc., Cincinnati, OH, September 3, 1991.
4. Written Communication from D. Borda, The Hamilton Foundry & Machine Co., Harrison, OH, to L. Gruber, Southwestern Ohio Air Pollution Control Agency, Cincinnati, OH, November 27, 1990.

5. *Summary of Source Test Results, Hunter Schlesser Sandblasting, San Leanardo, CA*, Bay Area Air Quality Management District, San Francisco, CA, March 3, 1993.

6. *Summary of Source Test Results, Poly Engineering, Richmond, CA*, Bay Area Air Quality Management District, San Francisco, CA, November 19, 1990.

One additional report (Peart, J., et al. [title unknown] Federal Highway Administration, Washington, DC, 1995.) was requested from the Federal Highway Administration in March 1995 but never received. References 2 through 6 (listed above) document emission tests on enclosed abrasive blasting operations. Brief reviews of References 1 through 6 are provided in the following paragraphs.

4.1.1 Reference 1

The most definitive study in terms of data quality and documentation was reported by Kinsey et al., as cited above. The reported (uncontrolled) emission factors were based on actual air emissions data from a pilot-scale test facility within which full-scale abrasive blasting (surface cleaning) was performed. This entailed the construction and use of a low speed wind tunnel that was large enough to house commercially available abrasive (sand) blasting equipment. Conventional EPA stack sampling and analysis procedures were used in each test to determine emissions of particulate matter (PM) and HAP metals generated by abrasive blasting of mild steel panels (automobile hoods and tank sides) with silica sand. The ten HAP metals are arsenic (As), beryllium (Be), cadmium (Cd), cobalt (Co), chromium (Cr), manganese (Mn), nickel (Ni), lead (Pb), antimony (Sb), and selenium (Se). Iron (Fe) emissions also were measured. Duplicate test runs were conducted at each of nine test conditions covering the nominal range of wind speeds (5, 10, and 15 mph) and types of cleaned surfaces (precleaned, painted, and rusted). Emissions and facility operating data were collected for each test condition. Finally, uncontrolled PM emission factors were developed for each test condition. The data from this document are assigned an A rating. The EPA reference test methods were used, adequate detail was provided, and no problems were reported.

4.1.2 Reference 2

This reference documents an emission test conducted on an enclosed abrasive blasting operation at a California Naval Aviation Depot. Particulate matter, chromium, and hexavalent chromium emissions were measured at the outlets of two fabric filters that control emissions from the blasting operations. A modified EPA Method 5 sampling train was used to measure PM emissions, and CARB Method 425 was used to measure chromium and hexavalent chromium. The blasting operations use plastic media as the blasting abrasive. The test report does not include process rates, and emission factors could not be developed from the data. The PM concentrations measured during the test averaged 3.61 mg/dscm (0.00158 gr/dscf). The chromium concentrations averaged 0.00187 mg/dscm (8.17×10^{-7} gr/dscf) and the hexavalent chromium concentrations averaged 0.000950 mg/dscm (4.12×10^{-7} gr/dscf). These data are not rated for use in developing emission factors.

4.1.3 Reference 3

This reference documents an emission test conducted on an enclosed abrasive blasting operation at Hamilton Foundry in Harrison, Ohio, on August 20 and 21, 1991. Particulate matter emissions were measured at the inlet and outlet of a fabric filter that controls emissions from the blasting operations and several other plant processes. The fabric filter collection efficiency was 99.9 percent during testing. The results from this test are not useful because several processes are ducted to the fabric filter that was tested.

4.1.4 Reference 4

This reference documents an emission test conducted on an enclosed abrasive blasting operation at Hamilton Foundry in Harrison, Ohio, on October 30, 1990. Particulate matter emissions were measured at the inlet and outlet of a fabric filter that controls emissions from the blasting operations and several other plant processes. The fabric filter collection efficiency was 99.9 percent during testing. The results from this test are not useful because several processes are ducted to the fabric filter that was tested.

4.1.5 Reference 5

This reference documents an emission test conducted on an enclosed abrasive blasting operation at Hunter Schlesser Sandblasting in San Leanardo, CA, on February 10, 1993. Particulate matter emissions were measured at the outlet of a fabric filter that controls emissions from blasting operations. Three CARB Method 5 test runs were completed, and the average PM concentration was 2.3 mg/dscm (0.001 gr/dscf). Glass beads were used as the blast media, and the targeted surfaces included two large motor shields and several handrails. Process rates are not provided in the report.

4.1.6 Reference 6

This reference documents an emission test conducted on an enclosed abrasive blasting operation at Poly Engineering in Richmond, CA, on February 10, 1993. Filterable PM emissions were measured at the outlet of a fabric filter that controls emissions from blasting operations. Three CARB Method 5 test runs were completed, and the average PM concentration was 0.055 gr/dscf. A CARB certified 30/40 mesh garnet was used as the blast media, and the targeted surface was unspecified parts. Process rates are provided (lb/hr of abrasive) in the report, and emission factors were developed in units of lb/1,000 lb of abrasive used. The test report contains incomplete documentation of the stack test data.

The data from this report are assigned a C rating because of the level of detail provided in the report. The test methodology appeared to be sound and no problems were reported. However, sufficient data are not included in the report to allow for a complete review of the test.

4.2 RESULTS OF DATA ANALYSIS

The individual data sets were evaluated using the criteria and rating system developed by the EPA's Office of Air Quality Planning and Standards for the development of AP-42 emission factors. This scheme entails the rating of test data quality followed by the rating of the adequacy of the data base relative to the characterization of uncontrolled emissions from the source.

A summary of the available test data for uncontrolled and controlled abrasive blasting operations are provided in Tables 4-2 and 4-3.

A number of comments should be made with regard to the data contained in Tables 4-2 and 4-3. In the case of Table 4-2, only four of the twelve data sets contained enough information to develop PM and/or lead emission factors for abrasive blasting operations. Six of the other studies involved some type of industrial hygiene or ambient air monitoring in the vicinity of the blasting operation. None of the industrial hygiene/ambient air studies characterized the blasting operation in sufficient detail for further analysis and emission factor development. Finally, two of the tests did not include process rates. Two

TABLE 4-2. SUMMARY OF TEST DATA FOR ABRASIVE BLASTING OPERATIONS[a]

Reference document	Type of operation tested	Type of abrasive	Sampler location	Particle size fraction, µmA[b]	Time weighted average concentration, mg/m^3	Data quality rating	Emission factor, mass/source extent	Comments
Samini, 1973; Samini et al., 1975	Outdoor sandblasting at two steel fabrication yards	Silica sand	Within 5 yd (4.6 m) of sandblaster	TP	1.46-76.8	NR	N/A	31 samples; no process data
				< 11	11.8	NR	N/A	16 sample average; no process data
				RP	0.109-8.93	NR	N/A	29 samples; no process data
Samini et al., 1974	Abrasive cleaning of ship hull	Stan-Blast	< 5 yd (4.6 m) from source	TP	10.2	NR	N/A	Sampling time = 185 min
				RP	4.58	NR	N/A	Blasting time = 180 min; no process data
			Sandblaster's chest	RP	88.8	NR	N/A	Sampling time = 181 min; blasting time = 150 min; no process data
			< 10 yd (9.1 m) from source	RP	2.26-9.88	NR	N/A	No process data available
				< 11	6.98	NR	N/A	
Landrigan et al., 1980	Abrasive bridge cleaning of lead-based paint	Grit (Black Beauty)	27 m downwind of bridge	TSP (Pb)	0.0129	NR	N/A	Data for a 6.1-h sampling period during which canvas shroud was not in place for a 2-h period; Pb contributions from paint chips, vehicle exhaust, and grit; no process data available
Bareford and Record, 1982	Abrasive bridge cleaning of lead-based paint	Sand	Center of plume exiting sandblasting bay	TP	—	D	57-455 lb/h/ sandblaster	2.5% Pb for particles < 2.4 µm; sand usage—700 lb/h per blaster (no exact throughput available)
				TP (Pb)	-	D	1.5-4.8 lb/h/ sandblaster	< 1% Pb for particles > 75 µm; sand usage—700 lb/h per blaster (no exact throughput available)
				< 10	—	D	24 lb/h/ sandblaster	Sand usage—700 lb/h per blaster (no exact throughput available)
				< 10 (Pb)	—	D	0.46 lb/h/ sandblaster	Sand usage—700 lb/h per blaster (no exact throughput available)
Beddows, 1983	General abrasive blasting of lead-based paint	Grit	Breathing zone samples	TP	3-30+	NR	N/A	8-h time-weighted averages; grit from coal slag typically contains from 20-40 µg of Pb/g of material; grit from copper smelting can contain up to 6,000 µg Pb/g of material; no process data reported
Lehner et al., 1985	Abrasive bridge cleaning of lead-based paint	Sand	300-400 ft (91-122 m) downwind of bridge	TSP	0.339-0.482	NR	N/A	24-h time-weighted averages; no process data or controls specified; assumed to be essentially uncontrolled
				TSP (Pb)	0.00122-0.00215	NR	N/A	

TABLE 4-2. (continued)

Reference document	Type of operation tested	Type of abrasive	Sampler location	Particle size fraction, μmA[b]	Time weighted average concentration, mg/m^3	Data quality rating	Emission factor, mass/source extent	Comments
WhiteMetal Inc., 1987	Outdoor blasting of steel panels coated with lead-based paint	30-60 mesh (0.59-0.25 mm) silica sand	5 ft (1.5 m) downwind	TSP	257.61	NR	N/A	Hi-vols installed downwind of dry blasting operation to demonstrate control effectiveness of "Jet Stripper"; no sampling time or process data reported
			50 ft (15 m) downwind	TSP	45.99	NR	N/A	
			100 ft (30 m) downwind	TSP	6.18	NR	N/A	
			200 ft (61 m) downwind	TSP	2.71	NR	N/A	
			500 ft (152 m) downwind	TSP	0.90	NR	N/A	
South Coast Air Quality Management District, 1988	Outdoor abrasive blasting	Sand	In ventilation system duct	TP	N/A	D	0.041 lb/lb sand	Emission factors determined by source test of an uncontrolled indoor blasting operation using a quasi-stack technique; original test report not available
		Grit		TP	N/A	D	0.010 lb/lb grit	
		Shot		TP	N/A	D	0.004 lb/lb shot	
		Other		TP	N/A	D	0.010 lb/lb abrasive	
Kinsey et al., 1995	Blasting of molded steel panels, painted, cleaned, or rusted	30-50 mesh silica sand	40 ft (12 m) downwind	TP, < 10, < 2.5	See Reference 1	A	See Table 4-4	Emission factors determined by source tests in low speed wind tunnel using standard test methods for total particulate, particle size distribution, and iron and 10 HAP metals
NEESA 2-161, 1990	Enclosed blasting of aircraft parts	Plastic	Fabric filter stack	TP	3.61	NR	N/A	Fabric filter-controlled plastic media blast room. No process data. Chromium conc. of 0.0187 mg/m^3 and Cr^{+6} conc. of 0.00095 mg/m^3
Hunter Schlesser Sandblasting, 1993	Enclosed blasting of motor shields and handrails	Glass beads	Fabric filter stack	TP	2.3	NR	N/A	Fabric filter-controlled glass bead blast room. No process data.
Poly Engineering, 1990	Enclosed blasting of unspecified parts	Garnet	Fabric filter stack	TP	126	C	0.00069 lb/lb garnet	1,740 lb/hr of abrasive used to blast 700 lb/hr of parts

[a]From references listed in Table 4-1. N/A = not available or not applicable. NR = not rated.

[b]TP = total particulate matter. RP = respirable particulate matter (≤ 3.5 μmA) as determined using a 10-mm nylon cyclone followed by a 37-mm filter cassette. TSP = total suspended particulate matter (≤ 30-50 μmA) as determined by a high volume air sampler.

TABLE 4-3. SUMMARY OF AVAILABLE CONTROL EFFICIENCY DATA FOR ABRASIVE BLASTING OPERATIONS[a]

Reference document	Type of operation tested	Type of abrasive	Control technology employed	Sampler location	Particle size fraction, µmA[b]	Average dust concentration, mg/m^3		Measured control efficiency	Comments
						Uncontrolled	Controlled		
WhiteMetal Inc., 1987	Outdoor blasting of steel panels coated with lead-base paint	30-60 mesh (250-590 µm) silica sand	Water jet blasting nozzle (i.e., "Jet Stripper")	5 ft (1.5 m) downwind	TSP	257.6	42.3	84	Comparison of uncontrolled and controlled dust concentrations assumes identical test conditions; original test data not available; no process data or sampling time reported.
				50 ft (15 m) downwind	TSP	46.0	3.3	93	
				100 ft (30 m) downwind	TSP	6.2	0.55	91	
				200 ft (61 m) downwind	TSP	2.7	0.32	88	
				500 ft (152 m) downwind	TSP	0.90	0.19	79	
So. Coast Air Quality Management District, 1988	Outdoor abrasive blasting	All	Wet blasting (as compared to dry blasting)	-	TP	NA	NA	50%	No basis of control estimate provided

[a]From references listed in Table 4-1. NA = not available.
[b]TSP = total suspended particulate matter (~ ≤30-50 µmA) as determined by a high volume air sampler. TP = total particulate matter.

additional studies (not shown in Table 4-2) had sufficient information to develop emission factors, but the stacks that were tested ducted emissions from abrasive blasting and other sources.

Several problems were also noted with the *Bareford and Record* and *South Coast AQMD* emission factor studies contained in Table 4-2. Both sets of emission factors were generally of poor quality and thus were given a D rating based on the criteria discussed above. The emission factors from these studies are not presented in the AP-42 section, but the South Coast AQMD study provides some valuable information on "relative dustiness" (the amount of PM emitted by the various blast media) of several abrasives. The study indicates that total PM emissions from abrasive blasting using grit are about 24 percent of total PM emissions from abrasive blasting with sand. The study also indicates that total PM emissions from abrasive blasting using shot are about 10 percent of total PM emissions from abrasive blasting with sand. This information is presented in the text of the AP-42 section.

With regard to Table 4-3, only two data sets were identified which address control efficiency applied to abrasive blasting operations. Both data sets were found to be extremely limited in scope and of poor quality. As with the data for uncontrolled emissions, documentation of process operation was nonexistent in both cases. However, the control efficiencies presented in these documents are discussed in the AP-42 section.

Table 4-4 provides an overall summary of the particulate emission factors developed in the study by Kinsey, et al. As shown in Table 4-4, the emission factors for total PM tend to increase with wind speed for each of the three types of mild steel surfaces blasted. Because the emissions contained no condensible fraction, the total PM was collected entirely as "filterable" PM. The emission factors for PM-10, on the other hand, show a tendency to decrease when the wind speed exceeds 10 mph. No substantial difference in particulate emissions was observed, however, by either the type of surface cleaned or coating removed by the abrasive.

The emission factors for five HAP metals and Fe are summarized in Tables 4-5, 4-6, and 4-7 for the total PM, PM-10, and PM-2.5 particle size fractions, respectively. Except for Fe, these emission factors are of the order of 10^{-6} kg per kg of sand. Five other HAP metals (As, Be, Co, Sb, and Se) were generally not detected above blank levels.

4.3 DEVELOPMENT OF CANDIDATE EMISSION FACTORS

Based primarily on lack of documentation of the abrasive blasting process operation associated with most of the tests summarized in Tables 4-2 and 4-3 (as noted above), only References 1 and 6 were used for developing candidate PM emission factors. Reference 1 addresses only silica sand as a blasting medium, and Reference 6 quantifies fabric filter-controlled PM emissions from blasting with garnet.

Regarding overall PM emissions from the Reference 1 abrasive blasting tests, no significant dependence on the surface condition of the mild steel target panels was observed. Moreover, only the factors for total PM emissions showed a consistent dependence on wind speed.

The candidate emission factors for PM-10 and PM-2.5 were derived (using Reference 1 data) as simple averages of the results from the sand blasting of the three target panels, as shown in Table 4-8. The candidate emission factors for total PM were differentiated by wind speed, as shown in Table 4-9.

TABLE 4-4. SUMMARY OF PM TEST DATA FROM REFERENCE 1[a]

Operating condition	Test runs	Total PM emission factor, kg/kg sand	PM-10 emission factor, kg/kg sand[b]	PM-2.5 emission factor, kg/kg sand[c]	Result of mass balance, % closure[d]
Clean surface					
5 mph	17/18	0.029	0.017	0.0024	100
10 mph	9/10	0.068	0.0081	0.0022	95
15 mph	23/24	0.092	0.0045	0.00090	86
Average emission factor		0.063	0.0099	0.0018	
Painted surface					
5 mph	15/16	0.027	0.0059	0.0010	99
10 mph	7/8	0.070	0.052	0.00086	98
15 mph	21/22	0.091	0.0091	0.0013	79
Average emission factor		0.063	0.022	0.0011	
Oxidized surface					
5 mph	19/20	0.025	0.0057	0.0018	100
10 mph	11/12	0.026	0.014	0.0011	100
15 mph	25/26	0.089	0.0030	0.00026	82
Average emission factor		0.047	0.0074	0.0011	

[a]All results to two significant figures. Sand blasting only. Data are A-rated.
[b]Particles ≤ 10 μm in aerodynamic diameter (equivalent unit density spheres).
[c]Particles ≤ 2.5 μm in aerodynamic diameter (equivalent unit density spheres).
[d]Percent closure $= \dfrac{\text{total sand recovered} + \text{total particulate emissions}}{\text{total sand fed to tunnel}} = 100$

TABLE 4-5. SUMMARY OF EMISSION FACTORS FOR PM METALS

Operating condition	Test run	Total emission factor, kg/kg sand					
		Cadmium	Chromium	Iron	Manganese	Nickel	Lead
Clean surface							
5 mph	17/18	1.8e-06	2.5e-06	2.8e-04	1.5e-06	2.0e-06	1.8e-06
10 mph	9/10	7.0e-07	6.5e-06	5.1e-04	2.9e-06	4.9e-06	1.3e-06
15 mph	23/24	1.8e-06	9.6e-06	4.2e-04	2.3e-06	8.0e-06	3.9e-06
Average emission factor		1.4e-06	6.2e-06	4.0e-04	2.3e-06	5.0e-06	2.4e-06
Painted surface							
5 mph	15/16	9.5e-07	4.3e-06	2.9e-04	2.0e-06	2.0e-06	7.1e-06
10 mph	7/8	1.1e-06	8.7e-06	3.5e-04	4.0e-06	4.7e-06	1.4e-05
15 mph	21/22	6.3e-06	1.9e-05	5.1e-04	4.0e-06	2.7e-05	2.0e-05
Average emission factor		2.8e-06	1.1e-05	3.8e-04	3.3e-06	1.1e-05	1.4e-05
Oxidized surface							
5 mph	19/20	6.4e-07	1.4e-06	6.2e-04	4.2e-06	1.3e-06	1.6e-05
10 mph	11/12	1.2e-06	5.2e-06	1.6e-03	1.2e-05	7.1e-06	7.8e-06
15 mph	25/26	1.6e-06	7.2e-06	1.3e-03	4.5e-06	8.3e-06	2.3e-05
Average emission factor		1.1e-06	4.6e-06	1.2e-03	7.1e-06	5.5e-06	1.5e-05

TABLE 4-6. SUMMARY OF EMISSION FACTORS FOR PM-10 METALS

Operating condition	Test run	PM-10 emission factor, kg/kg sand					
		Cadmium	Chromium	Iron	Manganese	Nickel	Lead
Clean surface							
5 mph	17/18	1.8e-06	2.4e-06	2.1e-04	1.3e-06	2.0e-06	1.8e-06
10 mph	9/10	a	6.4e-06	3.1e-04	2.1e-06	4.4e-06	1.3e-06
15 mph	23/24	1.3e-06	9.5e-06	2.7e-04	1.6e-06	7.6e-06	3.9e-06
Average emission factor		a	6.1e-06	2.6e-04	1.7e-06	4.7e-06	2.3e-06
Painted surface							
5 mph	15/16	4.8e-07	4.0e-06	1.8e-04	1.4e-06	1.9e-06	3.5e-06
10 mph	7/8	a	8.0e-06	2.8e-04	3.2e-06	4.2e-06	1.0e-05
15 mph	21/22	2.9e-06	1.8e-05	3.0e-04	3.0e-06	2.6e-05	7.9e-06
Average emission factor		a	6.1e-06	2.6e-04	1.7e-06	4.7e-06	2.3e-06
Oxidized surface							
5 mph	19/20	3.7e-7	1.4e-06	3.8e-04	2.4e-06	1.2e-06	7.0e-06
10 mph	11/12	a	5.1e-06	8.2e-04	6.6e-06	6.3e-06	5.6e-06
15 mph	25/26	2.2e-07	6.9e-06	4.8e-04	2.0e-06	7.8e-06	8.4e-06
Average emission factor		a	4.5e-06	5.6e-04	3.7e-06	5.1e-06	7.0e-06

[a]Cadmium was not detected in any of the particle sizing fractions and therefore the calculations could not be performed.

TABLE 4-7. SUMMARY OF EMISSION FACTORS FOR PM-2.5 METALS

Operating condition	Test run	PM-2.5 emission factor, kg/kg sand					
		Cadmium	Chromium	Iron	Manganese	Nickel	Lead
Clean surface							
5 mph	17/18	1.4e-06	1.5e-06	1.1e-04	1.5e-07	1.1e-06	1.1e-06
10 mph	9/10	a	3.3e-06	2.0e-04	2.4e-07	1.6e-06	1.2e-06
15 mph	23/24	8.0e-07	5.4e-06	1.8e-04	7.0e-08	3.0e-06	3.9e-06
Average emission factor		a	3.4e-06	1.7e-04	1.5e-07	1.9e-06	2.1e-06
Painted surface							
5 mph	15/16	2.1e-07	2.1e-06	1.0e-04	2.9e-06	8.6e-07	2.8e-06
10 mph	7/8	a	4.0e-06	1.6e-04	1.2e-06	1.5e-06	5.6e-06
15 mph	21/22	7.6e-08	7.4e-06	1.5e-04	1.2e-07	8.1e-06	6.3e-06
Average emission factor		a	4.5e-06	1.4e-04	5.4e-07	3.5e-06	4.9e-06
Oxidized surface							
5 mph	19/20	3.1e-07	3.2e-07	1.4e-04	4.2e-07	4.2e-07	4.5e-06
10 mph	11/12	a	3.0e-06	1.9e-04	2.4e-07	3.4e-06	4.9e-06
15 mph	25/26	3.1e-09	3.7e-06	2.2e-04	8.6e-08	4.0e-06	6.6e-06
Average emission factor		a	2.4e-06	1.8e-04	2.5e-07	2.6e-06	5.3e-06

[a]Cadmium was not detected in any of the particle sizing fractions and therefore the calculations could not be performed.

TABLE 4-8. CANDIDATE PM-10 AND PM-2.5 EMISSION FACTORS

Surface	PM emission factors, kg/kg sand	
	PM-10	PM-2.5
Precleaned	0.0099	0.0018
Painted	0.022	0.0011
Oxidized	0.0074	0.0011
Average	0.013	0.0013

TABLE 4-9. CANDIDATE TOTAL PM EMISSION FACTORS DIFFERENTIATED BY WIND SPEED

Wind speed	Emission factor (kg/kg sand) by surface type			Average
	Precleaned	Painted	Oxidized	
5 mph	0.029	0.027	0.025	0.027
10 mph	0.068	0.070	0.026	0.055
15 mph	0.092	0.091	0.089	0.091

All of these candidate emission factors are assigned E ratings because they are based on data from a single study.

Data from Reference 6 were used to calculate an emission factor for fabric filter-controlled abrasive (garnet) blasting. This emission factor is shown in Table 4-10.

TABLE 4-10. CANDIDATE EMISSION FACTOR FOR GARNET BLASTING

Source	Control	No. of tests	EMISSION FACTOR RATING	Total PM emission factor, kg/kg of abrasive used	Reference No.
Enclosed blasting of unspecified metal parts with 30/40 mesh garnet	Fabric filter	1	E	0.00069	6

Because the emissions of HAP metals are strongly dependent on the target material composition and its surface condition, no specific candidate emission factors are proposed.

4.4 REFERENCES FOR SECTION 4

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14. WhiteMetal, Inc., "Protecting Our Environment with the Jet Stripper," Houston, TX, June 1987.

15. South Coast Air Quality Management District, "Section 2: Unconfined Abrasive Blasting," Draft Document, El Monte, CA, September 8, 1988.

5. PROPOSED AP-42 SECTION 13.2.6

The following pages contain the proposed new AP-42 section for abrasive blasting as it would actually appear in the document.

Emission Factor Documentation for AP-42 Section 11.19.1

Sand and Gravel Processing

Final Report

For U. S. Environmental Protection Agency
Office of Air Quality Planning and Standards
Emission Factor and Inventory Group

EPA Contract 68-D2-0159
Work Assignment No. II-01

MRI Project No. 4602-01

April 1995

Emission Factor Documentation for AP-42
Section 11.19.1

Sand and Gravel Processing

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NOTICE

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PREFACE

This report was prepared by Midwest Research Institute (MRI) for the Office of Air Quality Planning and Standards (OAQPS), U. S. Environmental Protection Agency (EPA), under Contract No. 68-D2-0159, Work Assignment No. II-01. Mr. Ron Myers was the requester of the work.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

EMISSION FACTOR DOCUMENTATION FOR AP-42 SECTION 11.19.1
Sand and Gravel Processing

1. INTRODUCTION

The document *Compilation of Air Pollutant Emission Factors* (AP-42) has been published by the U. S. Environmental Protection Agency (EPA) since 1972. Supplements to AP-42 have been routinely published to add new emission source categories and to update existing emission factors. AP-42 is routinely updated by EPA to respond to new emission factor needs of EPA, State, and local air pollution control programs, and industry.

An emission factor is a representative value that attempts to relate the quantity of a pollutant released to the atmosphere with an activity associated with the release of that pollutant. Emission factors usually are expressed as the weight of pollutant divided by the unit weight, volume, distance, or duration of the activity that emits the pollutant. The emission factors presented in AP-42 may be appropriate to use in a number of situations, such as making source-specific emission estimates for areawide inventories for dispersion modeling, developing control strategies, screening sources for compliance purposes, establishing operating permit fees, and making permit applicability determinations. The purpose of this report is to provide background information from test reports and other information to support a revision to AP-42 Section 8.19.1, Sand and Gravel Processing, which subsequently will be Section 11.19.1.

This background report consists of five sections. Section 1 includes the introduction to the report. Section 2 gives a description of the sand and gravel industry. Included in the section are a characterization of the industry, an overview of the different process types, a description of emissions, and a description of the technology used to control emissions resulting from sand and gravel processing. Section 3 is a review of emissions data collection and analysis procedures. This section describes the literature search, the screening of emission data reports, and the quality rating system for both emission data and emission factors. Section 4 details the development of pollutant emission factors for the AP-42 section, including the review of specific data sets, the results of data analysis, and a summary of changes to the AP-42 section. Section 5 presents the proposed AP-42 Section 11.19.1, Sand and Gravel Processing.

2. INDUSTRY DESCRIPTION[1-3]

Deposits of sand and gravel, the unconsolidated granular materials resulting from the natural disintegration of rock or stone, are generally found in near-surface alluvial deposits and in subterranean and subaqueous beds. Sand and gravel are products of the weathering of rocks and unconsolidated or poorly consolidated materials and consist of siliceous and calcareous components. Such deposits are common throughout the United States. Construction sand and gravel are made up of varying amounts of different rock types and are, therefore, of varying chemical composition. Silica, or silicon dioxide (SiO_2), is the major constituent of commercial sands. Lesser amounts of feldspar, mica, iron oxides, and heavy minerals are common. Industrial sand, often called silica sand, and industrial gravel differ from construction sand and gravel in that they contain high percentages of quartz, or silica, typically 95 to 99 percent.

Construction sand and gravel plants are classified under Standard Industrial Classification (SIC) code 1442, construction sand and gravel. Industrial sand and gravel plants are classified under SIC code 1446, industrial sand. Emission sources in construction sand and gravel processing are included under the Source Classification Code (SCC) 3-05-025. A new SCC for industrial sand and gravel of 3-05-027 has been created in the process of revising the AP-42 section.

2.1 CHARACTERIZATION OF THE INDUSTRY[4-5]

In 1989, 5,687 construction sand and gravel pits in the United States produced 814,000,000 megagrams (Mg) (897,300,000 tons) of construction sand and gravel with a value of approximately $3,249,100,000. This production level represents a 2.8 percent decrease from 1988 production. Construction sand and gravel was produced in every State. The 10 leading States were, in descending order of tonnage, California, Michigan, Ohio, Texas, Washington, Arizona, Minnesota, Illinois, New York, and Indiana. Their combined production represented 52.9 percent of the national total. By major geographic region, the production quantity was West--36.7 percent, Midwest--30.3 percent, South--20.9 percent, and Northeast--12.1 percent. The quantity and total value of construction sand and gravel sold or used in the United States, by State, is presented in Table 2-1.

The largest use of construction sand and gravel (about 28 percent) is as aggregate for the production of concrete. The second largest use (about 15 percent) is as base material for highways, railways, runways, etc. Other major uses include aggregate for hot mix asphalt (9 percent), and fill for highway, dam, and other recontouring (7 percent). Smaller volumes of construction sand and gravel are used in plaster and gunite sands, snow and ice control, and railroad ballast. About 39 percent of total U.S. production is reported as "unspecified uses--actual and estimated." A more detailed breakdown of the major uses of construction sand and gravel sold or used in the United States is presented in Table 2-2.

In 1989, 153 industrial sand and gravel operations in the United States produced 26,500,000 megagrams (Mg) (29,200,000 tons) of industrial sand and gravel with a value of approximately $396,000,000. This production level represents a 3 percent increase from 1988 production. The five leading States in the production of industrial sand and gravel were, in descending order of volume, Illinois, Michigan, California, New Jersey, and Texas. Their combined production represented 46 percent of the national total. By major geographic region, the production quantity was Midwest--42 percent, South--35 percent, West--14 percent. The quantity and total value of industrial sand and gravel sold or used in the United States, by State, is presented in Table 2-3.

TABLE 2-1. CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN THE UNITED STATES, BY STATE (1989)[a]

State	Quantity		Total value, $
	Mg	Tons	
Alabama	9,400,000	10,400,000	36,500,000
Alaska	15,400,000	17,000,000	48,500,000
Arizona	30,800,000	33,900,000	133,900,000
Arkansas	6,800,000	7,500,000	25,500,000
California	125,500,000	138,300,000	670,800,000
Colorado	23,000,000	25,300,000	104,000,000
Connecticut	5,300,000	5,800,000	24,700,000
Delaware	1,700,000	1,900,000	6,200,000
Florida	16,200,000	17,900,000	55,500,000
Georgia	5,500,000	6,100,000	18,900,000
Hawaii	500,000	600,000	3,200,000
Idaho	5,300,000	5,800,000	18,900,000
Illinois	29,900,000	33,000,000	108,900,000
Indiana	26,900,000	29,600,000	99,200,000
Iowa	11,600,000	12,800,000	37,800,000
Kansas	11,800,000	13,000,000	33,200,000
Kentucky	5,000,000	5,500,000	15,100,000
Louisiana	12,300,000	13,600,000	54,400,000
Maine	7,800,000	8,600,000	30,100,000
Maryland	15,300,000	16,900,000	84,500,000
Massachusetts	12,600,000	13,900,000	57,000,000
Michigan	43,500,000	48,000,000	132,000,000
Minnesota	30,600,000	33,700,000	82,600,000
Mississippi	14,200,000	15,600,000	51,500,000
Missouri	9,100,000	10,000,000	32,500,000
Montana	5,300,000	5,800,000	13,900,000
Nebraska	13,800,000	15,200,000	41,800,000
Nevada	18,100,000	20,000,000	70,000,000
New Hampshire	5,400,000	6,000,000	20,400,000

TABLE 2-1. (continued)

State	Quantity		Total value, $
	Mg	Ton	
New Jersey	13,800,000	15,200,000	68,400,000
New Mexico	10,700,000	11,800,000	45,400,000
New York	28,700,000	31,600,000	118,500,000
North Carolina	10,200,000	11,200,000	43,700,000
North Dakota	3,300,000	3,600,000	8,100,000
Ohio	40,300,000	44,400,000	148,700,000
Oklahoma	7,700,000	8,500,000	20,000,000
Oregon	13,100,000	14,400,000	49,700,000
Pennsylvania	17,700,000	19,500,000	94,600,000
Rhode Island	1,000,000	1,100,000	3,900,000
South Carolina	6,800,000	7,500,000	23,300,000
South Dakota	5,800,000	6,400,000	20,800,000
Tennessee	5,500,000	6,100,000	21,900,000
Texas	39,800,000	43,900,000	155,800,000
Utah	13,000,000	14,300,000	41,500,000
Vermont	6,300,000	6,900,000	20,400,000
Virginia	11,700,000	12,900,000	49,700,000
Washington	34,300,000	37,800,000	124,700,000
West Virginia	2,100,000	2,300,000	6,700,000
Wisconsin	19,700,000	21,700,000	56,400,000
Wyoming	4,100,000	4,500,000	15,400,000
Total[b]	814,000,000	897,300,000	3,249,100,000

[a]Reference 4.
[b]Data may not add to total due to independent rounding.

TABLE 2-2. CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN THE UNITED STATES, BY MAJOR USE (1988)[a]

Use	Quantity		Total value $	Value per ton $
	Mg	Tons		
Concrete aggregate (including concrete sand)	209,180,000	230,576,000	887,422,000	3.85
Plaster and gunite sands	8,371,000	9,227,000	43,226,000	4.68
Concrete products (blocks, bricks, pipe, decorative, etc.)	9,437,000	10,403,000	38,916,000	3.74
Hot mix asphalt aggregates and other bituminous mixtures	74,767,000	82,417,000	318,662,000	3.87
Road base and coverings	123,920,000	136,597,000	413,330,000	3.03
Road stabilization (cement)	2,168,000	2,390,000	6,452,000	2.70
Road stabilization (lime)	893,000	984,000	2,592,000	2.63
Fill	56,800,000	62,611,000	134,709,000	2.15
Snow and ice control	5,420,000	5,974,000	20,086,000	3.36
Railroad ballast	579,000	638,000	2,849,000	4.47
Roofing granules	565,000	623,000	2,517,000	4.04
Filtration	63,000	69,000	372,000	5.39
Other	18,668,000	20,578,000	72,443,000	3.52
Unspecified:				
Actual	216,750,000	238,924,000	828,733,000	3.47
Estimated	110,090,000	121,352,000	353,689,000	2.91
Total or average[b]	837,690,000	923,400,000	3,126,000,000	3.39

[a]Reference 4.
[b]Data may not add to totals due to independent rounding.

TABLE 2-3. INDUSTRIAL SAND AND GRAVEL SOLD OR USED IN THE UNITED STATES, BY STATE (1989)[a]

State	Quantity		Total value, $
	Mg	Tons	
Alabama	730,000	805,000	8,092,000
Arizona	W	W	W
Arkansas	494,000	545,000	5,507,000
California	2,201,000	2,426,000	43,863,000
Colorado	W	W	W
Connecticut	W	W	W
Florida	618,000	681,000	7,768,000
Georgia	487,000	537,000	7,013,000
Idaho	416,000	459,000	5,037,000
Illinois	4,157,000	4,582,000	52,935,000
Indiana	W	W	W
Kansas	209,000	230,000	2,690,000
Kentucky	W	W	W
Louisiana	519,000	572,000	9,664,000
Maryland	W	W	W
Massachusetts	31,000	34,000	601,000
Michigan	2,599,000	2,865,000	24,577,000
Minnesota	W	W	W
Mississippi	W	W	W
Missouri	680,000	750,000	9,972,000
Montana	W	W	W
Nebraska	W	W	W
Nevada	651,000	718,000	W
New Jersey	1,630,000	1,797,000	26,138,000
New York	48,000	53,000	633,000
North Carolina	1,476,000	1,627,000	19,902,000
Ohio	1,265,000	1,394,000	24,662,000
Oklahoma	1,103,000	1,216,000	18,310,000
Pennsylvania	W	W	W

TABLE 2-3. (continued)

State	Quantity		Total value, $
	Mg	Tons	
Rhode Island	W	W	W
South Carolina	764,000	842,000	16,635,000
Tennessee	W	W	W
Texas	1,507,000	1,661,000	29,107,000
Utah	2,700	3,000	60,000
Virginia	W	W	W
Washington	W	W	W
West Virginia	W	W	W
Wisconsin	1,373,000	1,514,000	22,399,000
Other	3,530,000	3,891,000	74,630,000
Total[b]	26,494,000	29,205,000	410,200,000

[a]Reference 5. W = withheld to avoid disclosing company proprietary data; included with "Other."
[b]Data may not add to total due to independent rounding.

The largest use of industrial sand and gravel is for glassmaking. In 1989, 42 percent was consumed as glassmaking sand for use in the manufacture of containers, plate glass, specialty glass, and fiberglass. The second largest use (24 percent) was as foundry sand for molding and core facing, and as refractory material. Other important uses include abrasive sand (8 percent), hydraulic fracturing sand (5 percent), roofing granules and fillers, filtration, ceramics, and fillers. A more detailed breakdown of the major uses of industrial sand and gravel sold or used in the United States is presented in Table 2-4.

2.2 PROCESS DESCRIPTION[1-6]

2.2.1 Construction Sand and Gravel

Sand and gravel typically are mined in a moist or wet condition by open pit excavation or by dredging. Open pit excavation is carried out with power shovels, draglines, front end loaders, and bucket wheel excavators. In rare situations, light charge blasting is done to loosen the deposit. Mining by dredging involves mounting the equipment on boats or barges and removing the sand and gravel from the bottom of a body of water by suction or bucket-type dredges. After mining, the materials are transported to the processing plant by suction pump, earth mover, barge, truck, belt conveyors, or other means.

Although significant amounts of sand and gravel are used for fill, bedding, subbase, and basecourse without processing, most domestic sand and gravel is processed prior to use. The processing of sand and gravel for a specific market involves the use of different combinations of washers, screens, and classifiers to segregate particle sizes; crushers to reduce oversized material; and storage and loading facilities. A process flow diagram for construction sand and gravel processing is presented in Figure 2-1. The following paragraphs describe the process in more detail.

After being transported to the processing plant, the wet sand and gravel (raw feed) is stockpiled or emptied directly into a hopper, which typically is covered with a "grizzly" of parallel bars to screen out large cobbles and boulders. From the hopper, the material is transported to fixed or vibrating scalping screens by gravity, belt conveyors, hydraulic pump, or bucket elevators. The scalping screens separate the oversize material from the smaller sizes. The oversize material may be directed to a crusher for size reduction, to produce crushed aggregate, or to produce manufactured sands. Crushing generally is carried out in one or two stages, although three-stage crushing may also be performed. Following crushing, the material is returned to the screening operation for sizing. Alternatively, oversize material may be used for erosion control, reclamation, or other uses.

The material that passes through the scalping screen is fed into a battery of sizing screens, which generally consist of horizontal or sloped, single or multideck vibrating screens. Rotating trommel screens with water sprays are also used to process and wash wet sand and gravel. Screening separates the sand and gravel into different size ranges. Water is sprayed onto the material throughout the screening process. After screening, the sized gravel is transported to stockpiles, storage bins, or, in some cases, to crushers by belt conveyors, bucket elevators, or screw conveyors.

The sand is freed from clay and organic impurities by log washers or rotary scrubbers. After scrubbing, the sand typically is sized by water classification. Wet and dry screening are rarely used to size the sand. After classification, the sand is dewatered using screws, separatory cones, or hydroseparators. Material may also be rodmilled to produce smaller sized fractions, although this

TABLE 2-4. INDUSTRIAL SAND AND GRAVEL SOLD OR USED IN THE UNITED STATES, BY MAJOR USE (1989)[a]

Use	Quantity		Total value $	Value per ton $
	Mg	Tons		
Sand:				
Glassmaking:				
Containers	7,129,000	7,858,000	96,782,000	12.32
Flat (plate and window)	2,349,000	2,589,000	30,198,000	11.66
Specialty	691,000	762,000	12,049,000	15.81
Fiberglass (unground)	759,000	837,000	15,539,000	18.57
Fiberglass (ground)	224,000	247,000	6,463,000	26.17
Foundry:				
Molding and core	6,123,000	6,749,000	72,776,000	10.78
Molding and core facing (ground)	W	W	W	26.93
Refractory	305,000	336,000	2,002,000	5.96
Metallurgical:				
Silicon carbide	W	W	W	11.70
Flux for metal smelting	41,000	45,000	285,000	6.33
Abrasives:				
Blasting	2,075,000	2,287,000	42,190,000	18.45
Scouring cleansers (ground)	W	W	W	26.51
Chemicals (ground and unground)	741,000	817,000	10,580,000	12.95
Fillers (ground):				
Rubber, paints, putty, etc.	144,000	159,000	10,454,000	65.75
Silica flour	62,000	68,000	1,781,000	26.19
Ceramic (ground):				
Pottery, brick, tile, etc.	216,000	238,000	7,537,000	31.67
Filtration	281,000	310,000	6,033,000	19.46

TABLE 2-4. (continued)

Use	Quantity		Total value $	Value per ton $
	Mg	Tons		
Traction (engine)	282,000	311,000	2,902,000	9.33
Coal washing	W	W	W	28.36
Roofing granules and fillers	717,000	790,000	13,453,000	17.03
Hydraulic fracturing	1,389,000	1,531,000	34,494,000	22.53
Other uses, unspecified	735,000	810,000	10,940,000	13.51
Total or average	25,237,000	27,819,000	395,807,000	14.23
Gravel:				
Metallurgical: Silicon, ferrosilicon	688,000	758,000	8,295,000	10.94
Filtration	44,000	48,000	591,000	12.31
Nonmetallurgical flux	461,000	508,000	4,311,000	8.49
Total or average	1,256,000	1,385,000	14,388,000	10.39
Grand total or average[b]	26,494,000	29,205,000	410,200,000	14.05

[a]Reference 5. W = Withheld to avoid disclosing company proprietary data.
[b]Data may not add to totals due to independent rounding.

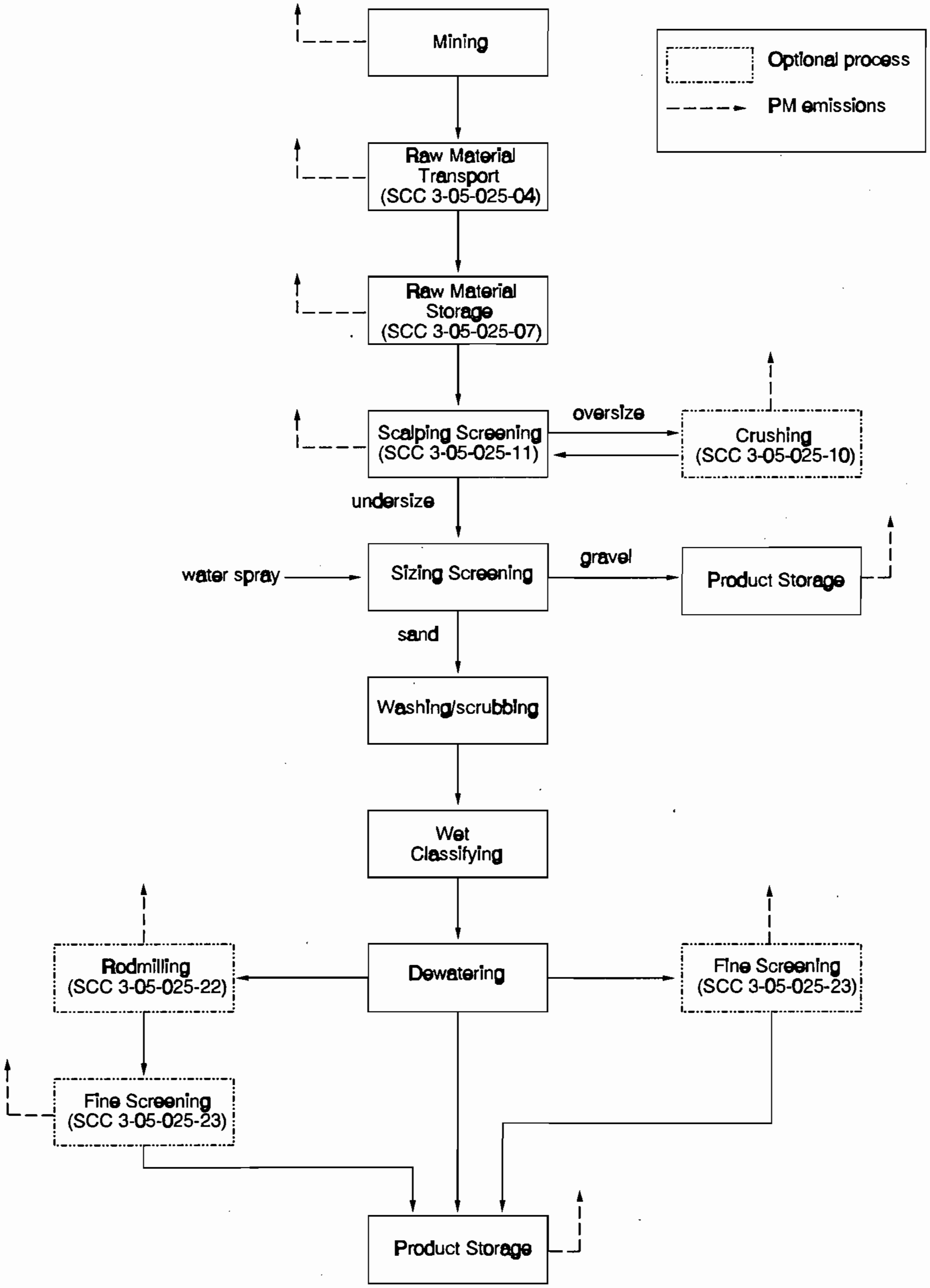

Figure 2-1. Process flow diagram for construction sand and gravel processing.

practice is not common in the industry. After processing, the sand is transported to storage bins or stockpiles by belt conveyors, bucket elevators, or screw conveyors.

2.2.2 Industrial Sand and Gravel

Industrial sand and gravel typically is mined from open pits of naturally occurring quartz-rich sand and sandstone. Mining methods depend primarily on the degree of cementation of the rock. In some deposits, blasting is required to loosen the material prior to processing. The material may undergo primary crushing at the mine site before being transported to the processing plant. Figure 2-2 is a flow diagram for industrial sand and gravel processing.

The mined rock is transported to the processing site and stockpiled. The material then is crushed. Depending on the degree of cementation, several stages of crushing may be required to achieve the desired size reduction. Gyratory crushers, jaw crushers, roll crushers, and impact mills are used for primary and secondary crushing. After crushing the size of the material is further reduced to 50 micrometers (μm) or smaller by grinding using smooth rolls, media mills, autogenous mills, hammer mills, or jet mills. The ground material then is classified by wet screening, dry screening, or air classification. At some plants, after initial crushing and screening, a portion of the sand may be diverted to construction sand use.

After initial crushing and screening, industrial sand and gravel are washed to remove unwanted dust and debris and then screened and classified again. The sand (now containing 25 to 30 percent moisture) or gravel then goes to an attrition scrubbing system that removes surface stains from the material by rubbing in an agitated, high-density pulp. The scrubbed sand or gravel is diluted with water to 25 to 30 percent solids and pumped to a set of cyclones for further desliming. If the deslimed sand or gravel contains mica, feldspar, and iron bearing minerals, it enters a froth flotation process to which sodium silicate and sulfuric acid are added. The mixture then enters a series of spiral classifiers where the impurities are floated in a froth and diverted to waste. The purified sand, which has a moisture content of 15 to 25 percent, is conveyed to drainage bins where the moisture content is reduced to about 6 percent. The material is then dried to a moisture content of less than 0.5 percent in rotary or fluidized bed dryers. The dryers generally are fired with natural gas or oil, although other fuels such as propane or diesel also may be used. After drying, the material is cooled and then undergoes final screening and classification prior to being stored and packaged for shipment.

2.3 EMISSIONS[1]

Emissions from the production of sand and gravel consist primarily of particulate matter (PM) and PM less than 10 micrometers (PM-10) in aerodynamic diameter that are emitted by many operations at sand and gravel processing plants, such as conveying, screening, crushing, and storing operations. Generally, these materials are wet or moist when handled, and process emissions are often negligible. A substantial portion of these emissions may consist of heavy particles that settle out within the plant. Other potentially significant sources of PM and PM-10 emissions are haul roads. Emissions from dryers include PM and PM-10, as well as typical combustion products including CO, CO_2, and NO_x. In addition, dryers may be sources of volatile organic compounds (VOC) or sulfur oxides (SO_x) emissions depending on the type of fuel used to fire the dryer.

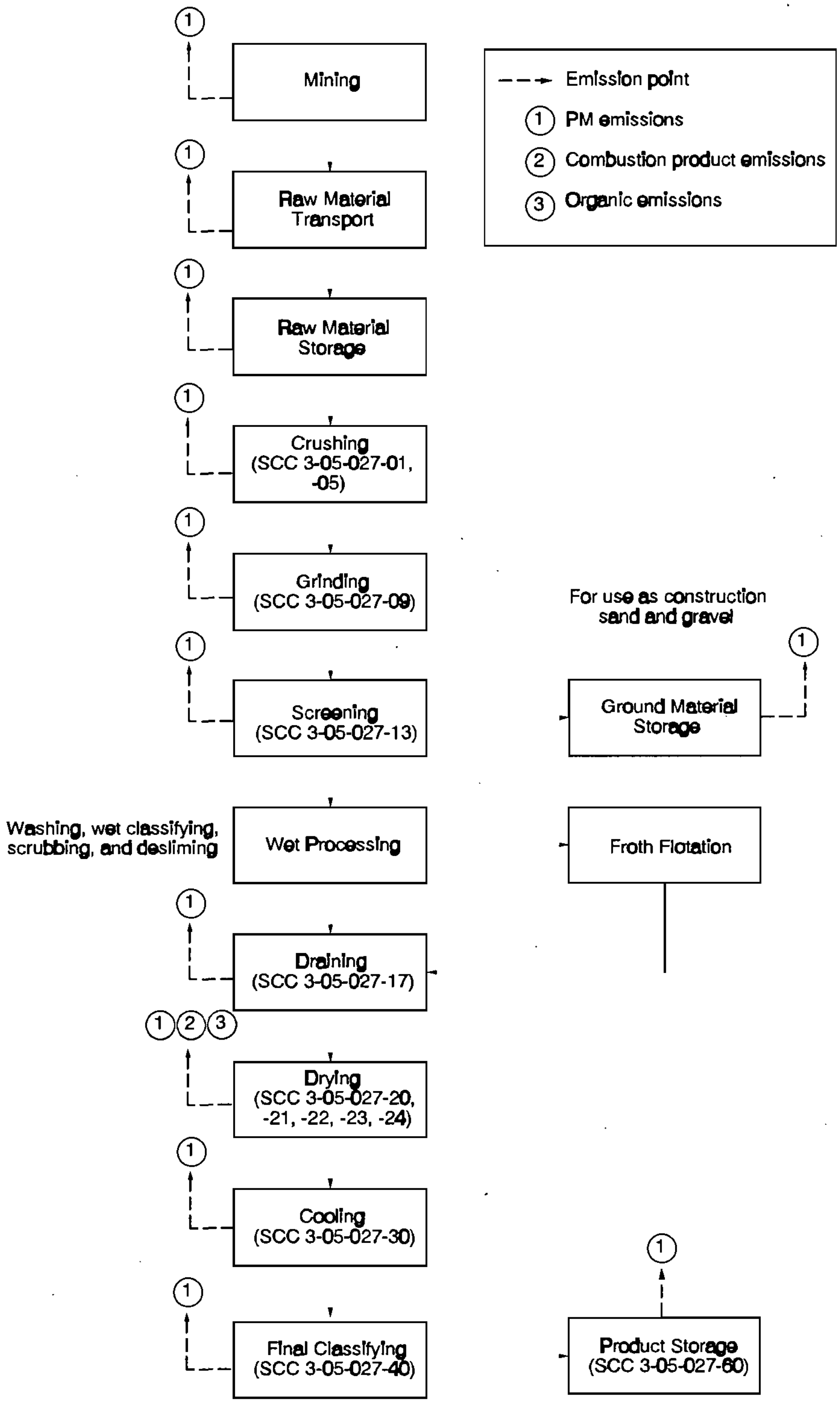

Figure 2-2. Flow diagram for industrial sand and gravel processing.

2.4 CONTROL TECHNOLOGY[1,3,6-14]

With the exception of drying, emissions from sand and gravel operations primarily are in the form of fugitive dust, and control techniques applicable to fugitive dust sources are appropriate. Some successful control techniques used for haul roads are application of dust suppressants, paving, route modifications, and soil stabilization; for conveyors, covering and wet suppression; for storage piles, wet suppression, windbreaks, enclosure, and soil stabilizers; and for conveyor and batch transfer points, wet suppression and various methods to reduce freefall distances (e.g., telescopic chutes, stone ladders, and hinged boom stacker conveyors); and for screening and other size classification processes, covering and wet suppression.

Wet suppression techniques include application of water, chemicals, and/or foam, usually at crusher or conveyor feed and/or discharge points. Such spray systems at transfer points and on material handling operations have been estimated to reduce emissions 70 to 95 percent. Spray systems can also reduce loading and wind erosion emissions from storage piles of various materials 80 to 90 percent. Control efficiencies depend upon local climatic conditions, source properties, and duration of control effectiveness. Wet suppression has a carryover effect downstream of the point of application of water or other wetting agents, as long as the surface moisture content is high enough to cause the fines to adhere to the larger rock particles.

In addition to fugitive dust control techniques, some facilities use add-on control devices to reduce emissions of PM and PM-10 from sand and gravel processing operations. Controls in use include cyclones, wet scrubbers, venturi scrubbers, and fabric filters. These types of controls are rarely used at construction sand and gravel plants, but are more common at industrial sand and gravel processing facilities.

REFERENCES FOR SECTION 2

1. *Air Pollution Control Techniques For Nonmetallic Minerals Industry*, EPA-450/3-82-014, U. S. Environmental Protection Agency, Research Triangle Park, NC, August 1982.

2. S. Walker, "Production of Sand and Gravel," Circular Number 57, National Sand and Gravel Association, Washington, D.C., 1954.

3. *Calciners and Dryers in Mineral Industries-Background Information for Proposed Standards,* EPA-450/3-85-025a, U. S. Environmental Protection Agency, Research Triangle Park, NC, October 1985.

4. "Construction Sand and Gravel," *U. S. Minerals Yearbook 1989, Volume I: Metals and Minerals*, U. S. Department of the Interior, Bureau of Mines, Washington, D.C., pp. 873 - 887.

5. "Industrial Sand and Gravel," *U. S. Minerals Yearbook 1989, Volume I: Metals and Minerals*, U. S. Department of the Interior, Bureau of Mines, Washington, D.C., pp. 889 - 903.

6. Written communication from R. Morris, National Aggregates Association, Silver Spring, MD, to R. Myers, U. S. Environmental Protection Agency, Research Triangle Park, NC, December 30, 1994.

7. *Stack Test Report for Redi-Crete Corporation*, Trace Technologies, Inc. Bridgewater, NJ, December 19, 1988.

8. *P.W. Gillebrand Company, Toxic Emissions Testing, Specialty Sand Dryer*, BTC Environmental, Inc., Ventura, CA, November 8, 1991.

9. *U.S. Silica Company, Newport, New Jersey, Emission Compliance Test Program*, AirNova, Inc., Collingswood, NJ, April 1990.

10. *The Morie Company, Inc., Mauricetown Plant, Emission Compliance Test Program*, AirNova, Inc., Collingswood, NJ, November 1989.

11. *Source Emissions Compliance Test Report, Number Two Sand Dryer, Jesse S. Morie & Son, Inc., Mauricetown, New Jersey*, Roy F. Weston, Inc., West Chester, PA, August 1987.

12. *Source Emissions Compliance Test Report, Sand Dryer System, New Jersey Pulverizing Company, Bayville, New Jersey*, Roy F. Weston, Inc., West Chester, PA, January 1988.

13. *Compliance Stack Sampling Report for Richard Ricci Company, Port Norris, NJ*, Recon Systems, Inc., Three Bridges, NJ, July 31, 1987.

14. *Report to Badger Mining Corporation, Fairwater, Wisconsin, for Stack Emission Test, Particulate Matter, Sand Rescreening System, St. Marie Plant, April 7, 1987*, Environmental Technology & Engineering Corporation, Elm Grove, WI, June 17, 1987.

3. GENERAL DATA REVIEW AND ANALYSIS

3.1 LITERATURE SEARCH AND SCREENING

Data for this investigation were obtained from a number of sources within the Office of Air Quality Planning and Standards (OAQPS) and from outside organizations. The docket for the development of new source performance standards (NSPS) for calciners and dryers in the mineral industries was reviewed for information on the industry, processes, and emissions. The Factor Information and Retrieval (FIRE), Crosswalk/Air Toxic Emission Factor Data Base Management System (XATEF) and VOC/PM Speciation Data Base Management System (SPECIATE) data bases were searched by SCC for identification of the potential pollutants emitted and emission factors for those pollutants. A general search of the Air CHIEF CD-ROM also was conducted to supplement the information from these two data bases.

Information on the industry, including number of plants, plant location, and annual production capacities, was obtained from the *Minerals Yearbook* and *Census of Manufactures*. The Aerometric Information Retrieval System (AIRS) data base also was searched for data on the number of plants, plant location, and estimated annual emissions of criteria pollutants.

A number of sources of information were investigated specifically for emission test reports and data. A search of the Test Methods Storage and Retrieval (TSAR) data base was conducted to identify test reports for sources within the sand and gravel processing industry. Copies of these test reports were obtained from the files of the Emission Monitoring and Analysis Division (EMAD). The EPA library was searched for additional test reports. A list of plants that have been tested within the past 5 years was compiled from the AIRS data base. Using this information and information obtained on plant location from the *Minerals Yearbook* and *Census of Manufactures*, State and Regional offices were contacted about the availability of test reports. However, the information obtained from these offices was limited. Publications lists from the Office of Research and Development (ORD) and Control Technology Center (CTC) were also searched for reports on emissions from the sand and gravel processing industry. In addition, representative trade associations were contacted for assistance in obtaining information about the industry and emissions.

To reduce the amount of literature collected to a final group of references from which emission factors could be developed, the following general criteria were used:

1. Emission data must be from a primary reference:

a. Source testing must be from a referenced study that does not reiterate information from previous studies.

b. The document must constitute the original source of test data. For example, a technical paper was not included if the original study was contained in the previous document. If the exact source of the data could not be determined, the document was eliminated.

2. The referenced study must contain test results based on more than one test run.

3. The report must contain sufficient data to evaluate the testing procedures and source operating conditions. A final set of reference materials was compiled after a thorough review of the pertinent reports, documents, and information according to these criteria.

3.2 EMISSION DATA QUALITY RATING SYSTEM[1]

As part of the analysis of the emission data, the quantity and quality of the information contained in the final set of reference documents were evaluated. The following data were excluded from consideration:

1. Test series averages reported in units that cannot be converted to the selected reporting units;

2. Test series representing incompatible test methods (i.e., comparison of EPA Method 5 front half with EPA Method 5 front and back half);

3. Test series of controlled emissions for which the control device is not specified;

4. Test series in which the source process is not clearly identified and described; and

5. Test series in which it is not clear whether the emissions were measured before or after the control device.

Test data sets that were not excluded were assigned a quality rating. The rating system used was that specified by EIB for preparing AP-42 sections. The data were rated as follows:

A--Multiple tests that were performed on the same source using sound methodology and reported in enough detail for adequate validation. These tests do not necessarily conform to the methodology specified in EPA reference test methods, although these methods were used as a guide for the methodology actually used.

B--Tests that were performed by a generally sound methodology but lack enough detail for adequate validation.

C--Tests that were based on an untested or new methodology or that lacked a significant amount of background data.

D--Tests that were based on a generally unacceptable method but may provide an order-of-magnitude value for the source.

The following criteria were used to evaluate source test reports for sound methodology and adequate detail:

1. Source operation. The manner in which the source was operated is well documented in the report. The source was operating within typical parameters during the test.

2. Sampling procedures. The sampling procedures conformed to a generally acceptable methodology. If actual procedures deviated from accepted methods, the deviations are well

documented. When this occurred, an evaluation was made of the extent to which such alternative procedures could influence the test results.

3. Sampling and process data. Adequate sampling and process data are documented in the report, and any variations in the sampling and process operation are noted. If a large spread between test results cannot be explained by information contained in the test report, the data are suspect and were given a lower rating.

4. Analysis and calculations. The test reports contain original raw data sheets. The nomenclature and equations used were compared to those (if any) specified by EPA to establish equivalency. The depth of review of the calculations was dictated by the reviewer's confidence in the ability and conscientiousness of the tester, which in turn was based on factors such as consistency of results and completeness of other areas of the test report.

3.3 EMISSION FACTOR QUALITY RATING SYSTEM[1]

The quality of the emission factors developed from analysis of the test data was rated utilizing the following general criteria:

A--Excellent: Developed only from A-rated test data from many randomly chosen facilities in the industry population. The source category is specific enough so that variability within the source category population may be minimized.

B--Above average: Developed only from A-rated test data from a reasonable number of facilities. Although no specific bias is evident, it is not clear if the facilities tested represent a random sample of the industry. The source category is specific enough so that variability within the source category population may be minimized.

C--Average: Developed only from A- and B-rated test data from a reasonable number of facilities. Although no specific bias is evident, it is not clear if the facilities tested represent a random sample of the industry. In addition, the source category is specific enough so that variability within the source category population may be minimized.

D--Below average: The emission factor was developed only from A- and B-rated test data from a small number of facilities, and there is reason to suspect that these facilities do not represent a random sample of the industry. There also may be evidence of variability within the source category population. Limitations on the use of the emission factor are noted in the emission factor table.

E--Poor: The emission factor was developed from C- and D-rated test data, and there is reason to suspect that the facilities tested do not represent a random sample of the industry. There also may be evidence of variability within the source category population. Limitations on the use of these factors are always noted.

The use of these criteria is somewhat subjective and depends to an extent on the individual reviewer. Details of the rating of each candidate emission factor are provided in Section 4 of this report.

REFERENCE FOR SECTION 3

1. *Technical Procedures for Developing AP-42 Emission Factors and Preparing AP-42 Sections*, EPA-454/B-93-050, Office of Air Quality Planning and Standards, U. S. Environmental Protection Agency, Research Triangle Park, NC, October 1993.

4. AP-42 SECTION DEVELOPMENT

4.1 INTRODUCTION

This section describes how the revised AP-42 section on sand and gravel processing was developed. First, descriptions of data sets reviewed for this revision are presented, followed by a discussion of how candidate emission factors were developed from the data. Finally, the proposed changes to the existing AP-42 section on sand and gravel processing are summarized.

4.2 REVIEW OF SPECIFIC DATA SETS

Fifteen references were documented and reviewed in the process of revising the section on sand and gravel processing. References 1 through 5 were taken from the existing background file for the section. These documents are discussed in Section 4.2.3 of this report. References 6 through 14 contain information not used in previous AP-42 sections on sand and gravel processing. Reference 15 was not used to develop emission factors; the reference included the results of tests that each consisted of only a single test run, and the results are not comparable to other tests due to the unusual sampling train configuration used. The documents that were used to develop emission factors for the revised AP-42 section are described in the following paragraphs.

4.2.1 Reference 6

This document presents background information that was used in the development of an NSPS for calciners and dryers for several mineral products industries. Appendix C of the document summarizes the results of emission tests conducted at four industrial processing facilities. The individual test reports for those tests were not available. Filterable PM emission data are presented for tests on four fluidized bed dryers located at four facilities and one rotary dryer. Two of the fluidized bed dryers were fired with propane, one dryer was fired with natural gas, and the remaining dryer was fired with No. 2 fuel oil. Particle size data also are presented for one fluidized bed and one rotary dryer, both of which were located at the same facility. Because the process rates for two of the tested facilities are considered confidential, emission factors were developed only for the average of the four fluidized bed dryers.

A rating of B was assigned to the test data. Although the document is not the primary reference for the data, it includes emission data on a run-by-run basis and descriptions of the tests and test methods used. The methodology appeared to be sound and no problems were reported.

4.2.2 Reference 7

This report documents measurements of filterable PM emissions from a combination rotary sand dryer and shaker screen. Emissions also were sampled for CO and total organic compounds (TOC) but these pollutants were not detected in the exhaust stream. The test was conducted in November 1988 to demonstrate compliance with State regulations.

The sources tested were located at a concrete batching plant, and emissions were controlled with the combination of a cyclone and fabric filter. Although not specified in the report, it is assumed that the cyclone is used for product recovery and was not considered as an additional control device. In addition, the report included no information on the type of screen tested or the relative contribution of the screen to overall emissions from the stack tested. However, it is assumed that the dryer was the primary contributor to the filterable PM emissions. Process rates were provided on the basis of production. The report also does not specify the test method used, but apparently the test was conducted in accordance with New Jersey Air Test Method 1 (NJATM 1), which is equivalent to EPA Method 5. Three filterable PM runs were conducted.

An emission factor was developed for controlled filterable PM emissions from the dryer and screen. The emission data are rated B. The test methodology was sound, and no problems were reported. However, the report lacked adequate details on the sources tested to warrant a higher rating.

4.2.3 Reference 8

This report documents measurements of emissions of polycyclic aromatic hydrocarbons (PAH) and formaldehyde from a diesel-fired rotary sand dryer. The test was conducted in November 1991; the report does not state the purpose of the test.

During the test, the dryer was drying what is referred to as "specialty sand," but the report provides no other information about the type of sand. It is assumed that the sand can be considered to be industrial sand. The basis for the process rates provided in the report is unclear; it is assumed that the rates were for production. The dryer is equipped with a low-NO_x burner and PM emissions are controlled with a pulse-jet fabric filter.

Emissions of PAH and formaldehyde were quantified using California Air Resources Board (CARB) Methods 429 and 430, respectively, and three test runs were conducted. The samples were analyzed for 16 PAH, and 3 were found in quantities above the detection limit; naphthalene was above the detection limit in all three runs, and fluoranthene and phenanthrene were above the detection limit for two of the three runs.

Emission factors were developed for formaldehyde, naphthalene, fluoranthene, and phenanthrene emissions from the dryer. To estimate the factors for fluoranthene and phenanthrene, one half the detection limit was used for the run that was below the detection limit.

The emission data are rated B. The test methodology was sound, and no problems were reported. However, the report lacked adequate details on the sources tested to warrant a higher rating.

4.2.4 Reference 9

This report documents measurements of filterable PM emissions from the handling, transfer, and storage of foundry sand. The exhaust stream sampled included emissions from conveyor belts and an elevator that transfers sand from a sand dryer to storage silos. Emissions generated within the silos also were included in the exhaust stream. The emissions from the sources are controlled with a wet scrubber. Production rates were provided on the basis of the rate of sand exiting the dryer. The test was conducted in March 1990 to demonstrate compliance with State regulations.

The test was conducted in accordance with NJATM 1, which is equivalent to EPA Method 5. Three filterable PM runs were conducted, and an emission factor for filterable PM was developed from the data.

The emission data are rated B. The test methodology was sound, and no problems were reported. However, the report lacked adequate details on the sources tested to warrant a higher rating.

4.2.5 Reference 10

This report documents measurements of NO_x emissions from a No. 2 fuel oil-fired fluidized bed dryer and a cooler in parallel. The dryer/cooler was processing industrial sand, and emissions were controlled with a fabric filter. The report included no information on the relative contribution of the cooler to overall emissions, but it is assumed that the dryer was the sole contributor of the NO_x emissions. Process rates were provided on the basis of production. The test was conducted in November 1989 to demonstrate compliance with State regulations.

Nitrogen oxide emissions were measured using Method 7E, and three test runs were conducted. The concentrations of CO_2 in the exhaust stream were measured by Orsat and also were reported.

Emission factors were developed for emissions of NO_x and CO_2 from the dryer/cooler. The emission data are rated B. The test methodology was sound, and no problems were reported. However, the report lacked adequate details on the sources tested to warrant a higher rating.

4.2.6 Reference 11

This report documents measurements of filterable PM emissions from the same oil-fired fluidized bed dryer/cooler that is the subject of Reference 10. The exhaust stream also was sampled for NO_x emissions, but none were detected. Emissions from the dryer/cooler were controlled with a fabric filter. The report included no information on the relative contribution of the cooler to overall emissions, but it is assumed that the dryer was the primary contributor to the filterable PM emissions. Process rates were provided on the basis of both feed and production. The test was conducted in November 1989 to demonstrate compliance with State regulations.

Filterable PM emissions were measured using NJATM 1, and three test runs were conducted. Emission factors were developed for emissions of filterable PM from the dryer/cooler. The emission data are rated A. The test methodology was sound, no problems were reported, and the test was well documented.

4.2.7 Reference 12

This report documents measurements of filterable PM emissions from a gas-fired rotary sand dryer. Emissions from the dryer are controlled with a combination of cyclone and wet scrubber. Although not specified in the report, it is assumed that the cyclone is used for product recovery and was not considered as an additional control device. The test was conducted in November 1987 to demonstrate compliance with State regulations.

The report does not specify process rates, but includes the operating capacity of the dryer and states that the dryer was operated at permit conditions. Therefore, for the purposes of developing emission factors, it was assumed that the dryer was operated at capacity during the test.

Filterable PM emissions were measured using NJATM 1, and three test runs were conducted. Emission factors were developed for uncontrolled and controlled emissions of filterable PM from the dryer. The emission data are rated C. The test methodology was sound, and no problems were reported. However, because of the uncertainty of the process rates, a higher rating was not warranted.

4.2.8 Reference 13

This report documents measurements of filterable PM emissions from a No. 2 fuel oil-fired rotary sand dryer. Emissions from the dryer are controlled with a combination of cyclone and wet scrubber. Although not specified in the report, it is assumed that the cyclone is used for product recovery and was not considered as an additional control device. Process rates were provided on the basis of production. The test was conducted in July 1987 to demonstrate compliance with State regulations.

Filterable PM emissions were measured using NJATM 1, and three test runs were conducted. The concentrations of CO_2 in the exhaust stream were measured by Orsat and also were reported. Emission factors were developed for emissions of filterable PM and CO_2 from the dryer. The emission data are rated A. The test methodology was sound, no problems were reported, and the report was adequately documented.

4.2.9 Reference 14

This report documents measurements of filterable PM emissions from industrial sand screening. Emissions from the screening system are controlled with a venturi scrubber. Process rates were provided on the basis of production. The test was conducted in April 1987 to demonstrate compliance with State regulations.

Filterable PM emissions were measured using Method 17, and three test runs were conducted. An emission factor was developed for emissions of filterable PM from the screens. The emission data are rated B. The test methodology was sound, and no problems were reported. However, the report lacked adequate documentation to warrant a higher rating.

4.2.10 Review of Emission Factor Data Bases

The FIRE, XATEF, and SPECIATE data bases do not include emission factors for sand and gravel processing.

4.2.11 Review of Test Data in AP-42 Background File

The background file includes five references that address emissions from construction sand and gravel processing. These references are referred to in this report as References 1 to 5. References 1, 2, and 5 form the basis for the emission factors presented in the previous version of AP-42 Section 8.19.1, Sand and Gravel Processing. However, as explained in the following paragraphs, only the data from Reference 2 were used in this revision to AP-42.

Reference 1 contains a review of emission factors presented in several documents including AP-42. Appendix C of the report presents data on emissions from screening. However, the sources tested were located at stone crushing plants. These data were used to develop emission factors for AP-42 Section 11.19.2, Crushed Stone Processing, and are not presented here.

Reference 2 includes the results of a sampling program designed to quantify total dust emissions from the various constituent sources associated with a representative aggregate storage operation. This testing program was conducted at a sand and gravel pit located in the Midwest. The test program consisted of 11 24-hour runs and 8 12-hour runs during a 1-month period. Conventional high volume (Hi-Vol) samplers with wind direction activators were used to measure dust emissions. A 180-degree sector of sampling was employed. Wind erosion, vehicle traffic in the vicinity of the piles, and material loading all contributed to the emissions sampled. Because emissions were measured during a continous 1-month period, sampling took place during the weekends and at night when there was no activity in the vicinity of the storage piles. By segregating the daily readings for the nonworking days, separate emission factors were developed for active storage piles (8 to 12 hours of activity per day), inactive storage piles (no activity), and a mix of active and inactive storage piles (five active days per week). The data are assigned a C rating. The test methodology appeared to be sound, no problems were reported during the valid test runs, and adequate detail was provided. However, no vertical profiling of the plume was conducted, and the samplers were not operated isokinetically.

Data from Reference 3 were not included in the revised section because the only information in the document relevant to sand and gravel processing is an equation that was developed in Reference 2 for calculating fugitive dust emissions from sand and gravel storage piles. Data from Reference 4 were not incorporated into the revised section because they are based on uncontrolled fugitive dust emission factors for sand and gravel storage piles taken from the 1972 version of AP-42. Reference 5 presents data on emissions from stone crushing, screening, transfer, and loading at five plants. However, all the plants tested were stone crushing plants. Therefore, the data were not addressed in this report.

4.3 DEVELOPMENT OF CANDIDATE EMISSION FACTORS

Tables 4-1 and 4-2 summarize the available test data for construction sand and gravel processing and for industrial sand and gravel processing, respectively. Table 4-3 presents the candidate emission factors for sand and gravel processing. The emission factor ratings assigned to the factors for the revised AP-42 section are based on the guidelines presented in Section 3.3 of this report. The main criteria used in rating the factors are as follows:

1. Factors based on C- or D-rated data generally must be assigned a rating of E; and

2. Factors based on B-rated data or a combination of A- and B-rated data, generally cannot be assigned a rating higher than C, and, if the data are from a small number of facilities, and are unlikely to represent a random sample of the industry, the factor generally is assigned a D-rating.

The following paragraphs describe how the data were used to develop the candidate emission factors for sand and gravel processing.

4.3.1 Construction Sand and Gravel

The only data available for construction sand and gravel processing were found in Reference 2, which presented the results of measurements of filterable PM emissions from gravel storage piles. The factors presented in Reference 2 actually represent emissions from a combination of storage pile wind erosion, material handling, and vehicle traffic. Consequently, those emission factors overestimate emissions from storage piles alone. Furthermore, Reference 2 does not include the

TABLE 4-1. SUMMARY OF TEST DATA FOR CONSTRUCTION SAND AND GRAVEL PROCESSING (a)

Source	Pollutant	No. of runs	Data rating	Emission factor (b) kg/Mg	lb/ton	kg/ha/day	lb/ac/day
Active storage piles (c)	Total suspended particulate	19	C	0.21	0.42	14.8	13.2
Inactive storage piles (d)	Total suspended particulate	19	C	0.055	0.11	3.9	3.5
Active/inactive storage piles (e)	Total suspended particulate	19	C	0.17	0.33	11.7	10.4

(a) Reference 2; for uncontrolled emissions.
(b) Factors in units of kg/Mg (lb/ton) of material stored and kg per hectare per day (lb per acre per day).
(c) Based on 8 to 12 hours of activity per 24-hour period; includes emissions from wind erosion, vehicle traffic, and material handling.
(d) Emissions due to wind erosion during inactive periods.
(e) Five active days per week.

TABLE 4-2. SUMMARY OF TEST DATA FOR INDUSTRIAL SAND AND GRAVEL PROCESSING

Process	APCD	Pollutant	No. of runs	Data rating	Emission factor kg/Mg Minimum	kg/Mg Maximum	kg/Mg Average	lb/ton Minimum	lb/ton Maximum	lb/ton Average	Ref. No.
Fluidized bed dryer, misc. fuels (a)	WS	filterable PM	12 (b)	B	0.0064	0.058	0.019	0.013	0.12	0.038	6
Dryer/ shaker screens	FF	filterable PM	3	B	0.0026	0.0063	0.0044	0.0053	0.013	0.0089	7
Dryer, diesel fired	FF	formaldehyde	3	B	8.5E-05	0.0047	0.0021	0.00017	0.0093	0.0043	8
		fluoranthene	3	B	8.9E-07	4.1E-06	3.0E-06	1.8E-06	8.3E-06	6.0E-06	8
		naphthalene	3	B	2.0E-05	4.3E-05	2.9E-05	4.0E-05	8.7E-05	5.9E-05	8
		phenanthrene	3	B	8.9E-07	1.1E-05	7.5E-06	1.8E-06	2.2E-05	1.5E-05	8
Sand handling, transfer, and storage	WS	filterable PM	3	B	0.00030	0.00087	0.00064	0.00059	0.0015	0.0013	9
Fluidized bed dryer/ cooler, oil-fired	FF	NOx	3	B	0.014	0.016	0.016	0.029	0.033	0.031	10
		CO2	3	B	11	18	15	21	37	29	10
Fluidized bed dryer/ cooler, oil-fired	FF	filterable PM	3	A	0.0021	0.0083	0.0061	0.0041	0.017	0.012	11
Rotary dryer, gas-fired	none	filterable PM	3	C	0.94	1.1	0.98	1.9	2.1	2.0	12
	WS	filterable PM	3	C	0.089	0.13	0.11	0.18	0.26	0.22	12
Rotary dryer, oil-fired	WS	filterable PM	3	A	0.020	0.022	0.021	0.040	0.043	0.041	13
		CO2	3	A	12	13	13	24	26	25	13
Screening, general	VS	filterable PM	3	B	0.0038	0.0050	0.0042	0.0075	0.010	0.0083	14

APCD = air pollution control device; WS = wet scrubber; FF = fabric filter; VS = venturi scrubber.
NS = not specified.
(a) Two propane-fired, one natural gas-fired, and one No. 2 fuel oil-fired.
(b) Average of four 3-run tests conducted on four dryers.

TABLE 4-3. SUMMARY OF CANDIDATE EMISSION FACTORS FOR SAND AND GRAVEL PROCESSING (a)

Process	Type of control	Pollutant	No. of tests	Average emission factor			References
				kg/Mg	lb/ton	Rating	
INDUSTRIAL SAND AND GRAVEL PROCESSING							
Sand dryer	none	filterable PM	1	0.98	2.0	E	12
Sand dryer	wet scrubber	filterable PM	5	0.019	0.039	C	6, 13
Sand dryer	fabric filter	filterable PM	2	0.0053	0.010	D	7, 11
Sand dryer	none	NOx	1	0.016	0.031	D	10
Sand dryer	none	CO2	2	14	27	D	10, 13
Sand dryer, diesel fired	fabric filter	formaldehyde	1	0.0021	0.0043	D	8
Sand dryer, diesel fired	fabric filter	fluoranthene	1	3.0E-06	6.0E-06	D	8
Sand dryer, diesel fired	fabric filter	naphthalene	1	2.9E-05	5.9E-05	D	8
Sand dryer, diesel fired	fabric filter	phenanthrene	1	7.5E-06	1.5E-05	D	8
Sand handling, transfer, and storage (b)	wet scrubber	filterable PM	1	0.00064	0.0013	D	9
Sand screening (b)	venturi scrubber	filterable PM	1	0.0042	0.0083	D	14

(a) Emission factors for storage in units kg/Mg (lb/ton) of material stored; emission factors for dryers in units of kg/Mg (lb/ton) of dried material produced; emission factors for screening in units of kg/Mg (lb/ton) of material screened.

(b) Dried sand.

necessary data from which comparisons can be made between measured emission rates and the emission rates estimated using the predictive fugitive dust equations presented in AP-42 Section 13.2. For these reasons, the factors developed from the data in Reference 2 were not incorporated in the revised AP-42 section for sand and gravel processing.

Although no other data for construction sand and gravel processing were located in the course of this review, the reader should note that emission factors for crushing, screening, and handling and transfer can be found in Section 11.19.2 of AP-42. In the absence of other data, the emission factors presented in that section can be used to estimate emissions from corresponding sand and gravel processing sources. Emission factors for industrial sand storage and screening, as described below, appear to be based on emissions from dried sand and are not recommended as surrogates for construction sand and gravel processing because they may result in overestimates of emissions from those sources.

4.3.2 Industrial Sand and Gravel

For industrial sand and gravel processing, a total of 15 data sets were available from which emission factors could be developed. From these data sets, candidate emission factors were developed for sand dryers, storage silos, and screening.

4.3.2.1 Sand Dryers. For industrial sand dryers, data were available on emissions for two types of dryers (fluidized bed and rotary) fired with four different fuels (natural gas, propane, oil, and diesel). The pollutants quantified included filterable PM (8 data sets), NO_x (1 data set), CO_2 (2 data sets), and four organic compounds (1 data set each). Multiple data sets were available for the following combinations of sources and controls: wet scrubber-controlled filterable PM emissions, fabric filter-controlled filterable PM emissions, and uncontrolled CO_2 emissions. A review of these data sets indicates that there does not appear to be justification for differentiating between fuel and dryer types with respect to emissions of these pollutants. For example, the filterable PM emission factors for wet scrubber-controlled emissions were determined to be 0.019 kg/Mg (0.038 lb/ton) (fluidized bed dryer, miscellaneous fuels) and 0.021 kg/Mg (0.041 lb/ton) (rotary dryer, oil-fired); for fabric filter-controlled filterable PM, emission factors were 0.0044 kg/Mg (0.0089 lb/ton) (unspecified dryer, fuel) and 0.0061 kg/Mg (0.012 lb/ton) (fluidized bed dryer/cooler, oil-fired); and the CO_2 emission factors were 13 kg/Mg (25 lb/ton) (rotary dryer, oil-fired) and 15 kg/Mg (29 lb/ton) (fluidized bed dryer/cooler, oil-fired). Therefore, these data were combined wherever possible to yield general emission factors for dryers, regardless of dryer type and fuel used. The one exception to this decision is for the data from Reference 8 for organic pollutant emissions from a diesel-fired dryer, as explained below. The following paragraphs describe how the emission factors were developed for the revised AP-42 section.

For uncontrolled filterable PM emissions, there is one C-rated data set (Reference 12) for a gas-fired rotary dryer. This data set was used to develop an E-rated emission factor of 0.98 kg/Mg (2.0 lb/ton).

For wet scrubber-controlled filterable PM emissions, data were available from Reference 6 for four fluidized bed dryers fired with three different fuels (0.019 kg/Mg [0.038 lb/ton]) and from Reference 13 for an oil-fired rotary dryer (0.021 kg/Mg [0.041 lb/ton]). These data were combined to yield a candidate filterable PM emission factor of 0.019 kg/Mg (0.039 lb/ton). Because this emission factor is based on relatively consistent B-rated data from 5 emission tests, it is assigned a rating of C.

For fabric filter-controlled filterable PM emissions, data were available from Reference 7 for an unspecified dryer and screen (0.0044 kg/Mg [0.0089 lb/ton]) and from Reference 11 for an oil-fired fluidized bed dryer/cooler (0.0061 kg/Mg [0.012 lb/ton]). In both cases, it is assumed that the dryers were the primary emission sources. These data were combined to yield a candidate filterable PM emission factor of 0.0053 kg/Mg (0.010 lb/ton). Because this emission factor is based on only two A-/B-rated emission tests, it is assigned a rating of D.

For NO_x emissions from industrial sand dryers, there is one B-rated data set (Reference 10) for an oil-fired fluidized bed dryer/cooler with a fabric filter (0.016 kg/Mg [0.031 lb/ton]). Because fabric filters have negligible effects on NO_x emissions, this emission factor is considered to represent uncontrolled NO_x emissions; it is assigned a rating of D.

For CO_2 emissions from industrial sand dryers, there are two data sets: one B-rated data set from Reference 10 for an oil-fired fluidized bed dryer/cooler (15 kg/Mg [29 lb/ton]) with a fabric filter and one A-rated data set from Reference 13 for an oil-fired rotary dryer (13 kg/Mg [25 lb/ton]) with a wet scrubber. These emission factors were combined to yield a candidate emission factor of (14 kg/Mg [27 lb/ton]) for CO_2 emissions from industrial sand dryers. This emission factor also is considered to represent uncontrolled CO_2 emissions and is assigned a rating of D.

For emissions of organic pollutants from industrial sand dryers, data were available from Reference 8 for four pollutants (formaldehyde, fluoranthene, naphthalene, and phenanthrene) emitted from a diesel-fired dryer of unspecified type. The data are rated B, and the corresponding emission factors are rated D. In all likelihood, the emissions of these pollutants are a function of the fuel used rather than the material dried. Therefore, unlike the other emission factors for industrial sand dryers, these emission factors are considered to be fuel specific.

4.3.2.2 Other Sources. The remaining data sets for industrial sand emissions are from Reference 9 for filterable PM emissions from dried sand handling, transfer, and storage operations controlled with a wet scrubber and from Reference 14 for a screening operation controlled with a venturi scrubber. Both data sets are rated B, and both were used to develop D-rated emission factors.

4.4 SUMMARY OF CHANGES TO AP-42 SECTION

4.4.1 Section Narrative

The process descriptions for both construction sand and gravel and industrial sand and gravel were expanded to provide more details on process operations, equipment used, and emission sources associated with the process. Process flow diagrams for construction sand and gravel and for industrial sand and gravel also were added to the section.

The discussion of emissions and controls for the industry also was modified. The previous AP-42 section included a detailed discussion of using predictive emission factor equations for estimating fugitive dust emissions. Because use of the equations is described in detail in AP-42 Section 13.2, the discussion in this AP-42 section was eliminated; the reader is referred to Section 13.2 for more information on estimating fugitive dust emissions. Finally, the discussion of controls was expanded to include add-on control devices commonly used at industrial sand and gravel processing facilities.

4.4.2 Emission Factors

The previous AP-42 section included emission factors for PM only. All of those emission factors were eliminated from the section. The majority of the factors were omitted because they were based on tests conducted on crushed stone processing sources. However, the reports for those tests were reviewed and incorporated in part in the revised AP-42 Section 11.19.2 on crushed stone processing. In addition, the factors for storage pile emissions were eliminated because the factors actually represented a combination of storage pile wind erosion, material handling, and vehicle traffic, and, thus, their applicability to other storage piles is questionable.

The revised section includes new emission factors developed from emission test reports not previously used for AP-42. All of the new factors are based on emission data for industrial sand processing. In addition to filterable PM, factors are presented for NO_x, CO_2, and four speciated organic pollutants.

REFERENCES FOR SECTION 4

1. *Review Emissions Data Base And Develop Emission Factors For The Construction Aggregate Industry*, Engineering-Science, Inc., Arcadia, CA, September 1984.

2. C. Cowherd, Jr., *et al.*, *Development Of Emission Factors For Fugitive Dust Sources,* EPA-450/3-74-037, U. S. Environmental Protection Agency, Research Triangle Park, NC, June 1974.

3. R. Bohn, *et al.*, *Fugitive Emissions From Integrated Iron And Steel Plants,* EPA-600/2-78-050, U. S. Environmental Protection Agency, Washington, D.C., March 1978.

4. G. A. Jutze and K. Axetell, *Investigation Of Fugitive Dust, Volume I: Sources, Emissions and Control*, EPA-450/3-74-036a, U. S. Environmental Protection Agency, Research Triangle Park, NC, June 1974.

5. *Fugitive Dust Assessment At Rock and Sand Facilities In The South Coast Air Basin,* Southern California Rock Products Association and Southern California Ready Mix Concrete Association, P.E.S., Santa Monica, CA, November 1979.

6. *Calciners and Dryers in Mineral Industries-Background Information for Proposed Standards,* EPA-450/3-85-025a, U. S. Environmental Protection Agency, Research Triangle Park, NC, October 1985.

7. *Stack Test Report for Redi-Crete Corporation*, Trace Technologies, Inc. Bridgewater, NJ, December 19, 1988.

8. *P.W. Gillebrand Company, Toxic Emissions Testing, Specialty Sand Dryer*, BTC Environmental, Inc., Ventura, CA, November 8, 1991.

9. *U.S. Silica Company, Newport, New Jersey, Emission Compliance Test Program*, AirNova, Inc., Collingswood, NJ, April 1990.

10. *The Morie Company, Inc., Mauricetown Plant, Emission Compliance Test Program*, AirNova, Inc., Collingswood, NJ, November 1989.

11. *Source Emissions Compliance Test Report, Number Two Sand Dryer, Jesse S. Morie & Son, Inc., Mauricetown, New Jersey*, Roy F. Weston, Inc., West Chester, PA, August 1987.

12. *Source Emissions Compliance Test Report, Sand Dryer System, New Jersey Pulverizing Company, Bayville, New Jersey*, Roy F. Weston, Inc., West Chester, PA, January 1988.

13. *Compliance Stack Sampling Report for Richard Ricci Company, Port Norris, NJ*, Recon Systems, Inc., Three Bridges, NJ, July 31, 1987.

14. *Report to Badger Mining Corporation, Fairwater, Wisconsin, for Stack Emission Test, Particulate Matter, Sand Rescreening System, St. Marie Plant, April 7, 1987*, Environmental Technology & Engineering Corporation, Elm Grove, WI, June 17, 1987.

15. *Emission Test Reports for U.S. Silica, Oceanside, CA, August 1989, September 1990, January 1991, and June 1987*, Air Pollution Control District, San Diego, CA.

13.2.6 Abrasive Blasting

13.2.6.1 General[1-2]

Abrasive blasting is the use of abrasive material to clean or texturize a material such as metal or masonry. Sand is the most widely used blasting abrasive. Other abrasive materials include coal slag, smelter slags, mineral abrasives, metallic abrasives, and synthetic abrasives. Industries that use abrasive blasting include the shipbuilding industry, automotive industry, and other industries that involve surface preparation and painting. The majority of shipyards no longer use sand for abrasive blasting because of concerns about silicosis, a condition caused by respiratory exposure to crystalline silica. In 1991, about 4.5 million tons of abrasives, including 2.5 million tons of sand, 1 million tons of coal slag, 500 thousand tons of smelter slag, and 500 thousand tons of other abrasives were used for domestic abrasive blasting operations.

13.2.6.2 Process Description[1-9]

Abrasive blasting systems typically include three essential components: an abrasive container (i. e., blasting pot); a propelling device; and a blasting nozzle or nozzles. The exact equipment used depends to a large extent on the specific application and type(s) of abrasive.

Three basic methods can be used to project the abrasive towards the surface being cleaned: air pressure; centrifugal wheels; or water pressure. Air blast (or dry) systems use compressed air to propel the abrasive using either a suction-type or pressure-type process. Centrifugal wheel systems use a rotating impeller to mechanically propel the abrasive by a combination of centrifugal and inertial forces. Finally, the water (or wet) blast method uses either air pressure or water pressure to propel an abrasive slurry towards the cleaned surface.

Abrasive materials used in blasting can generally be classified as sand, slag, metallic shot or grit, synthetic, or other. The cost and properties associated with the abrasive material dictate its application. The following discusses the general classes of commonly used abrasives.

Silica sand is commonly used for abrasive blasting where reclaiming is not feasible, such as in unconfined abrasive blasting operations. Sand has a rather high breakdown rate, which can result in substantial dust generation. Worker exposure to free crystalline silica is of concern when silica sand is used for abrasive blasting.

Coal and smelter slags are commonly used for abrasive blasting at shipyards. Black Beauty™, which consists of crushed slag from coal-fired utility boilers, is a commonly used slag. Slags have the advantage of low silica content, but have been documented to release other contaminants, including hazardous air pollutants (HAP), into the air.

Metallic abrasives include cast iron shot, cast iron grit, and steel shot. Cast iron shot is hard and brittle and is produced by spraying molten cast iron into a water bath. Cast iron grit is produced by crushing oversized and irregular particles formed during the manufacture of cast iron shot. Steel shot is produced by blowing molten steel. Steel shot is not as hard as cast iron shot, but is much more durable. These materials typically are reclaimed and reused.

Synthetic abrasives, such as silicon carbide and aluminum oxide, are becoming popular substitutes for sand. These abrasives are more durable and create less dust than sand. These materials typically are reclaimed and reused.

Other abrasives include mineral abrasives (such as garnet, olivine, and staurolite), cut plastic, glass beads, crushed glass, and nutshells. As with metallic and synthetic abrasives, these other abrasives are generally used in operations where the material is reclaimed. Mineral abrasives are reported to create significantly less dust than sand and slag abrasives.

The type of abrasive used in a particular application is usually specific to the blasting method. Dry blasting is usually done with sand, metallic grit or shot, aluminum oxide (alumina), or silicon carbide. Wet blasters are operated with either sand, glass beads, or other materials that remain suspended in water.

13.2.6.3 Emissions And Controls[1,3,5-11]

Emissions —

Particulate matter (PM) and particulate HAP are the major concerns relative to abrasive blasting. Table 13.2.6-1 presents total PM emission factors for abrasive blasting as a function of wind speed. Higher wind speeds increase emissions by enhanced ventilation of the process and by retardation of coarse particle deposition.

Table 13.2.6-1 also presents fine particulate emission factors for abrasive blasting. Emission factors are presented for PM-10 and PM-2.5, which denote particles equal to or smaller than 10 and 2.5 microns in aerodynamic diameter, respectively. Emissions of PM of these size fractions are not significantly wind-speed dependent. Table 13.2.6-1 also presents an emission factor for controlled emissions from an enclosed abrasive blasting operation controlled by a fabric filter; the blasting media was 30/40 mesh garnet.

Limited data from Reference 3 give a comparison of total PM emissions from abrasive blasting using various media. The study indicates that, on the basis of tons of abrasive used, total PM emissions from abrasive blasting using grit are about 24 percent of total PM emissions from abrasive blasting with sand. The study also indicates that total PM emissions from abrasive blasting using shot are about 10 percent of total PM emissions from abrasive blasting with sand.

Hazardous air pollutants, typically particulate metals, are emitted from some abrasive blasting operations. These emissions are dependent on both the abrasive material and the targeted surface.

Controls —

A number of different methods have been used to control the emissions from abrasive blasting. Theses methods include: blast enclosures; vacuum blasters; drapes; water curtains; wet blasting; and reclaim systems. Wet blasting controls include not only traditional wet blasting processes but also high pressure water blasting, high pressure water and abrasive blasting, and air and water abrasive blasting. For wet blasting, control efficiencies between 50 and 93 percent have been reported. Fabric filters are used to control emissions from enclosed abrasive blasting operations.

Table 13.2.6-1. PARTICULATE EMISSION FACTORS FOR ABRASIVE BLASTING[a]

EMISSION FACTOR RATING: E

Source	Particle size	Emission factor, lb/1,000 lb abrasive
Sand blasting of mild steel panels[b] (SCC 3-09-002-02)	Total PM	
	5 mph wind speed	27
	10 mph wind speed	55
	15 mph wind speed	91
	PM-10[c]	13
	PM-2.5[c]	1.3
Abrasive blasting of unspecified metal parts, controlled with a fabric filter[d] (SCC 3-09-002-04)	Total PM	0.69

a One lb/1,000 lb is equal to 1 kg/Mg. Factors represent uncontrolled emissions, unless noted. SCC = Source Classification Code.

b Reference 10.

c Emissions of PM-10 and PM-2.5 are not significantly wind-speed dependent.

d Reference 11. Abrasive blasting with garnet blast media.

References For Section 13.2.6

1. C. Cowherd and J. Kinsey, *Development Of Particulate And Hazardous Emission Factors For Outdoor Abrasive Blasting*, EPA Contract No. 68-D2-0159, Midwest Research Institute, Kansas City, MO, June 1995.

2. Written communication from J. D. Hansink, Barton Mines Corporation, Golden, CO, to Attendees of the American Waterways Shipyard Conference, Pedido Beach, AL, October 28, 1991.

3. South Coast Air Quality Management District, *Section 2: Unconfined Abrasive Blasting,* Draft Document, El Monte, CA, September 8, 1988.

4. A. W. Mallory, "Guidelines For Centrifugal Blast Cleaning", *J. Protective Coatings And Linings, 1(1)*, June 1984.

5. B. Baldwin, "Methods Of Dust-Free Abrasive Blast Clearing", *Plant Engineering, 32(4)*, February 16, 1978.

6. B. R Appleman and J. A. Bruno, Jr., "Evaluation Of Wet Blast Cleaning Units", *J. Protective Coatings And Linings, 2(8)*, August 1985.

7. M. K. Snyder and D. Bendersky, *Removal Of Lead-Based Bridge Paints*, NCHRP Report 265, Transportation Research Board, Washington, DC, December 1983.

8. J. A. Bruno, "Evaluation Of Wet Abrasive Blasting Equipment", *Proceedings Of The 2nd Annual International Bridge Conference*, Pittsburgh, PA, June 17-19, 1985.

9. J. S. Kinsey, *Assessment Of Outdoor Abrasive Blasting*, Interim Report, EPA Contract No. 68-02 4395, Work Assignment No. 29, U. S. Environmental Protection Agency, Research Triangle Park, NC, September 11, 1989.

10. J. S. Kinsey, S. Schliesser, P. Murowchick, and C. Cowherd, *Development Of Particulate Emission Factors For Uncontrolled Abrasive Blasting Operations*, EPA Contract No. 68-D2-0159, Midwest Research Institute, Kansas City, MO, February 1995.

11. *Summary Of Source Test Results, Poly Engineering, Richmond, CA*, Bay Area Air Quality Management District, San Francisco, CA, November 19, 1990.

12. *Emission Factor Documentation For AP-42 Section 13.2.6, Abrasive Blasting, Final Report*, Midwest Research Institute, Cary, NC, September 1997.

(National Association of Corrosion Engineers) Standard TM-01-69 as standardized in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," EPA Publication SW-846, as incorporated by reference in §260.11 of this chapter.

(b) A solid waste that exhibits the characteristic of corrosivity has the EPA Hazardous Waste Number of D002.

[45 FR 33119, May 19, 1980, as amended at 46 FR 35247, July 7, 1981; 55 FR 22684, June 1, 1990; 58 FR 46049, Aug. 31, 1993]

§261.23 Characteristic of reactivity.

(a) A solid waste exhibits the characteristic of reactivity if a representative sample of the waste has *any* of the following properties:

(1) It is normally unstable and readily undergoes violent change without detonating.

(2) It reacts violently with water.

(3) It forms potentially explosive mixtures with water.

(4) When mixed with water, it generates toxic gases, vapors or fumes in a quantity sufficient to present a danger to human health or the environment.

(5) It is a cyanide or sulfide bearing waste which, when exposed to pH conditions between 2 and 12.5, can generate toxic gases, vapors or fumes in a quantity sufficient to present a danger to human health or the environment.

(6) It is capable of detonation or explosive reaction if it is subjected to a strong initiating source or if heated under confinement.

(7) It is readily capable of detonation or explosive decomposition or reaction at standard temperature and pressure.

(8) It is a forbidden explosive as defined in 49 CFR 173.51, or a Class A explosive as defined in 49 CFR 173.53 or a Class B explosive as defined in 49 CFR 173.88.

(b) A solid waste that exhibits the characteristic of reactivity has the EPA Hazardous Waste Number of D003.

[45 FR 33119, May 19, 1980, as amended at 55 FR 22684, June 1, 1990]

§261.24 Toxicity characteristic.

(a) A solid waste exhibits the characteristic of toxicity if, using the Toxicity Characteristic Leaching Procedure, test Method 1311 in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," EPA Publication SW-846, as incorporated by reference in §260.11 of this chapter, the extract from a representative sample of the waste contains any of the contaminants listed in table 1 at the concentration equal to or greater than the respective value given in that table. Where the waste contains less than 0.5 percent filterable solids, the waste itself, after filtering using the methodology outlined in Method 1311, is considered to be the extract for the purpose of this section.

(b) A solid waste that exhibits the characteristic of toxicity has the EPA Hazardous Waste Number specified in Table I which corresponds to the toxic contaminant causing it to be hazardous.

TABLE 1—MAXIMUM CONCENTRATION OF CONTAMINANTS FOR THE TOXICITY CHARACTERISTIC

EPA HW No. [1]	Contaminant	CAS No. [2]	Regulatory Level (mg/L)
D004	Arsenic	7440–38–2	5.0
D005	Barium	7440–39–3	100.0
D018	Benzene	71–43–2	0.5
D006	Cadmium	7440–43–9	1.0
D019	Carbon tetrachloride	56–23–5	0.5
D020	Chlordane	57–74–9	0.03
D021	Chlorobenzene	108–90–7	100.0
D022	Chloroform	67–66–3	6.0
D007	Chromium	7440–47–3	5.0
D023	o-Cresol	95–48–7	[4] 200.0
D024	m-Cresol	108–39–4	[4] 200.0
D025	p-Cresol	106–44–5	[4] 200.0
D026	Cresol	....	[4] 200.0
D016	2,4-D	94–75–7	10.0
D027	1,4-Dichlorobenzene	106–46–7	7.5
D028	1,2-Dichloroethane	107–06–2	0.5
D029	1,1-Dichloroethylene	75–35–4	0.7
D030	2,4-Dinitrotoluene	121–14–2	[3] 0.13
D012	Endrin	72–20–8	0.02
D031	Heptachlor (and its epoxide).	76–44–8	0.008
D032	Hexachlorobenzene	118–74–1	[3] 0.13
D033	Hexachlorobutadiene	87–68–3	0.5
D034	Hexachloroethane	67–72–1	3.0
D008	Lead	7439–92–1	5.0
D013	Lindane	58–89–9	0.4
D009	Mercury	7439–97–6	0.2
D014	Methoxychlor	72–43–5	10.0
D035	Methyl ethyl ketone	78–93–3	200.0
D036	Nitrobenzene	98–95–3	2.0
D037	Pentrachlorophenol	87–86–5	100.0
D038	Pyridine	110–86–1	[3] 5.0
D010	Selenium	7782–49–2	1.0
D011	Silver	7440–22–4	5.0
D039	Tetrachloroethylene	127–18–4	0.7
D015	Toxaphene	8001–35–2	0.5
D040	Trichloroethylene	79–01–6	0.5
D041	2,4,5-Trichlorophenol	95–95–4	400.0
D042	2,4,6-Trichlorophenol	88–06–2	2.0
D017	2,4,5-TP (Silvex)	93–72–1	1.0
D043	Vinyl chloride	75–01–4	0.2

[1] Hazardous waste number.

[2] Chemical abstracts service number.
[3] Quantitation limit is greater than the calculated regulatory level. The quantitation limit therefore becomes the regulatory level.
[4] If o-, m-, and p-Cresol concentrations cannot be differentiated, the total cresol (D026) concentration is used. The regulatory level of total cresol is 200 mg/l.

[55 FR 11862, Mar. 29, 1990, as amended at 55 FR 22684, June 1, 1990; 55 FR 26987, June 29, 1990; 58 FR 46049, Aug. 31, 1993]

Subpart D—Lists of Hazardous Wastes

§ 261.30 General.

(a) A solid waste is a hazardous waste if it is listed in this subpart, unless it has been excluded from this list under §§ 260.20 and 260.22.

(b) The Administrator will indicate his basis for listing the classes or types of wastes listed in this subpart by employing one or more of the following Hazard Codes:

Ignitable Waste	(I)
Corrosive Waste	(C)
Reactive Waste	(R)
Toxicity Characteristic Waste	(E)
Acute Hazardous Waste	(H)
Toxic Waste	(T)

Appendix VII identifies the constituent which caused the Administrator to list the waste as a Toxicity Characteristic Waste (E) or Toxic Waste (T) in §§ 261.31 and 261.32.

(c) Each hazardous waste listed in this subpart is assigned an EPA Hazardous Waste Number which precedes the name of the waste. This number must be used in complying with the notification requirements of Section 3010 of the Act and certain recordkeeping and reporting requirements under parts 262 through 265, 268, and part 270 of this chapter.

(d) The following hazardous wastes listed in § 261.31 or § 261.32 are subject to the exclusion limits for acutely hazardous wastes established in § 261.5: EPA Hazardous Wastes Nos. FO20, FO21, FO22, FO23, FO26, and FO27.

[45 FR 33119, May 19, 1980, as amended at 48 FR 14294, Apr. 1, 1983; 50 FR 2000, Jan. 14, 1985; 51 FR 40636, Nov. 7, 1986; 55 FR 11863, Mar. 29, 1990]

§ 261.31 Hazardous wastes from non-specific sources.

(a) The following solid wastes are listed hazardous wastes from non-specific sources unless they are excluded under §§ 260.20 and 260.22 and listed in appendix IX.

Industry and EPA hazardous waste No.	Hazardous waste	Hazard code
Generic:		
F001	The following spent halogenated solvents used in degreasing: Tetrachloroethylene, trichloroethylene, methylene chloride, 1,1,1-trichloroethane, carbon tetrachloride, and chlorinated fluorocarbons; all spent solvent mixtures/blends used in degreasing containing, before use, a total of ten percent or more (by volume) of one or more of the above halogenated solvents or those solvents listed in F002, F004, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.	(T)
F002	The following spent halogenated solvents: Tetrachloroethylene, methylene chloride, trichloroethylene, 1,1,1-trichloroethane, chlorobenzene, 1,1,2-trichloro-1,2,2-trifluoroethane, ortho-dichlorobenzene, trichlorofluoromethane, and 1,1,2-trichloroethane; all spent solvent mixtures/blends containing, before use, a total of ten percent or more (by volume) of one or more of the above halogenated solvents or those listed in F001, F004, or F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.	(T)
F003	The following spent non-halogenated solvents: Xylene, acetone, ethyl acetate, ethyl benzene, ethyl ether, methyl isobutyl ketone, n-butyl alcohol, cyclohexanone, and methanol; all spent solvent mixtures/blends containing, before use, only the above spent non-halogenated solvents; and all spent solvent mixtures/blends containing, before use, one or more of the above non-halogenated solvents, and, a total of ten percent or more (by volume) of one or more of those solvents listed in F001, F002, F004, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.	(I)*
F004	The following spent non-halogenated solvents: Cresols and cresylic acid, and nitrobenzene; all spent solvent mixtures/blends containing, before use, a total of ten percent or more (by volume) of one or more of the above non-halogenated solvents or those solvents listed in F001, F002, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.	(T)

Recd 6-7-01 WAC

Brooks & Associates, Inc.

Engineering and Environmental Consulting

May 25, 2001

RECEIVED

JUN 07 2001

BUREAU OF AIR REGULATION

William Leffler, P.E.
Permit Engineer
Department of Environmental Protection
Division of Air Resources Management
3900 Commonwealth Boulevard
Tallahassee, Florida 32399-3000

Re: Response to "Second Incompleteness Letter" dated

Dear Mr. Leffler:

This will respond to your "second incompleteness letter" of May 14, 2001 regarding Conrad Yelvington Distributor Inc.'s (CYDI's) request for an air construction permit for a relocatable portable screening device knows as the "Powerscreen Chieftain 510" Transportable Scalping/Screening Unit. The Department initially issued an Intent to Issue and draft permit for the screening unit to be used for crushed stone, sand and gravel. Subsequently in October 2000 CYDI requested a modification of the draft Intent to Issue and permit in order to allow the screening unit to be used for spent Abrasive Blasting Media ("ABM"). On October 16, 2000, the Department requested additional information, and CYDI provided its response to this request on February 28, 2001, which response was engineer certified and re-submitted on April 6, 2001.

The Department's "second incompleteness letter" of May 14, 2001, did not number the specific items of requested information. In order to provide a clear response to all of the information requested, we have responded to each of the issues raised in your letter as follows:

1. **Information Requested:** *"The abrasive blast media... is not sufficiently consistent in its composition, nor have you submitted adequate sampling and material handling protocols to (sic) reasonable assurance that there will not be excessive dust emissions from the screener, that the dust from the screener, and from the associated materials stockpiles, will not contain unsafe levels of heavy metals."*

Response: CYDI believes that it has provided reasonable assurance of the characteristics of the ABM to be screened. CYDI has also proposed a specific testing protocol to ensure that no hazardous or toxic materials are accepted by CYDI. Finally, CYDI has provided calculations of the minimal emissions expected from this emission source. Specifically:

a. CYDI previously provided to you the calculated emission estimates for the ABM Materials. (Copy attached and highlighted.) Further assurances on emission

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Phone: (954) 796-1987 Fax: (954) 796-1984

limiting factors are provided in response to Item 2 below in the form of limitations on material volumes, throughput rates, and hours of operation.

b. We previously submitted laboratory data from representative samples of the ABM material. This data was included in our prior submission dated February 28, 2001. (Copy attached and highlighted)

c. The laboratory data submitted by CYDI is consistent with other reported technical literature on ABM materials including:

i. "Technical Memorandum TM-2178-ENV RECYLING AND REUSE OPTIONS FOR SPENT ABRASIVE BLASTING MEDIA AND SIMILAR WASTES. (1996);

ii. "Leaching Characteristics and Assessment of Abrasive Blasting Waste from Ship Maintenance Facilities and Sandblasting Sites" (Jenna Jambeck Carlson, University of Florida, 1998);

iii. "Best Management Practices for Waste Abrasive Blast Media (Tim Townsend, Florida Center for Solid and Hazardous Waste Research, 1998).

Together, these reports indicate the range of total metals, as well as TCLP metals detected in typical samples of ABM.

d. In order to provide additional assurances that no hazardous or toxic materials will be accepted at CYDI, a sampling and testing protocol has been proposed. Each source of material will be tested prior to being transported to a CYDI facility. CYDI will not accept any waste that is characteristically hazardous for toxicity using the TCLP analysis. (This protocol for testing of individual source materials was included in the February 28, 2001 response to your first incompleteness letter.)

2. **Information Requested:** *"Additionally, data from industrial studies is predominately based on TCLP data which provides some insight as to the leaching characteristics of this material if placed in a landfill, but very little data on the gross analysis of spent abrasive blast media nor the gross analysis of the dust that will be emitted as uncontrolled particulate emissions."*

Response: The literature and lab data referenced above includes both total metals and TCLP metals analysis for ABM materials. The relatively low concentrations of total metals found in these materials, combined with the low emission rates described above, provide reasonable assurance that the emissions from this source will not result in any violation of air quality standards. As further assurance, CYDI also proposes the following conditions on the available volume of ABM material for processing, a throughput rate for screening ABM, and limited hours of operations for screening of ABM materials:

> Available Volume shall not exceed 23000 tons per year of ABM.
>
> The throughput rate for ABM materials shall not exceed 80 per hour.
>
> The hours of operation will be limited to 200 hrs/year.

Information Requested: "*Without the solid waste permit application, which you represented as forthcoming in your March 6 response, I do not have sufficient information to assess the impact of the screener with proposed materials, at this location.*"

Response: CYDI is seeking an air permit for its proposed portable screening unit to be used at CYDI's terminals as well as possible other locations (shipyards) throughout the state. Review of this permit application should not be dependent upon other permits that may be required at various locations where the screening unit may be used. CYDI has previously indicated that it will also comply with any applicable solid waste regulations applicable to its operations.

The Department's Tampa District office has expressed some concerns over the issue of management of coal "bottom ash" at the CYDI Tampa terminal. This bottom ash material will not be screened with the portable screening unit sought through this permit application. The bottom ash material qualifies for an exemption from solid waste regulation as an industrial byproduct, and will be managed accordingly.

The materials that will be screened using the portable screening unit include crushed stone, sand, and gravel which are raw materials and are not subject to DEP solid waste regulations. Additionally, ABM materials will be screened and will be managed as an industrial byproduct subject to exemption from solid waste regulation. The ABM materials will be managed according to appropriate Best Management Practices required for such reuse materials.

3. **Information Requested:** "*Please advise as your intention to provide information to questions 3, 4, 5, 6, 7, 8, 9 and 10 of the October 6, 2000 request for additional information, and whether CYDI intends to publish the public notice attached to the Department's Intent to Issue Air Construction of August 10, 2000.*"

Response: We have previously responded to each of the items requested in the October 16, 2001 Request for Information. The information requested for Item 7 concerning emission-estimating protocols, was included in the emission estimates set forth in the Response to Item No. 4. Please let us know if there is a specific response that you believe was inadequate so that we may address it directly. Once the Department finalizes its review, and issues a modified Intent, CYDI will publish the required public notice.

Conclusion: We trust that this additional response, which has been sealed by the permit engineer of record, adequately provides you with information to provide sufficient assurances to issue the permit as requested. The proposed activity will generate only minimal particulate emissions, has sufficient emission limiting conditions, and is not likely to cause any violation of any applicable air emission standard. The de minimus nature of the type of activity proposed is indicated by the fact that the Department has proposed a categorical exemption for portable screening devices. While the proposed activity may ultimately qualify for such an exemption, CYDI has provided reasonable assurances that the proposed permit should be issued. Please let us know whether you require any additional information.

Sincerely,

Stephanie S. Brooks, P.E.
Brooks & Associates

cc: Clair Fancy, DARM
Gary Yelvington, CYDI
William C. Thomas, CYDI
Alex Padva, Ph.D
Geoffrey D. Smith, Esq.

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Just a note from . . .

LAW OFFICES OF
BLANK, MEENAN & SMITH, P.A.

Bill -
This will
confirm that all
outstanding issues are
addressed. Enclosed is
the signed + sealed
response from Stephanie
Brooks per your request.
[illegible] Smith

Leffler's copy

Recd 6-8-01

Cover letter from Geoff Searcy 6-8-01

Printed Postage History

Date	Mail Class	Postage ($)	Weight	Recipient	Reference	Special Services
4/6/01 12:27:02 PM	First-Class Mail	$0.34	0lb 1oz	Mr. William Leffler PE, Permitting Engineer, Division of Air Resources Management, Dept of Environmental Protection, 3900 Commonwealth BLVD, Tallahassee FL 32399-3000	<None>	
3/1/01 2:17:09 PM	Priority Mail	$5.55	2lb 1oz	Mr William Leffler PE, DEP-DARM, 3900 Commonwealth BLVD, Tallahassee FL 32399-6575	<None>	Delivery Confirmation

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

Department of Environmental Protection

Jeb Bush
Governor

Marjory Stoneman Douglas Building
3900 Commonwealth Boulevard
Tallahassee, Florida 32399-3000

David B. Struhs
Secretary

April 04, 2001

CERTIFIED MAIL RETURN RECEIPT REQUESTED

Mr. William C. Thomas, III
Vice President of Industrial Development & Operations
Conrad Yelvington Distributors, Inc.
Post Office Box 1686
Daytona Beach, Florida 32115

Re: Second Completeness Review for an Amended Application for an Air Construction Permit
Powerscreen Sand and Gravel Classifier: Permit No.: 7770473-001-AC

Dear Mr. Thomas:

On March 6, 2001, Conrad Yelvington Distributors, Inc., through its engineering consultant, Stephanie Brooks, P.E., submitted a letter and a package of supporting documents in reply to our October 6, 2000 incompleteness letter. The last paragraph of our October 6, 2000 letter and Rule 62-4.050(3), F.A.C., require that all applications for a Department permit must be certified by a professional engineer registered in the State of Florida. This requirement also applies to responses to Department's requests for additional information of an engineering nature. Therefore, this responses is deficient in the following aspect:

The response letter received March 6, 2001, and supporting attachments were not submitted under the Professional Engineer's seal. This deficiency was reported to Ms. Brooks on March 20, 2001.

The Department will resume processing your amended application after receipt of the requested information. You are again advised that Rule 62-4.055(1), F.A.C., requires applicants to respond to requests for information within 90 days, with processing time on the permit tolled during the actual time taken for the response. If you have any questions, please call me at (850) 921-9522.

Sincerely,

William Leffler, P.E.
Permitting Engineer

cc:
Stephanie S. Brooks, P.E., Brooks and Associates, Inc.
Clair Fancy, BAR
Bruce Mitchell, BAR
Jerry Campbell,E.P.C.H.C.
Richard B. Tedder, Division of Waste Management
Robert Butera, P.E., Southwest District Solid Waste

Brooks & Associates, Inc.

Engineering and Environmental Consulting

February 28, 2001

Mr. William Leffler, PE
Permitting Engineer
Division of Air Resources Management
Department of Environmental Protection
3900 Commonwealth BLVD
Tallahassee FL 32399-3000

RE: Response to RAI 7770473-001-AC

Dear Mr. Leffler:

Brooks & Associates, CYDI and Alex Padva, Ph.D. have been involved in developing the answers to your request. The items will be taken out of order but will provide information for all.

Items 8 and 9 CYDI does not accept any material that has not passed hazardous waste screening tests. Therefore there is no need for extraordinary methods of dealing with spills. The off-spec or unmerchantable portions of the spent ABM are hauled to a landfill for disposal. The handling of the material may change depending on the Reuse memo that is being generated by the Solid and Hazardous Waste Sections.

Item 10 The power screen will potentially be used in Hillsborough County at the current location, Duval County at a location to be determined and Orange County at a location to be determined.

Item 5 Additional permitting if required by the reuse memo will be handled on an as needed basis. CYDI and Brooks & Associates are well aware of the rule that getting an air permit does not grant immunity from other permitting requirements. A. Padva, Ph.D. is involved in resolving solid waste issues associated with the spent ABM.

Item 6 As the power screen is designed to be a portable unit, the requirement of a negative pressure dust collection system with air pollution control system along with an enclosed structure seem to be more applicable to permanent and therefore a continuous source of air pollution rather than a temporary one. The same comment extends to a continuous mist suppression system. The material's moisture content of 0.4% which is similar to the moisture content of crushed stone. A concrete floor is less onerous but still seems extraordinary for a slag

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Phone: (954) 796-1987 Fax: (954) 796-1984

material that isn't considered hazardous. Please see Virginia Material's Reuse document that allows for storage of material on the ground with a berm around it and a tarp to cover it for short-term storage.

Item 4 CYDI does not accept spent ABM that fails the TCLP determination for hazardous wastes. Each source of material is tested prior to being transported to the site. If the material fails, it isn't accepted and the generator of the material has to dispose of it instead of it being processed and then reused as kiln feed. Your rather broad request for " reasonable assurance that the permittee will not .... nor create any unsafe condition or health hazard by processing spent ABM on any of its sites" can only be answered by CYDI does not intend to create an unsafe condition or health hazards for the general population or its workers by processing any kind of material. In support of this statement please find a copy of the MSDS for similar material from Virginia Materials and copy of that company's beneficial reuse program document.

Item 3 Emission estimates for the piles. See Emissions inventory questionnaire from State of Missouri for Storage Piles.

Tampa area Emission Factors based on this sheet are:

Wind erosion	0.53 lb PM10 per acre of storage pile per day
Activity	0.41 lb PM 10 per ton

Using the chemical composition of Spent Coal Slag Media from Technical Memorandum TM-2178-ENV RECYCLING AND REUSE OPTIONS FOR SPENT ABRASIVE BLASTING MEDIA AND SIMILAR WASTES published in April 1996, we find that the weight percent of metals varies and that the TCLP results are very similar to the results of TCLP performed on our samples. Therefore, we can extrapolate that the weight percent of metals will be similar to the report's results.

Metal Emissions (example)

	Wind Erosion lb PM10 – day/acre	Activity lb PM10/ton
Pb	0.0027	0.0021

Processing 1000 tons per day from a pile that occupies about 3/10 of an acre and 255 days/yr operation.

Pb	0.0001 tpy	0.27 tpy

Items 1 and 2 The answers are contained in the enclosures. We have provided sieve analyses on our material, additional testing on our material and on similar from alternate sources. We have identified two additional technical documents which we use to base our belief that as long as the material does not fail TCLP or SPLP, it can safely be processed by CYDI without requiring onerous additional testing requirements or facilities to be built for processing and storage.

Should you have any questions, please call me at (954) 796-1987.

Thank you for your assistance,

Stephanie S. Brooks, PE

Stephanie S. Brooks, PE

Enclosures: Historical Weather Data for Tampa FL

Typical Chemical Analysis for Black Sand/Boiler Slag

MSDS for "Black Blast Abrasives"

Sieve Analyses

SPLP and TCLP data on Gross and Fine Samples

Additional Test Results for Black Sand

Screen or Mesh Size information

Beneficial Reuse and Disposal of Spent Abrasives Program

Emissions Inventory Questionnaire

Recycling and Reuse options for Spent Abrasive Blasting Media and Similar Wastes

Investigation of Separation, Treatment, and Recycling Options for Hazardous Paint Blast Media Waste

Cc: Mr. William Thomas, CYDI
Mr. Frank Milton, CYDI
Mr. Alex Padva, Ph.D.

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

Department of Environmental Protection

Jeb Bush
Governor

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Tallahassee, Florida 32399-3000

David B. Struhs
Secretary

February 1 ~~January 30~~, 2001

CERTIFIED MAIL RETURN RECEIPT REQUESTED

Mr. William C. Thomas, III
Vice President of Industrial Development & Operations
Conrad Yelvington Distributors, Inc.
Post Office Box 1686
Daytona Beach, Florida 32115

Re: Amended Application for an Air Construction Permit
Powerscreen Sand and Gravel Classifier: Draft Permit No.: 7770473-001-AC

Dear Mr. Thomas:

We received the original application for an air construction permit for a Powerscreen Chieftain 510 on April 19, 2000. The initial application indicated that the screener was to be employed as a relocatable facility at any on the applicant's aggregate storage and processing yards for screening and classifying sand and rock aggregates, at various storage yards owned or operated by Conrad Yelvington Distributors, Inc.(CYDI), throughout the state. This application was processed to a draft Air Construction Permit that was issued on August 11, 2000. In the final days of processing the application we discovered, during a telephone call, that the CYDI intended to use this screener for processing spent abrasive blasting media (ABM). This intended use was not indicated in the application. The spent ABM has the potential of containing toxic heavy metals and toxic chemical residues from paints. Rather than delay or deny the draft permit at that time, we included a paragraph prohibiting the processing of ABM or other hazardous material.

CYDI has never published the public notice that was included in the "Intent to Issue" package for 7770473-001-AC. Rather, CYDI sought to amend the application, and urge the Department to modify the draft Air Construction Permit. Assurances were to be provided that the spent abrasive material was not hazardous, that the proposed processing of ABM would not violate state or federal air pollution standards, that the ABM would not constitute a health hazard, to provide testing criteria for acceptable material, and a management plan for dust and unacceptable spent ABM material.

We agreed to allow you 60 days to amend the application (without additional fees).

Your letter transmitting Stephanie Brooks' undated letter and laboratory reports followed on October 2, 2000. We accepted these documents as an "amendment" to the application.. Ms. Brooks made some emission calculations based on TCLP test results and AP 42 emission factors. These calculations were unacceptable because TCLP is not an appropriate laboratory test for determining potential air emissions. I deemed this amendment to the application insufficient and wrote a "Completeness Review and Request for Additional Information", which was mailed on October 16, 2000. I also provided technical reference material that I obtained from the Department's Division of Waste and from an EPA internet search site.

The certified mail return receipt card shows that you received the notice of completeness review and request for additional information on October 23, 2000.

More than 90 days have past since you received our completeness letter. The application has been in house 280 days, including our agreed extensions.

The Powerscreen Chieftain 510 is not permitted to operate at this time. The documents issued on August 11, 2000, do not authorize assembly, testing or operation of the facility. They only reflect the Department's intent to issue an Air Construction Permit, following (and conditioned upon) the publication of a public notice and resolution of any issues arising therefrom. The procedure for obtaining an Air Operation Permit requires the existence of a valid Air Construction Permit, a separate application and fee for the Air Operating Permit, as well as completion of compliance testing.

Rule 62-4.055(1) Florida Administrative Code provides:

> (1) Within thirty days after receipt of an application for a permit and the correct processing fee the Department shall review the application and shall request submittal of additional information the Department is authorized by law to request. The applicant shall have ninety days after the Department mails a timely request for additional information to submit that information to the Department. If an applicant requires more than ninety days in which to respond to a request for additional information, the applicant may notify the Department in writing of the circumstances, at which time the application shall be held in active status for one additional period of up to ninety days. Additional extensions shall be granted for good cause shown by the applicant. A showing that the applicant is making a diligent effort to obtain the requested additional information shall constitute good cause. Failure of an applicant to provide the timely requested information by the applicable deadline shall result in denial of the application.

Since we have had no response to our letter of October 16, 2000, requesting additional information, nor have we had any request for an extension to the 90 day response time, the Department will allow you thirty days from the receipt of this letter to provide all the information requested in the October 16 letter, or to indicate good cause why this time should be extended. Otherwise, the requested permit will be denied.

If you have any questions, please call me at (850) 921-9522.

Sincerely,

W. Leffler

William Leffler, P.E.
Permitting Engineer

Cc:
Stephanie S. Brooks, P.E., Brooks and Associates, Inc.
Clair Fancy, BAR
Bruce Mitchell, BAR
Jerry Campbell, Hillsborough County Environmental Protection Commission
Richard B. Tedder, Division of Waste Management

Department of Environmental Protection

Jeb Bush
Governor

Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

David B. Struhs
Secretary

October 16, 2000

CERTIFIED MAIL RETURN RECEIPT REQUESTED

Mr. William C. Thomas, III
Vice President of Industrial Development & Operations
Conrad Yelvington Distributors, Inc.
Post Office Box 1686
Daytona Beach, Florida 32115

Re: Completeness review for an Amended Application for an Air Construction Permit
Powerscreen Sand and Gravel Classifier: Permit No.: 7770473-001-AC

Dear Mr. Thomas:

The Department has reviewed the amended application for use of the Powerscreen unit for processing spent abrasive blasting media, (spent ABM). Based on a review of this amended application, we consider it to be incomplete. Please submit the following information, including all calculations, assumptions and reference material, and any changed application pages that are appropriate to the Department, and we will begin reviewing and processing the latest request when we receive the requested information.

1. The analytical data provided with the amended application is not based on a statistically significant number of samples to reflect the probable maximum, and typical average, constituents of the material stream. The three sample analysis reports are not sufficient to form a reliable opinion as to the range of concentrations that may be attributable to spent ABM as a commodity.

Please provide statistically significant data on the chemical and physical characteristics of the spent ABM, including the chemical analysis reflecting the range, average, and standard deviation of mass concentrations in a statistically significant number of samples from each type of source or industry supplying spent ABM with respect to: Arsenic, Barium, Cadmium, Chromium, Copper, Iron, Lead, Nickel, Mercury, Selenium, Silver, Zinc, and any toxic anti-fouling paint compounds or volatile solvents that might be found in spent ABM recovered from shipyards.

2. The analytical data furnished does not reflect an appropriate test method. The TCLP related tests (EPA methods 1121, 1311, 6010B, 7470 and 7471A) are intended to measure the leaching potential of a sample. This leaching potential is not related to the mass concentration of the pollutants in the sample, nor in the dust or fine portion of the sample. The test results are expressed in milligrams of speculated solute per kilogram of sample. The TCLP tests and related lysimeter procedures are used to classify wastes based on their suitability for disposal in landfills, where contamination of groundwater, by percolation of rainwater through a waste layer, is the critical consideration. Air pollution estimates must be based on the mass concentrations of the identified constituents in the spent ABM, and if possible, on the mass concentrations of the identified constituents in the fine portion (passing the 200 mesh sieve) of the spent ABM.

Please provide engineering data on the physical characteristics of each type of spent ABM to be processed, including a dry and wet sieve analysis to determine the portion of the sample passing the 100 and 200 mesh screens; a hydrometric/gravimetric analysis to determine the particle size distribution of the fine portion of a each type of spent ABM; and an atomic adsorption spectroscopy analysis of the gross sample and the fine portion to determine the relative fraction of heavy metals or toxic components that may be entrained in the air by the various material handling procedures and the vibrating screen. Please identify appropriate laboratory methods and standards for identification and quantification of heavy metals and toxic chemicals in the dust fraction of the spent ABM to be processed.

3. The Department has experienced difficulty in finding background information on the nature of the spent ABM that the applicant proposes to process, except that such material often contains significant levels of heavy metals and that it often contains significant quantities of toxic chemicals, the environmental significance and fate of which are uncertain.

The Department has identified a thesis by Jenna Jambeck Carlson, *Leaching Characteristics and Assessment of Abrasive Blasting Waste from Ship Maintenance Facilities and Sandblasting Contractor Sites,* University of Florida (1998), and a paper by Tim Townsend, *Best Management Practices for Waste Abrasive Blast Media,* Florida Center for Solid and Hazardous Waste Management (1998) which are provided to the applicant, (Both of these references were prepared from the same data sets). These documents are focused landfill disposal and incorporation of waste ABM into soil cement or road construction material, but provide some guidance on the range of mass concentrations based on limited sampling.

4. The applicant has not provided any generally acceptable industry profile nor identified any other facilities which process similar materials in the manner proposed by the applicant. The Department has identified Virginia Materials, 3306 Peterson St., Norfolk, VA 23509 as a larger producer of spent ABM for recycling in the production of portland cement. We are aware that Rinker Materials, Inc., Tarmac America, Inc., and Florida Rock Industries, Inc., incorporate slag based spent ABM in their portland cement kiln feedstock.

Please provide any additional references to management practices, sampling protocol, and material batch acceptance standards that will give the Department 'reasonable assurance' that the permittee will not process hazardous spent ABM, store hazardous spent ABM on its sites, nor create any unsafe condition or health hazard by processing spent ABM on any of its sites.

5. There are other environmental issues that cause us to inquire about the status of permitting and compliance issues that would be addressed by other divisions of the Department, by the Hillsborough County Environmental Protection Commission and by The U.S. EPA. Please provide information on the following issues:

(a) Please describe measures will be taken to meet industrial waste water, solid waste, hazardous waste, and groundwater permitting rules; or,

(b) Please provide copies of the appropriate permits that have been issued or exemption letters that have been obtained.

6. Please comment on the following aspects of a management plan for the handling, processing, and storage of spent ABM:

(a) Why a concrete floor should not be required for the storage of spent ABM to prevent leaching and loss of water percolating through the storage piles.

(b) Why an enclosed structure should not be required to contain and recover dust from the proposed screening, or spent ABM storage operations.

(c) Why a continuous mist dust suppression system should not be employed within an the enclosed structure.

(d) Why a negative pressure dust collection system coupled with a air pollution collection device such as a cyclone, baghouse or scrubber, should not be required to eliminate airborne transport of dust containing heavy metals or toxic chemicals associated with processing of spent ABM.

7. Please specify an emission estimating protocol to quantify the loss of heavy metals and toxic components of spent ABM by wind erosion from storage piles process activities and work yard activities, and that entrainment caused by vehicular traffic at the processing facility.

8. Please describe the standard, or proposed procedure, to be taken in the event of any spill of spent ABM, whether on the facility, or in transit, either before of after processing, including alternative disposal plans, appropriate agencies to be notified, availability of containment equipment, and personnel training.

9. Please identify the disposal options and disposal site(s) for any 'off spec' or unmerchantable fraction of the spent ABM, including that portion passing the finest screen (tailings) and that portion retained on the coarsest screen (scalpings), which would presumably contain trash and shop waste from the producer of the spent ABM.

10. Please identify the sites around the state of Florida where the applicant contemplates using the transportable Powerscreen classifier to process spent ABM. Please provide the potential counties and the UTM coordinates or latitude and longitude for all such sites.

The Department will resume processing your amended application after receipt of the requested information. No additional fee is required. Rule 62-4.050(3), F.A.C., requires that all applications for a Department permit must be certified by a professional engineer registered in the State of Florida. This requirement also applies to responses to Department's requests for additional information of an engineering nature. Permit applicants are advised that Rule 62-4.055(1), F.A.C., requires applicants to respond to requests for information within 90 days, with processing time on the permit tolled during the actual time taken for the response. If you have any questions, please call me at (850) 921-9522.

Sincerely,

W. Leffler

William Leffler, P.E.
Permitting Engineer

Enclosures: Carlson and Townsend papers

Cc:
Stephanie S. Brooks, P.E. Brooks and Associates, Inc.
Clair Fancy, BAR w/o enclosure
Bruce Mitchell, BAR w/o enclosure
Jerry Campbell, Hillsborough County Environmental Protection Commission
Richard B. Tedder, Division of Waste Management w/o enclosure

STATE OF MISSOURI
DEPARTMENT OF NATURAL RESOURCES
AIR POLLUTION CONTROL PROGRAM
205 JEFFERSON STREET, P.O. BOX 176
JEFFERSON CITY, MISSOURI 65102

EMISSIONS INVENTORY QUESTIONNAIRE (EIQ)

FORM 2.8 STORAGE PILE WORKSHEET

SHADED AREAS FOR OFFICE USE ONLY

FACILITY NAME	FIPS COUNTY NO.	PLANT NO.	YEAR OF DATA

[1] STORAGE PILE INFORMATION

POINT NO.	AIRS ID-PT	SCC	SEG NO.	TYPE OF MATERIAL STORED
				Coal slag / Spent ABD

MOISTURE CONTENT (%): 0.4 (DEFAULT = .07%)

AREA OF STORAGE PILE (ACRES): 0.03 per pile

SILT CONTENT: 10 (DEFAULT = 1.6%)

STORAGE DURATION (DAYS):

ANNUAL AMOUNT STORED (TONS):

MAXIMUM HOURLY AMOUNT STORED: 550 TPH

RAW MATERIAL LOADING METHOD (CHECK ONE)
- ☐ BARGE
- ☐ RAIL
- ☐ TRUCK
- ☐ CONVEYOR
- ☐ OTHER (SPECIFY)

RAW MATERIAL UNLOADING METHOD (CHECK ONE)
- ☐ BARGE
- ☐ RAIL
- ☐ TRUCK
- ☐ CONVEYOR
- ☐ OTHER (SPECIFY)

[2] OTHER FACTORS AFFECTING EMISSION RATES

MEAN WIND SPEED (MPH): 8.3 (DEFAULT = 10 MPH)

% OF TIME WIND > 12 MPH: 32% (DEFAULT = 32%)

DRY DAYS PER YEAR: 260 (DEFAULT = 260 DAYS)

VEHICLE ACTIVITY FACTOR: 1 (DEFAULT = 1.0)

[3] STORAGE PILE EMISSION FACTOR CALCULATIONS

[3-A-1] LOAD IN-LOAD OUT COMPONENT =

.00224 X ({MEAN WIND SPEED} / 5)^1.3 / ({MOISTURE CONTENT (%)} / 2)^1.4

LOAD IN-LOAD OUT COMPONENT: 0.0412

[3-A-2] VEHICLE ACTIVITY COMPONENT =

0.05 X ({SILT CONTENT (%)} / 1.5) X ({DRY DAYS PER YEAR} / 235) X {VEHICLE ACTIVITY FACTOR}

0.05 x (10/1.5) x ((260/235) x 1)

VEHICLE ACTIVITY COMPONENT: 0.369

[3-B] WIND EROSION COMPONENT =

0.85 X ({SILT CONTENT (%)} / 1.5) X ({STORAGE DURATION (DAYS)}
X ({DRY DAYS PER YEAR} / 235) X ({% OF TIME WIND > 12MPH} / 15) LB/ACRE

WIND EROSION COMPONENT: 0.53 lb/acre per day

[4] STORAGE PILE PM10 EMISSION FACTOR

ACTIVITY PM10 EMISSION FACTOR =
{[3-A-1] LOAD IN-LOAD OUT COMPONENT} + {[3-A-2] VEHICLE ACTIVITY COMPONENT}

[4-A] ACTIVITY PM10 EMISSION FACTOR: 0.41 lb PM10 / ton LB PM10/TON

[4B] WIND EROSION PM10 EMISSION FACTOR: 0.53 LB PM10/ACRE

PLEASE NOTE

IF YOU USE A SOURCE CLASSIFICATION CODE (SCC) NUMBER AND EMISSION FACTOR FROM THE LIST IN THE INSTRUCTIONS FOR THIS FORM, MAKE SURE TO COMPLETE BLOCK 1, STORAGE PILE INFORMATION FOR EACH STORAGE PILE.

INSTRUCTIONS

FORM 2.8 STORAGE PILE WORKSHEET

This form is **REQUIRED** if a facility is reporting emissions from one or more open storage piles that are on the facility site.

Due to an APCP policy change in March 1998, the methodology for calculating storage pile emissions has been modified. There are now two different categories of emissions from storage piles: **(1) activity and (2) wind erosion**. The activity portion of storage pile emissions submittals includes the vehicle activity and load in/load out components and are calculated in the same manner as in previous EIQs. The wind erosion component is now calculated using pile area **(acres)** instead of **tons** stored as the throughput.

The rationale for the separation of these two categories is the physical difference in the nature of emissions from storage piles. Load in/load out and vehicle activity emissions are generated by human activity around the pile and can be represented by tons stored in the pile. However, wind erosion emissions can occur without disturbance of the pile and only occur during specific meteorological conditions.

With the use of the revised methodology, two different Source Classification Codes (SCC) are required. For quarry and associated industry storage piles, use SSC No. 3-05-020-07, Stone Quarrying, Open Storage (lb/ton) with activity emissions and use SCC No. 3-05-025-07, Sand/Gravel Storage Piles (lb/acre) with wind erosion emissions. **This will require the use of two emission point information forms (Form 2.0) for each different type of storage pile but point number should be the same.** Assign an activity SCC associated with a pound per ton emission factor to one Form 2.0 and a wind erosion SCC associated with a pound per acre emission factor to the other.

If you want to continue using SCC No. 3-05-020-07 with the default PM_{10} emission factor of 0.12 lb/ton for all storage pile emissions, complete all the information for Block 1, STORAGE PILE INFORMATION. If you are not using SCC emission factors, fill out this document completely.

Use Form 2.8 to derive two emission factors for each storage pile, using various criteria inputs. When calculating the PM_{10} emission factor for a storage pile, the following instructions apply.

Use a separate Form 2.8 for each storage pile emission point identified on Form 1.1, Process Flow Diagram and Form 1.2, Summary of Emission Points.

You may group and report separate storage piles as one point if they meet certain conditions: a) the physical characteristics of the pile and the surrounding environment are so similar that, if you calculate separate emission factors, the results would be the same; or b) the physical characteristics of the piles and the characteristics of the surrounding environment are so different that if you calculated emission factors for each pile, the results would not be equal. In this case, the reported emission factor will be the weighted average of the emission factor for each pile.

Activity Emission Factor Example: Suppose a facility has three distinct storage piles with annual throughputs of 100,000, 200,000 and 500,000 tons, respectively. Also assume the respective calculated PM_{10} activity emission factors are .18, .135 and .165 lbs/ton of material stored.

100,000 tons x .18 lbs/ton	=	18,000 lbs.
200,000 tons x .135 lbs/ton	=	27,000 lbs.
<u>500,000</u> tons x .165 lbs/ton	=	<u>82,500</u> lbs.
800,000 tons		127,500 lbs.

127,500 lbs. PM_{10}) 800,000 tons = .1594 lbs. PM_{10} /ton.

You would enter this weighted average result of .1594 on Form 2.0 for the activity portion as the emission factor for the point.

Complete <u>Facility Name</u>, <u>County Number</u>, <u>Plant Number</u> and <u>Year of Data</u>.
See Form 1.0 instructions, page 1.0-1.

1) STORAGE PILE INFORMATION

<u>**Point Number:**</u> This number is the unique identification number for each specific storage pile. This identification number must match the point number entered on Form 1.1, Process Flow Diagram; Form 1.2, Summary of Emission Points; and Form 2.0, Emission Point Information.

NOTE: Again, using the revised approach, there will be two Form 2.0 completed but the same point number will be used for each storage pile or group (one for activity and one for wind erosion).

<u>**SCC Number for Activity:**</u> List the SCC in tons that identifies the type of storage material for activity emissions.

<u>**SCC Number for Wind Erosion:**</u> List the SCC in **acres** that identifies the type of storage material for wind erosion emissions.

<u>**Type of Material Stored:**</u> Enter the type of material in the open storage pile for this emission point. Examples of some common storage pile materials include gravel, fines, pea gravel, crushed stone dust, crushed cinder, etc.

<u>**Moisture Content of Stored Material:**</u> Enter the moisture content of the storage pile if known. For examples, refer to Table 13.2.4-1 or Table 2.1-2-2 at the end of this instruction set. You may use a default value of 0.7% for the moisture content of the storage pile if no other information is available.

Use the moisture content percentage, not the decimal equivalent, when calculating the Load In-Load Out Factor in Section 3-A. Example: If the default value of 0.7% is selected, enter as .7 in the formula.

Area of Storage Piles: Estimate the number of acres of land that is under this specific storage pile.

Silt Content: Enter the Silt Content of the storage pile if known. Calculate the Silt Content by measuring the proportion of dry aggregate material that passes a 200 mesh screen, using ASTM-C-136 method. The Silt Content for some common materials stored in open storage piles are listed in Table 13.2.4-1 and Table 2.1.2-2. You may use a default value of 1.6% may be used for the storage pile if no other information is available.

Use the Silt Content percentage, not the decimal equivalent, when calculating the Wind Erosion and Activity Factors in Section 3-B and 3-C.
Example: If the default value of 1.6% is selected, enter as 1.6 in the formula.

Storage Duration: Enter the average number of days per year that aggregate material remains in the storage pile. Table 2.1.2-2 lists some estimates on the storage duration for various types of storage material.

Annual Amount Stored: Enter the total amount of all aggregate material produced and subsequently stored in the storage pile during the year. Enter tons of material stored per year.

Maximum Hourly Amount Stored: List the largest quantity of aggregate stored at any time during the last calendar year. Enter the maximum number of tons of material stored.

Raw Material Loading Method: Check the box that best corresponds to the main method of loading or removing material from the storage pile.

Raw Material Unloading Method: Check the box that best corresponds to the main method of unloading or adding material to the storage pile.

2) OTHER FACTORS AFFECTING EMISSION RATES

Mean Wind Speed: The statistical mean of all wind speeds at a height 10 centimeters above the storage piles, regardless of the wind direction. You may use a default value of 10 miles per hour for the Mean Wind Speed figure.

Percent of Time the Wind Velocity is Greater than 12 MPH:
The percent of time that the unobstructed wind velocity exceeds 12 miles per hour at the mean pile height. You may use a default value of 32%.

Dry Days Per Year: The number of days that at least 0.01 inches of rain did not fall. You may use a default value of 260 days.

Vehicle Activity Factor: Use the following table to select the correct value for VAF (Vehicle Activity Factor) for this storage pile. You may use a default value of 1.0.

MATERIAL	VAF VALUE
Coal	0.08
Coke	0.25
Gravel	0.25
Iron Ore	0.06
Limestone	0.25
Sand (Fines)	1.00
Slag	1.00
Top Soil (Overburden)	0.25
All Others	1.00

3) STORAGE PILE EMISSION FACTOR CALCULATIONS

A.1 LOAD IN-LOAD OUT FACTOR

The Load In-Load Out factor is a calculated number that represents the amount of PM_{10} emissions that will result from the Load In-Load Out process. Use this formula to calculate the factor:

Load In-Load Out Factor =
0.00224 x (Mean Wind Speed) 5)^1.3) [Moisture Content (%)) 2]^1.4 lb/ton
(The Values 1.3 and 1.4 are exponents).

Perform the calculation for the Load In-Load Out Factor and enter the results in Block 3-A.1 of this form.

A.2 VEHICLE ACTIVITY FACTOR

The Activity Factor is a calculated number that represents the amount of PM_{10} released into the atmosphere due to vehicular traffic around the storage pile. Use this formula to calculate the factor:

Activity Factor =
0.05 x [Silt Content (%)) 1.5] x (Dry Days per Year) 235)
x (Vehicle Activity Factor) lb/ton

Perform the calculation for the Activity Factor and enter the results in Block 3-A.2 of this form

B. WIND EROSION PORTION FACTOR

The Wind Erosion Factor is a calculated number that represents the amount of PM_{10} released into the atmosphere from this storage pile due to wind erosion. Use this formula to calculate the factor:

Wind Erosion Factor =
0.85 x [Silt Content (%)) 1.5] x Storage Duration (Days)
x (Dry Days per Year) 235) x [(% of Time Wind > 12 MPH)) 15] lb/acre

Perform the calculation for the Wind Erosion Factor and enter the results in Block 3-B of this form.

4) COMBINED ANNUAL STORAGE PILE PM_{10} EMISSION FACTORS

(A) Add the Load In-Load Out Factor (3-A.1), and Vehicle Activity Factor (3-A.2) together and enter the result in Block 4-A of this form. When using this worksheet, always express the units as pounds of PM_{10} emitted per ton of aggregate stored in piles.

(B) Enter the result of the calculation in Block 3-B. When using this worksheet, always express wind erosion units in pounds of PM_{10} per acre of storage.

ENTER THE FOLLOWING ON FORM 2.0, EMISSION POINT INFORMATION FOR <u>THE ACTIVITY</u> PORTION OF STORAGE PILE EMISSIONS:

Block 1 - Enter the <u>SCC</u>. If you use the default SCC, enter **3-05-020-07 (lb/ton).**

Block 7 - Enter the combined <u>Activity PM_{10} Emission Factor</u> (Block 4-A) for this storage pile in the appropriate box.

ENTER THE FOLLOWING ON A SEPARATE FORM 2.0, EMISSION POINT INFORMATION FOR THE WIND EROSION PORTION OF STORAGE PILE EMISSIONS:

Block 1 - Enter the SCC. If you use the default SCC, enter **3-05-025-07 (lb/acre).**

Block 7 - Enter the Wind Erosion PM_{10} Emission Factor (Block 4-B) for this storage pile in the appropriate box.

Table 7. Emission Factors for PM_{10} for Concrete Batching Activities

Component/Activities	PM_{10} Emission Factors (kg/tonne)
1. Materials Handling	
a) unenclosed	
Default formula for PM_{10}	$E_{PM10} = 0.75 * 0.001184 * [(U/2.2)^{1.3} / (M/2)^{1.4}]$ NB For materials where M = 0, use default of 0.0036 kg/t handled
<u>Reduction Factors (RF)</u>	
- wind breaks	0.7
- water sprays	0.5
- chemical suppression	0.2
- enclosure (2 or 3 walls)	0.1
- covered stockpiles	0.0
b) bag filters venting outside	$E_{PM10} = 12mg/m^3 * m^3/hr$ (flow) * hr/yr (OpHrs) * 10^{-6} ($12mg/m^3$ = 80% * undiff. ($15mg/m^3$))
c) enclosed	0.0
2. Materials Storage - wind erosion from active stockpiles (kg/ha/hr-area of base)	
Default	0.3
<u>Reduction Factors (RF)</u>	
- wind breaks	0.7
- water sprays	0.5
- chemical suppression	0.2
- enclosure (2 or 3 walls)	0.1
- covered stockpiles	0.0
3. Equipment Traffic - greater than 5 tonnes gross (kg/VKT on unsealed roads)	
<u>Option 1</u>	0.0019 * (# wheels)$^{3.4}$ * (road surface material silt content (g/m^2 as per AS3638))$^{0.2}$
<u>Option 2 Default</u>	1.5 (75% of undiff. (2.0))
<u>Reduction Factors (RF)</u>	
- watering (to eliminate visible dust)	0.25
- chemical spraying (rate)	0.2
4. Fuel Preparation & Drying - coal firing with dust collector	As per Section 1 *b) bag filters*
5. Limestone/Raw Material Crushing - material through crusher (kg/tonne)	
- uncontrolled	0.017
- fabric filter	0.0002
- wet or chemical suppression	0.0005
- wet scrubber	0.004

Tampa, Fla.

HISTORICAL WEATHER DATA

Average Temperature

	Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
°F	**72.4**	59.9	61.5	66.6	71.3	77.4	81.3	82.4	82.4	80.9	74.8	67.5	62.2
°C	**22**	15	16	19	21	25	27	28	28	27	23	19	16

Years Charted: 30 **Source:** National Weather Service, San Francisco

Results based on data collected from 1961 - 1990

Average High Temperature

	Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
°F	**81.6**	69.8	71.4	76.6	81.7	87.2	89.5	90.2	90.2	89	84.3	77.7	72.1
°C	**27**	21	21	24	27	30	31	32	32	31	29	25	22

Years Charted: 30 **Source:** National Weather Service, San Francisco

Results based on data collected from 1961 - 1990

Average Low Temperature

	Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
°F	**63**	50	51.6	56.5	60.8	67.5	72.9	74.5	74.5	72.8	65.2	57.2	52.3
°C	**17**	10	10	13	16	19	22	23	23	22	18	14	11

Years Charted: 30 **Source:** National Weather Service, San Francisco

Results based on data collected from 1961 - 1990

Average Wind Speed

	Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
mph	8.3	8.6	9.2	9.4	9.2	8.7	7.9	7.1	6.9	7.7	8.4	8.4	8.4
km/h	13	13	14	15	14	13	12	11	11	12	13	13	13

Years Charted: 47 **Source:** National Weather Service, San Francisco
Results based on data collected through 1993

Average Days of Precipitation

	Total	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Days	106	7	7	7	5	6	12	16	17	13	7	5	6

Years Charted: 47 **Source:** National Weather Service, San Francisco
Results based on data collected through 1993

Days With Sunshine

	Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
%	66	63	66	71	75	75	67	62	61	61	65	64	62

Years Charted: 46 **Source:** National Weather Service, San Francisco
Results based on data collected through 1993

Mean Number of Cloudy Days

	Total	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Days	121	12	10	10	8	8	10	12	11	11	9	9	11

Years Charted: 47 **Source:** National Weather Service, San Francisco
Results based on data collected through 1993

Mean Number of Partly Cloudy Days

	Total	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Days	143	10	9	10	11	12	14	16	17	14	10	9	10

Years Charted: 47 **Source:** National Weather Service, San Francisco
Results based on data collected through 1993

Highest Recorded Temperature

	Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
°F	99	86	88	91	93	98	99	97	98	96	94	90	86
°C	37	30	31	32	33	36	37	36	36	35	34	32	30

Years Charted: 47 **Source:** National Weather Service, San Francisco
Results based on data collected through 1993

Lowest Recorded Temperature

	Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
°F	18	21	24	29	40	49	53	63	67	57	40	23	18
°C	-7	-6	-4	-1	4	9	11	17	19	13	4	-5	-7

Years Charted: 47 **Source:** National Weather Service, San Francisco
Results based on data collected through 1993

Mean Number of Days Below 32°F/0°C

	Total	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Days	3	2	1	---	0	0	0	0	0	0	0	---	1

Years Charted: 30 **Source:** National Weather Service, San Francisco
Results based on data collected through 1993

Average Precipitation

	Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
in.	43.92	1.99	3.08	3.01	1.15	3.1	5.48	6.58	7.61	5.98	2.02	1.77	2.15
mm	1115	50	78	76	29	78	139	167	193	151	51	44	54

Years Charted: 30 **Source:** National Weather Service, San Francisco
Results based on data collected from 1961 - 1990

Average Snowfall

	Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
in.	0	0	0	0	0	0	0	0	0	0	0	0	0
mm	0	0	0	0	0	0	0	0	0	0	0	0	0

Years Charted: 47 **Source:** National Weather Service, San Francisco
Results based on data collected through 1993

Mean Number of Clear Days

	Total	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Days	102	9	9	11	11	11	6	3	3	5	12	12	10

Years Charted: 47 Source: National Weather Service, San Francisco
Results based on data collected through 1993

Average Morning Relative Humidity

	Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
%	88	87	86	87	87	86	87	87	90	91	89	88	87

Years Charted: 30 Source: National Weather Service, San Francisco
Results based on data collected through 1993

Average Afternoon Relative Humidity

	Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
%	58	59	56	55	51	52	60	63	64	61	57	57	59

Years Charted: 30 Source: National Weather Service, San Francisco
Results based on data collected through 1993

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

AGGREGATE SYSTEM

FINE AGGREGATE CODE FORM

SOURCE IDENTIFICATION

PROJECT NO. ______ PAY ITEM NO. ______ MATERIAL NO. ______

SAMPLE NO. 1 LAB NO. 1 TESTED BY PDPG DATE SAMPLED 02/22/01

SAMPLED BY FRANK M. DATE TESTED 02/23/01 SOURCE NO. (MINE/TERMINAL) ______ MINE NO. ______

MATERIAL IDENTIFICATION

MATERIAL CODE ______ MATERIAL TYPE ______ SAMPLE TYPE ______ SAMPLED FROM ______

PROCESS ______

INFORMATION ______

TEST RESULTS

FM ______ TARGET FM ______ PASS 200 10.26 APPARENT 2.815

______ TYPE GV ______ MOISTURE CONTENT 0.4% ABSORP. 0.4%

% CARB ______ MOD L.A. ______ SPGR(DRYBULK) 2.786 MOD GRAD ______

BULK(SSD) 2.796 DES MIX ______

ASPHALT / CONCRETE PLANT NO. ______

REMARKS NFCT MATERIAL

SAMPLE WT. 411.5 gms/lbs -DRY WT. 381.4 = loss 30.1 + PAN WT. 12.1

WEIGHT (WT.)

%-200=[(Origional Dry Wt. -Dry Wt. After Washing)+Minus 200 Matelal From Dry Sieving] x 100/origional Dry Wt.

Gradation 411.5

	SIEVE SIZE	ACCUM WT		% WEIGHT	% RETAINED		% PASSING	REMARKS
1	3/8"-9.5mm	0.0		0.0%	0.0%		100.0%	
2	No.4-4.75mm	2.6		0.6%	0.6%		99.4%	
3	No.10-2.00mm	5.7		1.4%	1.4%		98.6%	
4	NO.40-425um	179.1		43.5%	43.5%		56.5%	
5	NO.80-180um	296.9		72.2%	72.2%		27.8%	
6	NO.100-150M	320.2		77.8%	77.8%		22.2%	
7	NO.200-75M	368.40		89.5%	89.5%		10.5%	
TOTAL WEIGHT		380.50						

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
AGGREGATE SYSTEM
FINE AGGREGATE CODE FORM

SOURCE IDENTIFICATION

PROJECT NO. ______ PAY ITEM NO. ______ MATERIAL NO. ______

SAMPLE NO. 2 LAB NO. 2 TESTED BY PDPG DATE SAMPLED 02/22/01

SAMPLED BY FRANK M. DATE TESTED 02/23/01 SOURCE NO. (MINE/TERMINAL) ______ MINE NO. ______

MATERIAL IDENTIFICATION

MATERIAL CODE ______ MATERIAL TYPE ______ SAMPLE TYPE ______ SAMPLED FROM ______

PROCESS ______

INFORMATION ______

TEST RESULTS

FM ______ TARGET FM ______ PASS 200 9.26 APPARENT ______

TYPE GV ______ MOISTURE CONTENT 0.3% ABSORP. ______

% CARB ______ MOD L.A. ______ SPGR(DRYBULK) ______ MOD GRAD ______

BULK(SSD) ______ DES MIX ______

ASPHALT / CONCRETE PLANT NO. ______

REMARKS NFCT MATERIAL

SAMPLE WT. 444.8 gms/lbs -DRY WT. 417.4 = loss 27.4 + PAN WT. 13.8

WEIGHT (WT.)

%-200=[(Origional Dry Wt. -Dry Wt. After Washing)+Minus 200 Mateial From Dry Sieving] x 100/origional Dry Wt.

Gradation 444.8

	SIEVE SIZE	ACCUM WT	% WEIGHT	% RETAINED	% PASSING	REMARKS
1	3/8"-9.5mm	0.0	0.0%	0.0%	100.0%	
2	No.4-4.75mm	2.5	0.6%	0.6%	99.4%	
3	No.10-2.00mm	4.7	1.1%	1.1%	98.9%	
4	NO.40-425um	199.6	44.9%	44.9%	55.1%	
5	NO.80-180um	327.0	73.5%	73.5%	26.5%	
6	NO.100-150M	351.6	79.0%	79.0%	21.0%	
7	NO.200-75M	401.80	90.3%	90.3%	9.7%	
	TOTAL WEIGHT	415.60				

Screen or mesh size

In the language of the sandblaster the size of the blasting grit is referred to as the mesh or screen size. The screen number is the number of equal size holes in a 1" square screen. The larger the number, the more holes and therefore the smaller each hole is. The lower the number the coarser the media. Please note that the screen material takes up space so a #4, which has 4 holes per square inch is not 1/4" in size. It is actually about 3/16" or 1/16" less then 1/4".

The size of a particle of blasting grit is the number given to the smallest screen it will pass through. In other words if something passes through a #30 screen but stops at the #25 screen it is known as a #30.

In blasting you want to have a mix of sizes to give the best cleaning and profile so you normally see sizes like 20/40. This means that most of what is in the mix is a #30 with part of it finer, up to a #40 and some of it coarser, down to a #20.

The terms fine, medium or coarse or the numbers 0, 00, 000 or 2, 3 or 4 given out by some manufacturers are not what you want to use to compare sizes between two companies. One companies fine can be someone else's medium.

For your information:

- Regular ground coffee is approximately a 16/40 mesh.
- Sugar is about a 50/80 mesh.
- Table salt around a 30/80 mesh.
- Fine ground black pepper is a 30/50 mesh.

The following is a friendly comparison chart of National Bureau of Standards (NBS) screen sizes used in the blasting industry

Screen Number	Size in MM	Size in Inches	Nearest Fraction*
4	4.75	.187	3/16"
5	4.00	.157	5/32"
6	3.35	.132	1/8"
7	2.80	.111	
8	2.36	.0937	3/32"
10	2.00	.0787	5/64"
12	1.70	.0661	
14	1.40	.0555	
16	1.18	.0469	3/64"
18	1	.0394	

20	.85	.0331	
25	.71	.0278	1/32"
30	.60	.0234	
35	.50	.0197	
40	.425	.0165	
45	.355	.0139	1/64"
50	.300	.0117	
80	.180	.0070	
100	.150	.0053	
120	.125	.0049	
200	.075	.0029	
325	.045	.0017	

*Close to, but not exact in every case!

Got a question - sales@sandblaster.com is the address for answers.

RINKER Environmental Services, INC.

COMPQAP #950491
HRS #E86538

Materials Analysis Report

REPORT DATE 2/19/98
SAMPLE DATE 2/4/98
SAMPLE SOURCE [redacted]
REFERENCE 46
R.E.S. ID NUMBER 8920
SAMPLE TYPE Black Sand

PARAMETER	RESULT	UNITS	METHOD	D. LIMITS	ANALYSIS DATE	ANAL INITIAL
Arsenic	0.6	mg/kg	7060	0.5	2/9/98	PEP
Barium	379	mg/kg	7080	0.9	2/10/98	PEP
Cadmium	0.05	mg/kg	7131	0.02	2/6/98	PEP
Chromium	35.4	mg/kg	7191	0.8	2/10/98	PEP
Mercury	BDL	mg/kg	7471A	1.0	2/5/98	PEP
Lead	7.0	mg/kg	7420	0.1	2/11/98	PEP
Selenium	0.5	mg/kg	7740	0.4	2/9/98	PEP
Silver	BDL	mg/kg	7761	0.1	2/6/98	PEP
Copper	14.5	mg/kg	7210	1.0	2/11/98	JSP
Zinc	43.0	mg/kg	7950	1.0	2/11/98	JSP

Juan A. Gonzalez

Juan Gonzalez
QA/QC Manager

RINKER Environmental Services, INC.

COMPQAP #950491
HRS #E86536

Materials Analysis Report

REPORT DATE	2/19/98
SAMPLE DATE	2/4/98
SAMPLE SOURCE	[redacted]
REFERENCE	48
R.E.S. ID NUMBER	8921
SAMPLE TYPE	Black Sand

PARAMETER	RESULT	UNITS	METHOD	D. LIMITS	ANALYSIS DATE	ANAL INITIAL
Arsenic	1.1	mg/kg	7060	0.5	2/9/98	PEP
Barium	580	mg/kg	7080	0.9	2/10/98	PEP
Cadmium	0.12	mg/kg	7131	0.02	2/6/98	PEP
Chromium	49.7	mg/kg	7191	0.8	2/10/98	PEP
Mercury	BDL	mg/kg	7471A	1.0	2/5/98	PEP
Lead	29.5	mg/kg	7420	0.1	2/11/98	PEP
Selenium	BDL	mg/kg	7740	0.4	2/9/98	PEP
Silver	BDL	mg/kg	7761	0.1	2/6/98	PEP
Copper	2850	mg/kg	7210	1.0	2/11/98	JSP
Zinc	865	mg/kg	7950	1.0	2/11/98	JSP

Juan A. Gonzalez

Juan Gonzalez
QA/QC Manager

RINKER Environmental Services, INC.

COMPQAP #950491
HRS #E86536

Materials Analysis Report

REPORT DATE	2/19/98
SAMPLE DATE	2/4/98
SAMPLE SOURCE	[redacted]
REFERENCE	48
R.E.S. ID NUMBER	8922
SAMPLE TYPE	Black Sand

PARAMETER	RESULT	UNITS	METHOD	D. LIMITS	ANALYSIS DATE	ANAL. INITIAL
Arsenic	1.3	mg/kg	7060	0.5	2/9/98	PEP
Barium	170	mg/kg	7080	0.9	2/10/98	PEP
Cadmium	0.03	mg/kg	7131	0.02	2/6/98	PEP
Chromium	32.8	mg/kg	7191	0.8	2/10/98	PEP
Mercury	BDL	mg/kg	7471A	1.0	2/5/98	PEP
Lead	7.5	mg/kg	7420	0.1	2/11/98	PEP
Selenium	BDL	mg/kg	7740	0.4	2/9/98	PEP
Silver	BDL	mg/kg	7761	0.1	2/6/98	PEP
Copper	39.1	mg/kg	7210	1.0	2/11/98	JSP
Zinc	76.5	mg/kg	7950	1.0	2/11/98	JSP

Juan A. Gonzalez

Juan Gonzalez
QA/QC Manager

Internal Cnt / BlkSnd-Feb98

RINKER Environmental Services, INC.

COMPQAP #950491
HRS #E86536

Materials Analysis Report

REPORT DATE	2/19/98
SAMPLE DATE	2/4/98
SAMPLE SOURCE	[redacted]
REFERENCE	79
R.E.S. ID NUMBER	8923
SAMPLE TYPE	Black Sand

PARAMETER	RESULT	UNITS	METHOD	D. LIMITS	ANALYSIS DATE	ANAL. INITIAL
Arsenic	BDL	mg/kg	7060	0.5	2/9/98	PEP
Barium	1030	mg/kg	7080	0.9	2/10/98	PEP
Cadmium	0.06	mg/kg	7131	0.02	2/6/98	PEP
Chromium	49.2	mg/kg	7191	0.8	2/10/98	PEP
Mercury	BDL	mg/kg	7471A	1.0	2/5/98	PEP
Lead	13.0	mg/kg	7420	0.1	2/11/98	PEP
Selenium	BDL	mg/kg	7740	0.4	2/9/98	PEP
Silver	BDL	mg/kg	7761	0.1	2/6/98	PEP
Copper	45.0	mg/kg	7210	1.0	2/11/98	JSP
Zinc	21.2	mg/kg	7950	1.0	2/11/98	JSP

Juan A. Gonzalez

Juan Gonzalez
QA/QC Manager

RINKER Environmental Services, INC.

COMPQAP #950491
HRS #E86536

Materials Analysis Report

REPORT DATE	2/19/98
SAMPLE DATE	2/4/98
SAMPLE SOURCE	[redacted]
REFERENCE	38
R.E.S. ID NUMBER	8924
SAMPLE TYPE	Black Sand

PARAMETER	RESULT	UNITS	METHOD	D. LIMITS	ANALYSIS DATE	ANAL. INITIAL
Arsenic	BDL	mg/kg	7060	0.5	2/9/98	PEP
Barium	215	mg/kg	7080	0.9	2/10/98	PEP
Cadmium	0.02	mg/kg	7131	0.02	2/6/98	PEP
Chromium	24.0	mg/kg	7191	0.8	2/10/98	PEP
Mercury	BDL	mg/kg	7471A	1.0	2/5/98	PEP
Lead	6.0	mg/kg	7420	0.1	2/11/98	PEP
Selenium	BDL	mg/kg	7740	0.4	2/9/98	PEP
Silver	BDL	mg/kg	7761	0.1	2/6/98	PEP
Copper	68.0	mg/kg	7210	1.0	2/11/98	JSP
Zinc	18.8	mg/kg	7950	1.0	2/11/98	JSP

Juan A. Gonzalez

Juan Gonzalez
QA/QC Manager

Internal.Cst/ BlkSnd-Feb98

TYPICAL CHEMICAL ANALYSIS
BLACK SAND - BOILER SLAG

Bulk Materials International Company Inc.

silicon dioxide	SiO_2	43.2%
aluminum oxide	Al_2O_3	18.5%
iron oxide	Fe_2O_3	27%
magnesium oxide	MgO	2%
calcium oxide	CaO	7%
sulfur trioxide	SO_3	3%

Southeastern Environmental
Laboratories, Inc.
80 Industrial Loop North, Building 5
Orange Park, FL 32073
(904) 269-6176

DHRS E-82179

CQAP # 880633G

Conrad Yelvington
460 Bay Point Way N.
Jacksonville, Florida 32259

Sampled By: Client
Client Job/PO No.:
Project Name: NFCT
Submission Number: 10006422
Reported Date: 2/23/01

Description **Sample ID**

Gross

Sample Date: 2/21/01

Parameter	Result	Units	Method	Date/Time
Arsenic	U 0.100	mg/kg	6010	2/22/01
Barium	796	mg/kg	6010	2/22/01
Cadmium	U 0.030	mg/kg	6010	2/22/01
Chromium	115	mg/kg	6010	2/22/01
Copper	599	mg/kg	6010	2/22/01
Iron	256	mg/l	6010	2/23/01
Lead	16.3	mg/kg	6010	2/22/01
Mercury	0.091	mg/kg	7470	2/23/01
Nickel	33.5	mg/kg	6010	2/22/01
Selenium	U 0.200	mg/kg	6010	2/22/01
Silver	U 0.030	mg/kg	6010	2/22/01
Zinc	112	mg/kg	6010	2/22/01

Southeastern Environmental
Laboratories, Inc.
80 Industrial Loop North, Building 5
Orange Park, FL 32073
(904) 269-6176

DHRS E-82179

CQAP # 880633G

Conrad Yelvington
460 Bay Point Way N.
Jacksonville, Florida 32259

Post-it® Fax Note 7671	Date 2-26	# of pages ▶ 3
To Frank Milton	From Wanda	
Co./Dept.	Co.	
Phone #	Phone #	
Fax #	Fax #	

Sampled By: Client
Client Job/PO No.:
Project Name: NFCT
Submission Number: 10006422
Reported Date: 2/23/01

Description **Sample ID**

Fines (-200)

Sample Date: 2/21/01

Parameter	Result	Units	Method	Date/Time
Arsenic	U 0.100	mg/kg	6010	2/22/01
Barium	696	mg/kg	6010	2/22/01
Cadmium	U 0.030	mg/kg	6010	2/22/01
Chromium	124	mg/kg	6010	2/22/01
Copper	793	mg/kg	6010	2/22/01
Iron	268	mg/l	6010	2/23/01
Lead	229	mg/kg	6010	2/22/01
Mercury	0.634	mg/kg	7470	2/23/01
Nickel	35.9	mg/kg	6010	2/22/01
Selenium	U 0.200	mg/kg	6010	2/22/01
Silver	U 0.030	mg/kg	6010	2/22/01
Zinc	126	mg/kg	6010	2/22/01

Southeastern Environmental
Laboratories, Inc.
80 Industrial Loop North, Building 5
Orange Park, FL 32073
(904) 269-6176

DHRS E-82179

CQAP # 880633G

Conrad Yelvington
460 Bay Point Way N.
Jacksonville, Florida 32259

Sampled By: Client
Client Job/PO No.:
Project Name: NFCT
Submission Number: 10006422
Reported Date: 2/23/01

Description | Sample ID

SPLP

Sample Date: 2/21/01

Parameter	Result	Units	Method	Date/Time
Arsenic	U 0.100	mg/l	1312/6010	2/22/01
Barium	0.420	mg/l	1312/6010	2/22/01
Cadmium	U 0.030	mg/l	1312/6010	2/22/01
Chromium	U 0.050	mg/l	1312/6010	2/22/01
Lead	U 0.100	mg/l	1312/6010	2/22/01
Mercury	U 0.005	mg/l	1312/7470	2/23/01
Selenium	U 0.200	mg/l	1312/6010	2/22/01
Silver	U 0.030	mg/l	1312/6010	2/22/01
Copper	3.27	mg/l	1312/6010	2/22/01
Iron	5.76	mg/l	1312/6010	2/23/01
Nickel	0.027	mg/l	1312/6010	2/22/01
Zinc	7.28	mg/l	1312/6010	2/22/01

Approved By: Radford Murphy

Advanced Environmental Laboratories, Inc.

Aanlytical Report

Client: Gulf Marine Repair.
Project No.: 32937
Matrix: TCLP Extract

Report No.: J001042
Date Sampled: Unknown
Date Submitted: 5/9/00
Date Reported: 5/11/00
Page No.: 2 of 2

[redacted]
Units: mg/L

				Lab Code:	J001042-1	J001108-1-mb
Aanlyte	**Method**	**MRL**	**TCLP Limits**	**Date Aanlyzed**	**Sand Blast**	**Method Blank**
Arsenic	6010B	0.050	5.0	5/10/00	U	U
Barium	6010B	0.25	100	5/10/00	0.568	U
Cadmium	6010B	0.025	1.0	5/10/00	U	U
Chromium	6010B	0.05	5.0	5/10/00	U	U
Lead	6010B	0.050	5.0	5/10/00	U	U
Selenium	6010B	0.05	1.0	5/10/00	U	U
Silver	6010B	0.05	5.0	5/10/00	U	U
Mercury	7470A	0.0020	0.20	5/10/00	U	U

GALE EUSTACE

U: Not detected above the MRL
MRL. Method Reporting Limit

SCHNEIDER LABORATORIES

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LABORATORY ANALYSIS REPORT

EPA SW846 Method 1311 (Toxicity Characteristic Leachate Procedure)

ACCOUNT:	4869-99-23	DATE COLLECTED:	7/27/99
CLIENT:	Worth Contracting	DATE RECEIVED:	7/29/99
ADDRESS:	2112 Jernigan Rd	DATE ANALYZED:	8/2/99
	Jacksonville, Fl. 32207	DATE REPORTED:	8/2/99
P.O.#:			
PROJECT NAME:	Washington Terrace	SAMPLE TYPE:	TCLP
PROJECT NO.:	239		
JOB LOCATION:	St. Pete, Fl.		
CLIENT SAMPLE NO.:	23010		
SLI SAMPLE NO.:	1998319		

METAL NAME:	ACTUAL CONC.	UNITS	ANALYSIS METHOD	REGULATORY LIMIT(ppm)
Arsenic (As)	<0.04	ppm	EPA 6010	5.0
Barium (Ba)	1.19	ppm	EPA 6010	100.0
Cadmium (Cd)	<0.02	ppm	EPA 6010	1.0
Chromium (Cr)	0.05	ppm	EPA 6010	5.0
Lead (Pb)	<0.20	ppm	EPA 7420	5.0
Mercury (Hg)	<0.005	ppm	EPA 7470	0.2
Selenium (Se)	<0.05	ppm	EPA 6010	1.0
Silver (Ag)	<0.02	ppm	EPA 6010	5.0

SAMPLE TYPE: Blast Waste
SAMPLE pH: 8.35
ANALYST: CAROLYN C. RING

REVIEWED BY Matthew D. Asbury, Analyst

*Quality Control Data available upon request. *For true values, assume 2 significant figures. Sample concentrations below the Minimum Reporting Limit are indicated with a "less than" (<) sign. Note on measurement units: mg/L = ppm (parts per million). All testing is done in strict accordance with Schneider Laboratories, Inc. protocol.*

DHRS # 82315

Southeastern Environmental Laboratories, Inc.
80 Industrial Loop North, Building 5
Orange Park, FL 32073
(904) 269-6176

DHRS E-82179

CQAP # 880633G

Conrad Yelvington
460 Bay Point Way N.
Jacksonville, Florida 32259

Sampled By: Client
Client Job/PO No.: H/S - [illegible]
Project Name: Sandblasting Abrasive
Submission Number: 9900160
Reported Date: 11/17/99

Description	**Sample ID**
Sandblasting Abrasive	

Sample Date: 11/10/99

Parameter	**Result**	**Units**	**Method**	**Analyst Initials**	**Date/Time**
Arsenic	U 0.25	mg/l	1311/6010	VP	11/17/99
Barium	0.13	mg/l	1311/6010	VP	11/17/99
Cadmium	U 0.10	mg/l	1311/6010	VP	11/17/99
Chromium	U 0.10	mg/l	1311/6010	VP	11/17/99
Lead	U 0.10	mg/l	1311/6010	VP	11/17/99
Mercury	U 0.005	mg/l	1311/7471	VP	11/17/99
Selenium	U 0.25	mg/l	1311/6010	VP	11/17/99
Silver	U 0.20	mg/l	1311/272.1	VP	11/17/99

5 Day Turn Around

Approved By: [signature]

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Mr. William Leffler PE
Permitting Engineer
Division of Air Resources Management
Dept of Environmental Protection
3900 Commonwealth BLVD
Tallahassee FL 32399-3000

Virginia Materials
3306 Peterson Street, Norfolk, VA 23509-2415
Phone: 757-855-0155, FAX: 757-857-5631

BENEFICIAL REUSE AND DISPOSAL OF SPENT ABRASIVES PROGRAM

TOMORROW'S FUTURE STARTS TODAY!

TABLE OF CONTENTS

Background

Virginia Material's program for the removal of spent abrasives has been developed to meet the increased need to recycle waste products rather than dumping those materials in landfills. The use of spent abrasives in the portland cement manufacturing process converts a waste material into a useful product, thus removing the potential risk that landfilled abrasive wastes may have should they become a future problem. By using your spent abrasive as a raw material in a new product it "*Breaks the chain of custody*!"

On October 28, 1997; Virginia Materials was issued the first and so far the only permit for a Materials Recovery Facility in the Commonwealth of Virginia which serves as a spent blast grit reprocessing facility at its location - 3306 Peterson Street, Norfolk, Virginia. To date more the 150,000 tons have been recycled which otherwise would have been destined to be placed into landfills. Of course at the same time this eliminates depletion of our natural resources and minerals that would have been used otherwise.

Working with the Department of Environmental Quality and our cement industry consultant, Bulk Materials we have developed standards to enable us to meet the relevant regulatory requirements as well as kiln requirements by sampling: testing and classifying spent abrasive blasting materials. Materials meeting the criteria for acceptance by us are now processed and transported by rail to cement plants. In general, the only spent abrasives that will be unacceptable for shipping will be those containing more than 5 parts per million (PPM) of lead when tested by the TCLP leachate extraction procedure or otherwise considered hazardous.

The procedures and fee for removal and disposal will depend on the volume and location of the spent abrasive. Our customer's responsibility will be to provide assistance with sampling and testing of the waste material prior to moving and classification then to provide facilities and labor for loading of accepted material into dump trailers, or trucks, dumpsters, rail cars, barges, or VM bins prior to shipment to Norfolk.

Virginia Materials offers this spent abrasive disposal service to provide a cost-effective method of reprocessing a waste material to provide a new, useful product and reduce the amount of material being placed in landfills. Please contact Ben Burns at VM if we can be of assistance to you with this program.

Your Responsibilities

The Commonwealth of Virginia Department of Environmental Quality Division of Waste Operations Guidance Document No. 97-2001 sets the standard for the handling, storage and disposal of spent sandblasting abrasives for the Commonwealth of Virginia. Other states will have similar rules and regulations and should be read and understood by those concerned.

The items of most importance to the facility where the sandblasting is taking place are contained in section III and section IV and paraphrased here:

From Section III

"Appropriate Container" as pertains to spent and/or discarded sandblast grit falls into two categories; long term (i.e., longer than 90 days) and short term (i.e., less than or equal to 90 days):

- *for long term storage, means an enclosed building, tank, or impermeable pad with curbs and drains. Containers which are not covered must be capable of collecting and controlling, in addition to the material contained, the water volume resulting from a 24-hour, 25 year storm event. Also, containers for long term storage must have outlets or drains for proper removal of collected liquids to a sanitary sewer or holding tank for ultimate disposal at an approved publicly-owned treatment works (POTW) or other permitted wastewater treatment facility;,*
- *for short term storage, means dumpsters or roll off containers which are covered with a tarp, or an enclosed building, or if material is piled on the ground (i.e., a waste pile), a berm around such pile, with the pile covered with a tarp. These containers must be designed to minimize run-on and run-off.*

From Section IV

1. *Spent sandblast grit from sandblasting operations that is being generated on a site shall be stored or in appropriate containers for no more than 90 days. No spent sandblast grit may be brought from off-site. Best management practices for the sandblasting operations shall be implemented so that the spent sandblast material is not discharged to state waters.*

As you can see from the above it is required that the sandblasting facility to remove all spent abrasives with in the defined "short term" period of 90 days.

Don't take a chance, Virginia Materials has the necessary facilities for storage and processing of your spent abrasives.

How it Works

CHANGING WASTE INTO A USEFUL PRODUCT

All of the spent sandblast abrasives accepted by our licensed Material Recovery Facility at Virginia Materials are presently processed and transported to a cement kiln manufacturer. There they are used as a raw material "feed stock" and are mixed with other raw materials to produce Portland Cement. This mix of materials is processed and burned in a kiln with a 3,400°F temperature achieving a material temperature of 2,800°F. The spent sandblast abrasives are chemically changed and recycled to create a "risk-free" environmentally safe product called a clinker which is cooled and ground into portland cement.

LEAD BASED COATING REMOVAL

Are you faced with removing lead-based paints? Blastox has become the recognized leader for the removal of lead based and other heavy metals paints. When properly utilized, sandblasting abrasives pre-blended with Blastox will not mask hazardous lead waste. A potentially lead contaminated hazardous waste will become non-hazardous waste and can be placed in our Beneficial Reuse Program.

Virginia Materials is an authorized blender of Blastox and will accept the used material into our Beneficial Reuse Program.

PROGRAM MANAGER

Mr. Benjamin Burns has been appointed our "Beneficial Reuse Program" Manager. Ben has been coordinating Virginia Materials efforts and oversees the program since its inception. Ben is a graduate of Old Dominion University with a strong work ethic and gets the job done right the first time.

Ben Burns along with all the Virginia Materials staff is ready to help you with "Beneficial Reuse" including transportation, TCLP procedures, and with any other questions or concerns that may arise. Call Ben anytime!

Beneficial Reuse Participants

We are proud to highlight a few of our fine customers who have taken the initiative on their own to start recycling voluntarily. Thus helping themselves and the environment.

Alco Welding	Ampro
Bay Mechanical	Colonnas Shipyard
Consolidated Launcher	Hico
Holmes Brothers	Huntsman Chemical
Lockly Mfg.	Marine Hydraulics
Metro Machine	Mid Atlantic Coatings
Moon Engineering	Norfolk Naval Shipyard
Norshipco	Oilfield Pipe & Supply
Reliable Trash	Riggins
Superior Disposal	Technico
Vanwin Coatings	Virginia Machine
	North Carolina DOT

Service Fees

Our charge to you for processing and transportation to the portland cement manufacturer is $23.90/Ton FOB Virginia Materials.

In certain situations, based upon large volume, it is possible to develop a reduced service fee. Upon your request we will be happy to design a program to meet you specific goals.

Please note that we must have a TCLP report on the material to assure that it is non-hazardous before shipment and handling.

Transportation

There are a number of ways for you to get the spent abrasive material to us that we can arrange for you. The least expensive is generally via dump trailer or truck; however, roll off containers may be used.

We also offer customers who use our steel bins to take delivery of new abrasive the option to return the spent material in the same bins, at no additional cost then what you would normally pay for return of the empty bins.

The use of bulk bags or super sacks is another permissible method to return spent abrasives back to us. This can work well when the new abrasives are purchased in the super sacks and you, the user refill it for transportation via truck, rail or boat if tonnages warrant it.

For large volume disposal needs in excess of 80 tons and it the distance is considerable, Virginia Materials may be able to arrange for the use of open top hopper rail cars.

Examples of cleaning rates of some common abrasives:

Abrasive	Consumption	Production Rate	Comments
Silica Sand 16/40 mesh	2.6 lbs/sq/ft	4.75 sq/ft/min	1.5 mil profile Dusty
Coal Slag 12/40 mesh	3.2 lbs/sq/ft	3.83 sq/ft/min	2.5 - 3 mil profile Medium dust and embeddment
Steel Grit #40	5.5 lbs/sq/ft	3.06 sq/ft/min	2.5 mil profile No dust, but high embeddment
Garnet #36	3.6 lbs/sq/ft	3.55 sq/ft/min	1.5 mil profile Medium dust and embeddment
Aluminum Oxide #36	3.1 lbs/sq/ft	4.58 sq/ft/min	1.5 mil profile Very little dust
Staurolite 50/100 mesh	3.1 lbs/sq/ft	4.85 sq/ft/min	.5 mil profile medium dust
Copper Slag 16/40 mesh	3.1 lbs/sq/ft	4.36 sq/ft/min	2 mil profile Medium dust and embeddment
Brown Blast 16/50 mesh	1.5 lbs/sq/ft	3.0 sq/ft/min	3 mil profile Medium dust and embeddment
Glass Grit 8/40 mesh	2.8 lbs/sq/ft	3.33 sq/ft/min	4 mil profile Medium dust and embeddment
Crystalgrit 20/70 mesh	1.5 lbs/sq/ft	5.97 sq/ft/min	3 - 4 mil profile Very low dust and embeddment

The above numbers were derived from tests by Virginia Materials and others including SSPC. All testing was done with a #6 (3/8") nozzle at 100 PSI and blasting to a SSPC 10 (near white finish) on new steel with mil scale only.

Many, many, many factors contribute to the consumption and production rates of abrasive blasting and your results may be very different from the above. This is only for comparison purposes to show the **typical differences** between materials.

Revised: October 05, 2000.

Beneficial Reuse Program

Handling spent abrasives with common sense and the environment in mind!

It has come to our attention in recent years that disposing of the spent abrasive is frequently almost as costly as actually buying the grit. In order to help customers with this problem, Virginia Materials has come up with a solution that not only helps our customers but also helps to preserve the environment.

Instead of disposing of the spent grit in landfills, as is customary, Virginia Materials accepts spent grit from our customers. After collecting and screening the grit to ensure the removal of all oversize trash we ship it to a portland cement manufacturer as a feed stock. The cement company superheats this raw material to a molten state (2600° F) along with other materials and uses it to make clinker, which is then ground up and used to produce portland cement. Thus, our customers no longer need to take up precious landfill space with tons of waste grit which can be better used to make a useful end product, which will probably itself be recycled, as concrete is almost infinitely recyclable these days. This also reduces the use of our natural resources by cutting into the use of precious minerals that would have been used.

Another benefit of this beneficial reuse plan is that the waste grit is safely disposed of in a manner whereby it will never become a problem and be traced back to the generator, as can happen with land filling. Such as could be the case in a "Superfund Site" with liability to everyone who disposed of something in it - hazardous or not! This plan is heartily endorsed by the Department of Environmental Quality Waste Division authorities and by all customers who have taken advantage of it. Virginia Materials is fully licensed by the State of Virginia as a material recovery facility.

To view our full program download this Adobe Acrobat file - Beneficial Reuse Program

Home	Information	What's New	Products

Virginia Materials and Supplies, Inc.
3306 Peterson Street~Norfolk, VA 23509
Phone (757) 855-0155~ Fax (757) 857-5631
Email jb@sandblaster.com

Material Safety Data Sheet
(Complies with 29 CFR 1910.1200)

Section I - General

Virginia Materials & Supplies, Inc. (VMS)
T/A Virginia Materials
3306 Peterson Street
Norfolk, VA 23509

EMERGENCY TELEPHONE NUMBERS:
(757) 855-0155
(800) 793-0094

Product Name: "Black Blast" Abrasives

CAS Number:	68476-96-0 Particles not otherwise **regulated**
Common Name:	Slag, Coal
Date:	May 1995

SECTION II - Ingredients

Slag, Coal 99% - 100%

Nuisance Dust		OSHA *PEL	ACGIH *TLV
Total Dust	:	15	10
Respirable Dust	:	5	5

*Values Expressed as mg/M3

SECTION III - Physical Data

Physical Form:	Solid (angular granules)	**Boiling Temperature:**	N/A	**Melting Point:**	Greater than 2300 F
Vapor Pressure/Density:	N/A	**Evaporation Rate:**	N/A	**Specific Gravity:**	2.7 g/cc (typical)
Water Solubility:	Negligible	**Color:**	Black	**Odor:**	None

SECTION IV - Fire and Explosion Data

Product is nonflammable and nonexplosive.

SECTION V - Reactivity Data

Product is stable under normal conditions of use, storage and transportation.

SECTION VI - Health Hazard Data

Low health risk by inhalation. Treat as a nuisance dust. Typical free silica less than 0.1%. This material is not a recognized carcinogen or cocarcinogen. Human toxic response has not been demonstrated for any route of entry. Mechanical irritation may occur to eyes, skin or respiratory tract. Pre-existing health conditions may be aggravated.
Carcinogenicity: NTP - no; IARC Monographs - no; OSHA Regulated - no.

FIRST AID:

In case of:

1. Eye contact - Immediately flush eyes thoroughly with water or an opthalmic saline solution.
2. Skin contact - Wash skin with soap and water if irritation occurs.
3. Inhalation - Remove affected person(s) to fresh air source.
4. Oral Intake - Rinse mouth with water.

IF SYMPTOMS PERSIST CONTACT PHYSICIAN OR OTHER MEDICAL PERSONNEL.

SECTION VII - Spill, Leak and Disposal Procedures

No special procedures required for clean-up. Wetting with water will reduce airborne dust. Uncontaminated product does not exceed Toxicity Characteristic Leaching Procedure (TCLP) limits and may be disposed of as an inert material in an appropriate solid waste landfill according to applicable Federal, State and Local regulations.

SECTION VIII - Control Measures

Use appropriate NIOSH certified respiratory protection when exposure limits may be exceeded. Maintain sufficient ventilation to allow visual contact with work surfaces. Appropriate abrasive blaster's protective equipment is required, which may also include gloves, hood with protective lens, safety glasses and hearing protection.

SECTION IX - Special Precautions

Keep product dry and free of all contamination to assure free flow. Use an appropriate safety screen over fill hatch of blasting pot. Respirable dust may be generated during pressure abrasive cleaning operations.

NOTE

The opinions expressed herein are those of qualified experts within Virginia Materials & Supplies, Inc. (VMS). VMS believes that the information contained herein is current and accurate for the normal and intended use of this product as of the date of the Material Safety Data Sheet. Since the use of this information and of those opinions or the conditions of use of the product are not within the control of Virginia Materials & Supplies Inc., it is the user's obligation to determine and observe the conditions of safe use and disposal of the product by their operations.

Revised 08/2/99 Supercedes 5/12/99

NAVAL FACILITIES ENGINEERING SERVICE CENTER
Port Hueneme, California 93043-4370

Technical Memorandum
TM-2178-ENV

RECYCLING AND REUSE OPTIONS FOR SPENT ABRASIVE BLASTING MEDIA AND SIMILAR WASTES

by

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April 1996

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This handbook is designed to help Navy personnel with waste minimization and pollution prevention efforts by assisting them to identify and apply recycling and resuse options for mineral-based spent abrasive blasting media (ABM) and similar waste materials. The handbook is intended as a technology transfer document to increase the awareness of recycling and reuse options for spent ABM and similar wastes. The following types of information will be included in the handbook: (1) defining the contaminant and matrix characteristics for ABM and similar wastes, (2) outlining specific technologies for recycling and reusing these wastes, and (3) describing how to identify and evaluate options for recycling and reusing these wastes.

Recycling spent ABM has the potential to significantly reduce waste generation while saving money. The reported production rate of spent ABM from eight U.S. Navy shipyards is in the range of 75,000 to 100,000 tons (68,000 to 90,800 metric tons) per year (Bryan et al., 1990). Promising waste minimization alternatives are available for managing ABM.

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CONTENTS

CONTENTS
(Continued)

APPENDICES

FIGURES

TABLES

ACRONYMS AND ABBREVIATIONS

AASHTO	American Association of State Highway and Transportation Officials
ABM	abrasive blasting media
ARRA	Asphalt Recycling and Reclaiming Association
ASTM	American Society for Testing and Materials
BDAT	Best Demonstrated Available Technology
BDL	below detection limit
Caltrans	California Department of Transportation
C&D	construction and demolition
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	*Code of Federal Regulations*
DNR	Department of Natural Resources
DTSC	(California) Department of Toxic Substances Control
EAF	electric arc furnace
EPA	Environmental Protection Agency
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FOB	free on board
FR	*Federal Register*
IGT	Institute of Gas Technology
MTPY	metric tons per year
NFESC	Naval Facilities Engineering Service Center
OAR	Oregon Administrative Rules
OMB	Office of Management and Budget
PCB	polychlorinated biphenyl
ppm	parts per million
R&D	research and development
RCRA	Resource Conservation and Recovery Act
SIC	Standard Industrial Classification
SITE	Superfund Innovative Technology Evaluation
SSPC	Steel Structures Painting Council
STLC	(California) Soluble Threshold Limit Concentration
TCLP	Toxicity Characteristic Leaching Procedure
TIM	(Washington Department of Ecology) Technical Information Memorandum
UCD	use constituting disposal

VISITT	Vendor Information System for Innovative Treatment Technologies
WAC	Washington Administrative Code
WET	(California) Waste Extraction Test

RECYCLING AND REUSE OPTIONS
FOR SPENT ABRASIVE BLASTING MEDIA
AND SIMILAR WASTES

1.0 INTRODUCTION

This handbook is designed to help Navy personnel with waste minimization and pollution prevention efforts by assisting them to identify and apply recycling and reuse options for mineral-based spent abrasive blasting media (ABM) and similar waste materials. The handbook is intended as a technology transfer document to increase the awareness of recycling and reuse options for spent ABM and similar wastes. The following types of information will be included in the handbook:

- defining the contaminant and matrix characteristics for ABM and similar wastes
- outlining specific technologies for recycling and reusing these wastes
- describing how to identify and evaluate options for recycling and reusing these wastes.

The handbook does not address steel shot, glass beads, plastic beads, sodium bicarbonate, or wheat starch ABM.

Recycling spent ABM has the potential to significantly reduce waste generation while saving money. The reported production rate of spent ABM from eight U.S. Navy shipyards is in the range of 75,000 to 100,000 tons (68,000 to 90,800 metric tons) per year (Bryan et al., 1990). Promising waste minimization alternatives are available for managing ABM.

Specific processes and vendors are mentioned in many sections of this technology transfer report. Mention of a process or a vendor does not constitute a recommendation or endorsement. All descriptions and data are taken from literature data. None of the reported results are based on data collected by or first-hand knowledge of the authors.

2.0 WASTE CHARACTERISTICS

This section describes the physical properties and chemical composition of slag and mineral ABM and the contaminant content of spent ABM and similar wastes.

2.1 Characteristics of Abrasive Blasting Media

This section describes the types of ABM used to remove paint from ships, bridges, and similar large structures documents the physical and chemical characteristics of the ABM.

2.1.1 Types of Abrasive Blasting Media used at Shipyards

Many types of ABM are used to remove paint, coatings, and/or corrosion from industrial structures. Any ABM used at a U.S. Navy shipyard or at a private shipyard working on U.S. Navy vessels must meet Mil-A-22262b(SH) specifications. The qualified ABM are listed in Appendix A. Processed coal and metallurgical slags are popular sources for ABM, but natural mineral materials may also be used. Slag blasting media are typically used once in a blasting operation and then discarded, although tougher materials such as garnet can be cleaned and reused.

One widely used type of ABM is made as a byproduct of coal combustion. The ABM is a fused ferro-alumino-silicate formed when molten slag from a coal combustion boiler is quenched in water. The water quench cools the slag quickly, resulting in an amorphous, noncrystalline particulate. Thermal shock from the rapid cooling fractures the slag into rough, angular particles. ABM can be produced from the slag particles simply by segregating different particle-size grades using screens (Austin, 1995). Higher quality ABM can be made by performing an initial crushing and screening followed by magnetic separation to remove metal particles. The upgraded slag particulate is then screened to separate size grades. The 11 companies that supply ABM made from coal slag had total volume and sales in 1992 of 442,000 tons (401,000 metric tons) and $19,500,000, respectively. Reed Minerals, the largest volume producer supplying about 62% of the sales, makes a product called Black Beauty™ (the use of trade names in this report does not necessarily constitute endorsement for use). Due to the dominance of the Black Beauty™ in the coal slag ABM market, many users incorrectly use the trade name as a generic term for coal slag ABM. Similar materials made by the other companies are marketed under other trade names such as Stan-Blast™ made by Stan-Blast Abrasives (17% of sales) and Black Diamond™ made by Foster Dixianan (10% of sales) (Paumanok, 1992).

ABM is also made from slag produced by pyrometallurgical processing to recover copper or nickel. The metallurgical slags are quenched to produce glassy fragments and then screened in the same manner as the coal slag. As with the coal slag, magnetic separation may be used to remove metal particles.

Copper slag is a mixture of ferrosilicate, ferro-alumino silicate, calcium silicate, magnesium silicate, and silica with trace amounts of antimony, arsenic, copper, and lead. Seven companies supply ABM made from copper slag with total volume and sales in 1992 of 187,000 tons (170,000 metric tons) and $10,300,000, respectively. The largest suppliers are Kleen-Blast Abrasives (37% of sales volume), Minerals Research and Recovery (29% of sales volume), RDM Multi-Enterprises (21% of sales volume), and MDC Industries (7.5% of sales volume) (Paumanok, 1992). The copper slag materials are marketed under trade names such as Sharp Shot™, Apache Black Hawk™, and Copper Blast™. The copper slag ABM product trade-named Kleen Blast™ is imported from Canada.

Nickel slag is a mixture of magnesium ferro-silicate and silica with trace amounts of other metals (Austin, 1995). There are two suppliers of nickel slag ABM in the United States market. Green Diamond Abrasives produces Green Diamond™ nickel slag using slag from a smelter near Riddle, Oregon, with total volume and sales in 1992 of 45,000 tons (40,800 metric tons) and $3,200,000, respectively. Kayway Industries imports about 5,000 tons/yr (4,540 metric tons/yr) of nickel slag ABM from Canada for sale in the United States (Paumanok, 1992).

Physical and chemical characteristics influence the recyclability of slag ABM. The regulatory status is the single most important factor because waste management practices controlled by the Resource Conservation and Recovery Act (RCRA) or state hazardous waste regulations reduce the flexibility in selecting and implementing recycling options. Physical properties such as particle size and shape and chemical properties such as total composition also affect the acceptance of spent ABM in commercial applications.

ABM produced from slag may contain elevated background levels of regulated metals. ABM from coal slag will typically contain nickel and vanadium and a variety of other metals depending on the coal that was used as the source of the slag. Copper slag from primary smelters contains elevated copper and barium levels and lower but significant levels of cobalt, trivalent chromium, and nickel. Copper slag from secondary smelters may contain significant levels of lead and arsenic. Nickel slag typically contains elevated concentrations of nickel, copper, and trivalent chromium and lower levels of cobalt and vanadium. Arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver are used to determine leachable metal toxicity by the U.S. Environmental Protection Agency (U.S. EPA) under RCRA. Some states, for example California, consider additional metals and total content as well as leachability in their definition of hazardous waste. It is unlikely but possible that unused ABM will be classified as a hazardous material by virtue of its background soluble or total metal content. A high background metals content in the virgin ABM means that the addition of a relatively small amount of metals-containing dust during blasting may cause the spent ABM to be classified as hazardous.

Most ABM are produced in at least three different particle size grades. In general, the coarser grades are more compatible with recycling as aggregate for portland cement concrete or asphaltic concrete because they mix better. Rounded particles are more suitable for use in portland cement, whereas sharp, angular particles are better for use in asphaltic concrete.

The chemical composition can affect the performance of spent ABM. The dark colors of slag ABM may limit acceptance in products with an appearance function where the slag materials replace lighter colored natural minerals. High chloride concentrations are undesirable in many applications. Sulfate concentrations or high alkali reactivity would make the ABM unsuitable for use as aggregate in portland cement.

Natural minerals such as silica sand, garnet, or staurolite are also used for ABM. Silica sand ABM is typically composed of mostly quartz with some garnet and feldspar and traces of lithic fragments such as hornblende. The fine silica particles produced by blasting with sand create a significant health concern, so use of sand as ABM is declining. Garnet is a general name for a family of complex silicate minerals having similar physical properties and crystal form. The general formula for garnet is $A_3B_2(SiO_4)_3$, where A can be calcium, magnesium, ferrous iron, or manganese and B can be aluminum, ferric iron, chromium, or (in rare cases) titanium. The most common garnet minerals for use as ABM are $Mg_3Al_2(SiO_4)_3$ (pyrope), $Fe_3Al_2(SiO_4)_3$ (almandite), and $Ca_3Fe_2(SiO_4)_3$ (andradite). Almandite and almandite-pyrope solid solutions make the best abrasive grains. Andradite is softer and breaks down more easily. Staurolite is $(Fe^{2+},Mg,Zn)_2Al_9(Si,Al)_4O_{23}(OH)_2$.

Mineral ABM may be naturally occurring sand or may be manufactured by crushing and size-grading using screens. Sand for abrasive blasting is produced by 48 companies operating 84 mines (Austin, 1995). Silica sand does not meet the requirements of the MIL-A-22262b(SH) specification due to the high free silica content. Ten firms produce garnet ABM with a total volume and sales in 1992 of 25,000 tons (22,700 metric tons) and $7,800,000, respectively (Paumanok, 1992). DuPont, marketing Starblast™, is the only supplier of staurolite ABM. Unofficial sources estimate the 1992 volume and sales for Starblast™ at 55,000 tons (50,000 metric tons) and $7,700,000, respectively (Paumanok, 1992). Similar to slag ABM, mineral ABM is available in different particle sizes, with the coarse grades more amenable to recycling into asphalt. However, unlike slag ABM, abrasives made from natural minerals contain low background metals concentrations. The matrix of mineral ABM is unlikely to contribute to total or leachable hazardous metals which can make recycling easier.

2.1.2 Physical Characteristics of Abrasive Blasting Media

As discussed above, the physical properties of ABM influence the selection of recycling options. Some key properties of unused slag and mineral ABM are shown in Table 2-1.

Table 2-1. Physical Properties of Unused Abrasive Blasting Media

Parameter	Coal Slag ABM Properties	Copper or Nickel Slag ABM Properties	Silica Sand ABM Properties	Garnet ABM Properties
Physical form	Angular, amorphous grains	Angular, amorphous grains	Rounded irregular, crystalline grains	Subangular, crystalline grains
Mesh sizes available (U.S. screen size)	10 to 100	8 to 80	6 to 270	8 to 300
CAS[(a)] number	68476-96-0	No data	No data	1302-62-1
Melting point (°F)	>2,000	2,400	No data	>2,280
Hardness (Mohs scale)	6 to 7.5	7 to 7.5	5 to 6	6.5 to 9
Bulk density lb/ft^3	75 to 100	84 to 95	100	130 to 147
Specific gravity	2.8	2.8 to 3.6	2.6	3.2 to 4.3
Water solubility	Negligible	Negligible	Negligible	Negligible
Color	Black	Black	White to tan	Wide variation, generally red to brown

(a) CAS is Chemical Abstracts Service.
Source: Compiled from Austin, 1995; Williams, 1991; and manufacturers' literature.

ABM is available in grades, based on particle size, ranging from extra coarse to very fine. The size grading available varies with the grit maker but some example particle size ranges for grades of expendable ABM are indicated in Table 2-2. The correspondence of screen size to screen opening is shown in Table 2-3 along with the Unified Soil Classification size ranges for sand, silt, and clay to provide a basis for comparing the size of ABM with typical soil materials.

Table 2-2. Example Screen Size Ranges for Abrasive Blasting Media[a]

U.S. Screen Size	Coarse (4.0 to 5.5 mil)[b]	Medium (3.0 to 4.0 mil)[b]	Fine (2.0 to 3.5 mil)[b]
6	0	0	0
8	5	0	0
12	25	3	0
16	33	37	0.4
20	17	28	11
30	12	19	43
40	6	9.2	34
50	1.5	3.1	8.5
pan	0.5	0.7	2.9

(a) Percent of sample retained on screen.
(b) Anchor pattern given by grade of grit.

2.1.3 Chemical Characteristics of Abrasive Blasting Media

This section summarizes some recent data about the total composition and leachable metals content of unused and spent ABM. As discussed in Section 2.1.1, slag media may contain elevated levels of regulated metals. Pigments in paint chips removed by ABM increase the leachable metal content of spent ABM. Some common pigments containing RCRA hazardous metals include red lead, white lead, chromium yellow, chromium orange, molybdate orange, zinc yellow, chromium green, and chromium oxide green (U.S. EPA, 1990b, EPA/530-SW-90-059Y). Spent ABM in shipyards can contain paint chips with copper- or tributyltin-based antifouling paints or lead-based primers.

2.1.3.1 Chemical Characteristics of Unused Media. The approximate chemical composition of some example slag and mineral ABM materials in unused condition is shown in Table 2-4. Most coal slag ABM contains only small quantities of RCRA-regulated metals, and the vitrified form provides a leach-resistant matrix, so hazardous metal leachability should be low. For example, all Toxicity Characteristic Leaching Procedure (TCLP) leachable metal concentrations from Black Beauty™ ABM, as shown in Table 2-5, are far below the regulatory level for a toxic leachable characteristic. Metallurgical slag typically will have higher residual metal content but is still unlikely to have a RCRA leachable toxicity characteristic in the unused condition. The natural mineral ABM materials should have low trace metal content (see Table 2-5). The Mil Spec for ABM requires that unused material pass both the RCRA and the California leaching tests.

2.1.3.2 Chemical Characteristics of Media Used on Ships. Mare Island Naval Shipyard in Vallejo, California generated about 2,000 tons (1,800 metric tons) per year of spent ABM from sand-blasting submarines. Mare Island used ABM derived from a slag copper smelting that is sold under the trade name of Kleen Blast™. The average bulk elemental composition of Kleen Blast™ is as follows:

Iron oxide as Fe_2O_3	23%
Silica as SiO_2	45%
Alumina as Al_2O_3	7%
Calcium as CaO	19%
Sodium as Na_2O	<0.2%
Potassium as K_2O	<0.1%
Magnesium as MgO	6%

Table 2-3. Correspondence of Screen Size Number to Opening Size

U.S. Screen Size	Opening Size (mm)	Opening Size (inches)	Unified Soil Classification
4	4.75	0.187	Coarse sand
6	3.35	0.132	
8	2.36	0.0937	
10	2.00	0.0787	
12	1.7	0.0661	Medium sand
14	1.4	0.0555	
16	1.18	0.0469	
18	1.00	0.0394	
20	0.850	0.0331	
30	0.600	0.0234	
40	0.425	0.0165	
50	0.300	0.0117	
60	0.250	0.0098	
70	0.212	0.0083	Fine sand
80	0.180	0.0070	
100	0.150	0.0059	
120	0.125	0.0049	
140	0.106	0.0041	
200	0.075	0.0029	
230	0.063	0.0025	Clay or silt[a]
270	0.053	0.0021	
325	0.045	0.0017	

(a) Clay is soil passing a 0.003-in (0.075-mm) screen that is plastic (putty-like) and has strength after drying in the air, and silt is soil passing a 0.003-in (0.075-mm) screen that shows little or no plasticity and has no strength when dried in the air.

Source: ASTM, 1995, Specification E 11 and Standard D 2487.

The total copper content of Kleen Blast™ is about 0.2%. Copper or tributyltin from antifouling paints and lead and other metals from paint pigments may increase the metal loading in the ABM during sandblasting. The types and concentrations of metals depend on the types of paints and coatings being removed. Typical metals concentrations in the spent ABM at Mare Island are shown below:

	mg/kg		mg/kg
Copper (Cu)	3,120	Cobalt (Co)	70
Barium (Ba)	1,080	Nickel (Ni)	62
Zinc (Zn)	197	Lead (Pb)	33
Vanadium (V)	118	Arsenic (As)	25
Chromium (Cr)	90		

Table 2-4. Chemical Composition of Unused Abrasive Blasting Media

Component	Coal Slag ABM Comp. (weight %)	Copper Slag ABM Comp. (weight %)	Silica Sand ABM Comp. (weight %)	Garnet ABM Comp. (weight %)
SiO_2	47.2	32 to 45	>99	36 to 37
Free SiO_2	<1	<1	>99	<1
Al_2O_3	21.4	3.0 to 7.0	0.15	20
FeO				30
Fe_2O_3	19.2	23 to 48	0.045	2 to 33
CaO	6.8	0 to 19	0.011	1 to 2
MgO	1.5	1.5 to 6.0	0.005	3 to 6
K_2O	1.6	<0.1 to 1.2		
TiO_2	1.0		0.013	2
Na_2O	0.6	<0.2		
MnO				1
As	<0.0001	0.01 to 0.04		<0.01
Co	0.00023	0.02 to 0.03		<0.01
Cr	0.00013	0.04 to 0.05		<0.01
Cu	0.00046	0.2 to 0.4		<0.01
Pb	0.00014	0.1 to 0.2		<0.01

Source: Compiled from Austin, 1995; Williams, 1991; and manufacturers' literature.

Table 2-5. Toxicity Characteristic Leaching Procedure Analysis Results for Unused Abrasives

Contaminant	Coal Slag Leachability[a] (mg/L)	Garnet Leachability (mg/L)	Regulatory Limit (mg/L)
Ag	BDL to 0.151	<0.05	5.0
As	BDL to 0.048	<0.1	5.0
Ba	BDL to 0.482	<0.1	100.0
Cd	BDL to 0.007	<0.02	1.0
Cr	BDL	<0.05	5.0
Hg	BDL to 0.041	<0.001	0.2
Pb	BDL to 0.605	<0.5	5.0
Se	BDL to 0.048	<0.1	1.0

(a) BDL = below detection limit.
Source: Reed Minerals, 1995.

2.1.3.3 Chemical Characteristics of Media Used on Bridges. The Commonwealth of Pennsylvania funded a study of beneficial reuse options for spent ABM used to remove lead-based paint from bridges (Weyand and Sutton, 1990). As part of the project, samples of spent coal slag and spent copper slag ABM were analyzed to determine the total composition and TCLP leachability. The total composition is shown in Tables 2-6 and 2-7 for coal and copper slag, respectively. The TCLP results are shown in Tables 2-8 and 2-9 for coal and copper slag, respectively.

Two of the copper slag samples had low TCLP leachable lead (see samples 7 and 9 in Table 2-9). The authors note that all three copper slag samples contain a higher concentration of elemental iron and ferrous iron than the coal slag samples. Elemental iron reduces lead leachability, leading the authors to propose iron stabilization as a possible mechanism. They also note that samples 7 and 9 required significantly more acid addition to maintain a final pH of 4.8. The greater acid requirement indicates more reserve alkalinity which may have reduced lead leachability in the TCLP test.

Table 2-6. Total Chemical Composition for Spent Coal Slag Media

Element	Total Composition of Slag Sample (wt %)					
	1	2	3	5	6	8
Pb	0.15	0.26	0.47	0.20	0.28	0.50
Cu	0.00	0.00	0.00	0.04	0.07	0.01
Zn	0.02	0.03	0.04	0.27	0.42	0.16
Ti	0.59	0.59	0.60	0.62	0.60	0.71
Al	10.8	10.7	10.8	11.4	11.6	11.2
Si	22.5	21.7	22.2	21.6	21.8	20.2
Ca	2.86	2.79	2.93	2.86	2.79	1.22
Fe	16.6	18.4	16.5	15.5	15.0	20.1
Ni[(a)]	0.12	0.06	0.10	0.09	0.12	0.07
Ba[(a)]	0.09	0.09	0.09	0.22	0.22	0.22
Sr[(a)]	0.07	0.07	0.09	0.13	0.15	0.06
Cr[(a)]	0.10	0.07	0.12	0.06	0.07	0.08

(a) Estimated by x-ray fluorescence methods.

Table 2-7. Total Chemical Composition for Spent Copper Slag Media

Element	Total Composition of Slag Sample (wt %)		
	4	7	9
Pb	0.84	0.52	0.92
Cu	0.94	0.69	0.56
Zn	3.75	3.25	3.15
Ti	0.36	0.37	0.40
Al	6.0	7.4	7.1
Si	14.1	15.5	16.1
Ca	6.58	5.36	4.43
Fe	23.6	23.1	23.4
Ni[(a)]	0.20	0.15	0.15
Ba[(a)]	0.19	0.13	0.17
Sr[(a)]	0.03	0.05	No data
Cr[(a)]	0.29	0.21	0.21

(a) Estimated by x-ray fluorescence methods.

Table 2-8. TCLP Results for Spent Coal Slag Media

Element	TCLP Result for Slag Sample (mg/L)					
	1	2	3	5	6	8
Pb	6.9	22.0	25.0	25.0	13.0	23.0
Ag	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
As	<0.003	<0.003	0.005	<0.003	<0.003	<0.003
Ba	0.50	0.60	0.30	0.40	0.40	0.60
Cd	0.022	<0.005	0.036	0.011	0.014	<0.005
Cr	0.41	0.25	0.33	0.02	0.02	0.10
Hg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Se	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004

Table 2-9. TCLP Results for Spent Copper Slag Media

Element	TCLP Result for Slag Sample (mg/L)		
	4	7	9
Pb	25.0	0.73	1.5
Ag	<0.01	<0.01	<0.01
As	<0.003	<0.003	<0.003
Ba	1.4	1.70	2.10
Cd	0.026	0.016	<0.005
Cr	0.10	<0.01	0.01
Hg	<0.0002	<0.0002	<0.0002
Se	<0.004	<0.004	<0.004

2.2 Characteristics of Other Similar Wastes

As part of the project, other wastes generated at Navy facilities with characteristics similar to ABM will be identified. Data on characteristics of the wastes and where/how they are generated by the Navy will be provided.

Wastes similar to ABM will be defined as a hard, granular matrix with a high silica and/or alumina content contaminated mainly with inorganics. Examples of such materials include:

- metals-contaminated soils
- casting sands
- catalysts
- ashes and condensed fumes
- slags
- construction and demolition debris
- refractory bricks
- metallurgical furnace dust.

2.2.1 Metals-Contaminated Soils

A variety of activities can contaminate soils with metals. The backstop at a firing range collects lead (possibly containing arsenic as a hardening alloy) and copper. Metal waste discharges from activities such as plating and paint removal. Fugitive emissions or leachate from waste piles, landfills, or sludge deposits also can add undesirable metal constituents to soil.

Soils consist of weathered mineral grains and organic materials in varying proportions. Soils typically are heterogeneous and may be stratified due to historical variations during the soil formation process. Soil layers form as a result of interaction between the soil and groundwater, atmosphere, and vegetation. The properties of the upper layers are particularly affected by biological activity of plants and microorganisms. As a result, the surface soil properties are strongly influenced by soil chemistry, moisture content, and climatic conditions.

The wide variations in natural soil properties and contaminant levels encountered in site remediation cannot be overemphasized. Not only do soil and contaminant conditions vary from site to site, but wide ranges of conditions frequently occur within one site. The process or equipment selected to handle contaminated soils must be able to accept wide variations in soil conditions and contaminant levels.

Many systems are available for classifying soil type and constituents. Most of these classifications include particle size as the primary physical parameter. Typical classifications, in order of decreasing size, are:

- gravel
- sand
- silt
- clay

The organic content of soil can vary from less than 1% in dry, sandy soils to more than 20% in soils that are exposed to water much of the time. The chemistry of the organic portion of soils is complex. The soil organic content will consist of high-molecular-weight humic materials and lower-molecular-weight organic acids and bases. The high-molecular-weight humic materials have low water solubility and high affinity for metals. The humic and fulvic acid fraction account for most of the metal immobilization due to soil organic matter. These acids immobilize metals by complexation and chelation mainly due to acidic sites. The lower-molecular-weight organics tend to mobilize metals. These nonhumic materials form water-soluble complexes with metals resulting in more mobile species (Czupyrna et al., 1989).

Other characteristics that help identify soil type and behavior include structure, color, density, type, and amount of organic and inorganic colloidal materials. Typical engineering properties, such as density and Atterberg limits, will indicate the handling properties of the soil. The solubility of metals in soil is controlled by factors such as pH, Eh, the ion exchange capacity, and the complexing and chelating effects of organic matter. Measurement methods and the significance of each of these factors have been described in several documents (Bodek et al., 1988; Cameron, 1992; Sims et al., 1984).

2.2.2 Casting Sands

Foundries use sand to make molds and cores to contain and shape metal during casting. The sand grains are held together with additives called binders. Mold-making techniques may use sand mixed with a small amount of clay and water or more complex binder systems such as silicates or organic resins such as phenolic-urethane polymers.

2.2.3 Catalysts

Catalysts used for industrial processes typically are in the form of a ceramic support carrying a small quantity of metal catalyst such as a chromium, nickel, or platinum group metal. The supporting ceramic often is a sphere of controlled particle size consisting mainly of alumina (Al_2O_3) and silica (SiO_2). In use, the catalyst becomes fouled with reactants or reaction products (Pavel and Elvin, 1994). Catalyst activity often can be recouped by thermal regeneration, but some of the particles break during the regeneration process. Once the catalyst particles become too small to be useful, they can become a waste disposal problem.

2.2.4 Ashes and Condensed Fumes

Fly ash is fine particulate waste collected from off-gas leaving processes such as smelting or coal combustion. Fly ash particles form in a high-temperature gas stream. At the typical combustion or processing temperature of about 2,900°F (1,600°C), the ash material is a molten sphere. As the particles cool, they retain a generally spherical shape. The particulate is collected by baghouses, electrostatic precipitators, or similar off-gas cleaning equipment. The particulate is mainly glassy, spherical silicates and aluminates material with particle sizes in the range of 4E-5 to 6E-3 in (1 to 150 micrometers [ìm]) (Gera et al., 1991). The fine particulate may be removed from the off-gas cleaning equipment as either a dry powder or a water slurry and then be sent to a storage pile for subsequent disposal or recycling.

Fumes are very fine particulates produced during high-temperature metal processing. Volatile metals or metal oxides evaporate and recondense to form the fume. One common example is condensed silica fume, a fine particulate consisting of over 90% silica. Condensed silica fume is a byproduct of ferroalloy production. Metal impurities may impart a hazardous waste characteristic. The fume is an artificial pozzolan with a very high activity due to its small particle size and amorphous structure. Volatile metals such as cadmium and zinc also are prone to fume formation. The fine-particle fumes are difficult to transfer by conventional materials-handling techniques (Popovic et al., 1991).

2.2.5 Slags

Slag is a fused solid consisting mainly of inorganic oxides of silicon, iron, and calcium with metallic impurities. Slag is a typical waste product from pyrometallurgical metal processing. The slag composition depends on the feed material source and the process used. Slags generally contain silica (SiO_2) as the main constituent along with fluxing salts (e.g., calcium and magnesium) and metal impurities from the ore.

Density, porosity, and leach resistance are the main properties considered in evaluating slag as a contaminated matrix. These properties vary depending on the method of producing the slag. The form of slag produced depends on the conditions used for cooling. Testing has indicated that faster slag cooling is important for reducing the mobility of metals. The general categories of slag are air-cooled, expanded, and granulated.

2.2.6 Construction and Demolition (C&D) Debris

C&D debris is bulky waste resulting from land clearing, building new structures, and remodeling or tearing down old structures (von Stein, 1993). The approximate overall average content of debris from demolishing structures in the United States is 53.8% concrete, 21.2% brick, 22.0% wood, 2.7% iron and steel, and 0.22% glass. Small amounts of a wide range of substances, including copper, lead, aluminum, plastic, paper, gypsum board, and asbestos, make up the rest of the debris. Crushed C&D debris usually has a soil or rocklike appearance and consistency. Concrete in C&D debris may contain steel or iron reinforcing bars which can complicate processing the waste for reuse. Although C&D debris usually is not hazardous waste, the potential for hazardous or toxic contaminants should not be ignored. Possible sources of contaminants in C&D debris include:

- asbestos used for insulation or structural applications
- creosote, pentachlorophenol, or chromated copper arsenate preservatives in wood
- polychlorinated biphenyls (PCBs) in electrical components
- metals (particularly lead) in paint pigments.

2.2.7 Refractory Bricks

Refractory bricks are high-performance ceramic materials used to line high-temperature processing equipment. Refractory bricks are made from chromite or similar chromium oxide materials. The bricks deteriorate in use and are replaced periodically during furnace maintenance (Martin et al., 1987). Many refractory bricks contain percentage levels of chromium and can exhibit the D007 chromium toxicity hazard characteristic. The bricks also may become contaminated by process materials during use.

2.2.8 Metallurgical Furnace Dust

In production of steel in electric arc furnaces (EAFs), feed materials are charged into a refractory-lined furnace and melted by an electric current arcing between electrodes through the metal feed. EAFs accept a high proportion of scrap in the feed. The scrap steel is often galvanized, coated, or plated to improve its function. The most common surface treatments are zinc galvanizing, lead terne coating, and cadmium plating. Each of these plating metals tends partition to the vapor phase as a fume. The fume condenses and is then removed by a dry filtration or wet scrubbing operation. The EAF process removes many metal impurities from the scrap by volatilization. Because of the ability to remove impurities, the EAF processes almost 100% scrap (with a maximum of 30% galvanized scrap feed). The high level of scrap feed to the EAF causes elevated levels of zinc, cadmium, or lead in the fumes from the furnace. Due to the presence of these metals, emission control dust/sludges from EAFs are a RCRA-listed waste (K061).

The composition of the dust formed varies directly with the type of steel being produced and the constituents being volatilized from the furnace. Specifications for carbon steels are generally less restrictive than specifications for high-alloy steels. Carbon steel making can start with an initial charge of scrap containing higher loadings of plating and other impurities. Due to the higher scrap loading, the dust generated from the production carbon steels may contain more lead and other impurities than the dust from the production of specialty, stainless, and alloy steels. Dust from making higher alloy steels will contain more chromium and nickel. Typical concentration ranges for EAF dust from specialty-steel and low-ally producers are shown in Table 2-10.

Table 2-10. Typical Composition Ranges for EAF Emission Control Dust

Element	Metal Content Range for Specialty-Steel Producers (weight %)	Metal Content Range for Low-Alloy Producers (weight %)
Cadmium	0.04 to 0.08	0.01 to 0.07
Lead	0.54 to 1.36	0.21 to 45.28
Zinc	2.27 to 8.52	0.79 to 3.49
Nickel	1.83 to 3.60	0.13 to 0.24
Iron	22.96 to 25.81	4.07 to 43.09
Chromium	7.64 to 11.71	0.01 to 3.43

Source: Hanewald et al., 1992.

3.0 RECYCLING AND REUSE OPTIONS

This section describes the operating features and applications of recycling and reuse options for ABM and similar wastes. The recycling methods are arranged generally in the order of decreasing value of the product produced. Methods to recycle spent ABM are organized into the following groups:

- reconditioning and reuse of spent ABM
- processing to convert spent ABM into high- or medium-value ceramic products
- using spent ABM as a raw material in portland cement
- using spent ABM as aggregate in portland cement concrete
- using spent ABM as aggregate in asphaltic concrete
- using spent ABM as a basic construction material
- processing to convert spent ABM into low-value ceramic products
- using spent ABM as a flux-forming addition in a smelter.

3.1 Reconditioning and Reuse of Spent Abrasive

This section describes methods to process and reuse spent ABM. The spent ABM can be cleaned using physical separation to remove fines and/or hard metal or metal oxide particles and then reused.

3.1.1 Description of Recycling Option

Reclamation of ABM implies collecting the ABM after use and processing to remove undesirable components in the ABM. Reclamation of spent ABM applies simple unit operations, but there are challenges to successful implementation. Collecting and storing the spent media requires equipment and procedures not used in normal blast cleaning done outdoors on large structures such as ships. Once the spent ABM is collected, several processing steps are needed to return the material to its original quality to allow reuse.

Collection and handling of spent ABM can be conducted with minimal concern about adding extraneous contaminants when the spent ABM is to be discarded. Spent ABM collected for disposal usually contains a high proportion of soil and may contain general site trash including paper, cloth, or plastic scraps and small metal parts (e.g., bolts, screws, and brackets). Additional care must be taken to collect the spent ABM for reclamation.

A wide variety of undesirable components including debris from the work area, ABM fragments, and paint particles and contaminants removed from the hull are intermixed with the spent ABM. When the ABM impacts the surface being cleaned, some of the media fracture, producing fine particulates that must be removed during the reclamation process. A high proportion of fines will:

- reduce the effectiveness of coating removal
- increase dust generation when the grit is reused.

Small bits of steel and metal oxide are cut away from the ship hull during the blast cleaning process. If these hard particles are not removed by the reclamation process, they will strike the surface being cleaned creating high residual stress in small areas. These stressed spots can be points of initiation of fatigue fractures or increased corrosion.

Simple screening is unlikely to clean the spent ABM sufficiently to allow reuse. Because the contaminants in the ABM have a wide range of physical and chemical properties, successful reclamation processing requires more sophisticated methods. Screening to remove oversize debris is always the first step. This first simple cleanup is followed by various combinations of magnetic separation, water-assisted beneficiation, and thermal treatment to produce an acceptable reclaimed ABM product.

3.1.2 Advantages of Recycling Option

Reclaiming spent ABM for reuse provides reduction in resource consumption with minimum transportation and handling. Onsite recycling is the next level in the U.S. EPA's waste reduction hierarchy, when waste production cannot be prevented at the source.

3.1.3 Limitations of Recycling Option

Reclamation requires the use of a tough, fracture-resistant ABM which increases the unit cost, and purchasers often prefer to minimize even the initial cost. Sand, the cheapest media, is unsuitable for reclamation. Slag-based media cost more per ton but will survive a few cycles of reuse, and garnet media, which cost even more, can be reused for many cycles. The number of reuse cycles attained in practice will depend on many factors including the air pressure used to apply the ABM, the type of coating removed, and the worker's experience level.

A significant fraction of undesirable materials (e.g., ABM fragments, paint chips, and hard particles) must be removed from the spent ABM. These undesirable components will need to be managed as waste and may be listed as hazardous waste under RCRA.

The possible presence of hard particles in the reclaimed ABM increases the concern for creating high stress points in the ship hull when the ABM is reused.

The possible presence of impurities in the reclaimed ABM increases the concern for high airborne contaminant levels in the work areas and for contaminating the ship hull when the ABM is reused.

3.1.4 Example Applications

3.1.4.1 Thermal Processing of Spent ABM. The U.S. Navy and the Institute of Gas Technology (IGT) have been developing and testing thermal processing to reclaim spent ABM. The technology is an extension of a fluidized-bed coal combustion system developed by IGT that has been applied to the reclamation of foundry sand. The fluidized-bed ABM treatment system is illustrated in Figure 3-1.

The spent ABM is conveyed from a storage pile to pass through a grizzly and a 0.5-in (12-mm) vibrating screen to remove oversized debris and then through a magnetic separator to remove ferromagnetic particles. After the initial cleaning, the spent ABM is fed by a screw conveyor into the top of the fluidized-bed calciner. A mixture of gas and air is introduced into a pipe in the bottom center of the bed. The air and natural gas burn directly in the bed to heat the spent ABM to 1,200°F to 1,600°F (650°C to 870°C) and to oxidize the organic portion of paint chips to CO_2, H_2O, and metal oxides.

The gas flow in the calciner provides mixing and size classification in addition to the heating action. The ABM bed is well agitated and heated by the burning gas to ensure good combustion of the paint chips and removal of the fine particulates. Metal oxides from the burned paint chips and undersized particles of broken ABM are entrained in the gas stream and lifted out of the calciner. The clean ABM flows down along the sloped grid and exits the bottom of the calciner past the incoming air and gas.

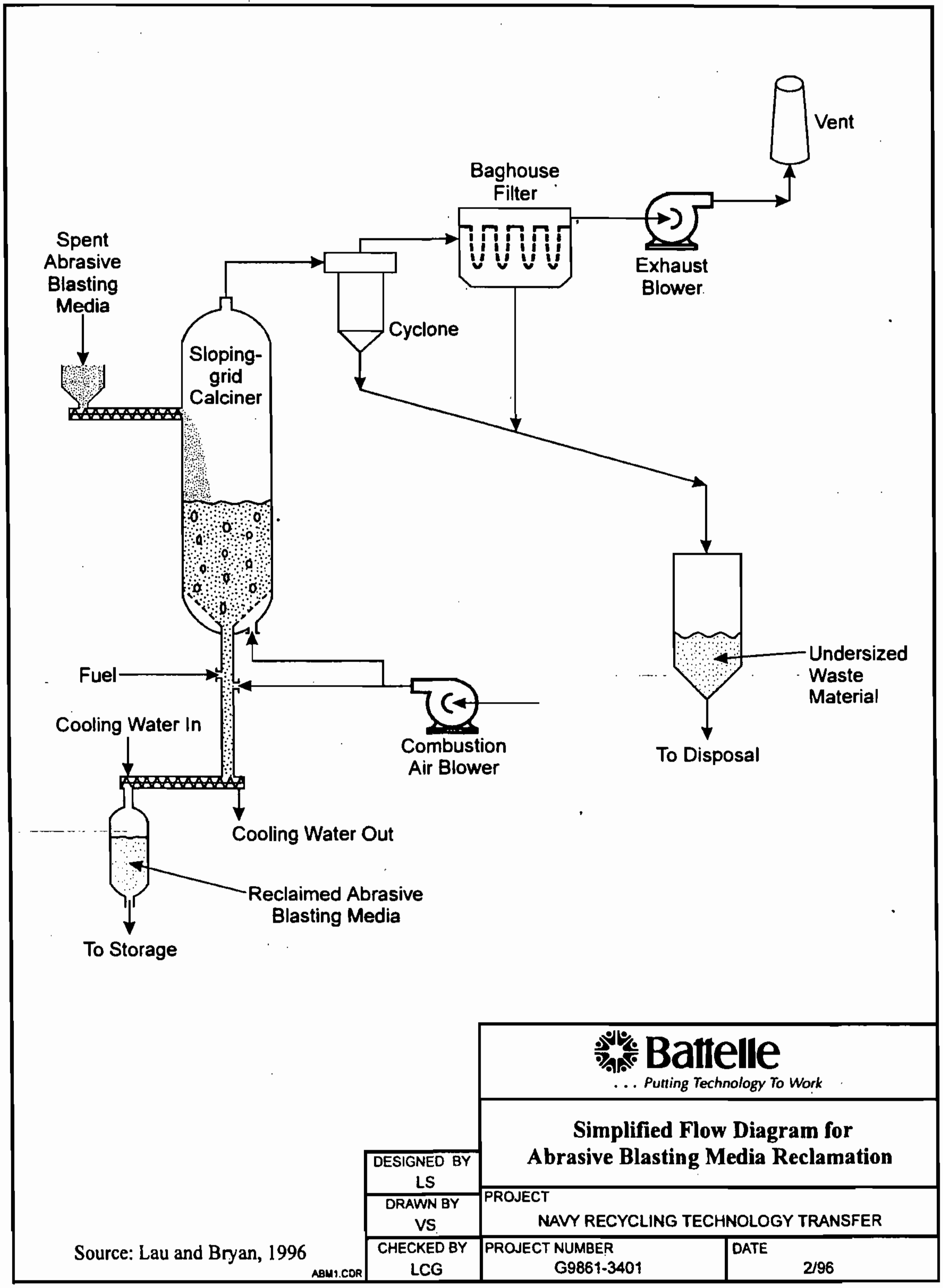


Figure 3-1. Simplified Flow Diagram of Abrasive Blasting Media Reclamation

The clean ABM is moved from the bottom of the calciner through a water-cooled screw conveyor and placed into storage for reuse. The process can reclaim between 80% to 90% of the spent ABM.

The metal oxides and fine particles are removed from the off-gas for disposal. Off-gas from the calciner is cooled with a water spray and then passed through a cyclone separator and bag filter to collect particulates for disposal.

3.1.4.2 Physical Reclamation of Spent ABM. Pittsburgh Mineral and Environmental Technology owns and operates mobile units for recovery of spent abrasive contaminated with paint chips containing hazardous metal contaminants. The most common application is treatment of abrasive used to remove lead-based paints from bridges, overpasses, and other steel highway structures. The spent abrasive is a complex mixture of abrasives, paint chips, steel, and rust. The process is reported to separate the spent abrasive stream into three reusable fractions:

- paint chips
- coarse abrasive
- undersized abrasive.

The lead-bearing paint chips can be sent to a lead smelter for reprocessing, the coarse abrasive is reused, and the undersized fines are used as feed for other ceramic products such as bricks.

The abrasive processing unit is mobile and can be set up at the paint removal site to process material at the rate of about 2 to 5 tons (1.8 to 4.5 metric tons) per hour. Spent abrasive is screened to remove coarse materials such as debris and larger paint chips. Magnetic separation then removes the steel particulates and other ferromagnetic materials. The nonmagnetic portion is fed onto a gravity separation table to separate the fine particulate from the coarse abrasive based on the apparent density of the particles (as determined by their respective gravity, shape, texture, and size). The coarse fraction can be reused as abrasive. The fine fraction is further treated by electrostatic separation based on differences in surface conductivity to separate the paint chips from the fine abrasive particles. The paint chips can be fed to a metal smelter, and the fine abrasives can be fed to a brick-making process. The process is reported to be accepted by the U.S. EPA Region III and the Pennsylvania Department of Environmental Resources as a recycling process for abrasive contaminated with lead-bearing paint chips (Gilbert and Weyand, 1990).

3.1.4.3 Soil Washing to Clean Spent ABM. Westinghouse Electric Corporation has developed a cleaning system for spent sandblasting abrasive used to remove lead-containing paint. The technology is based on Westinghouse research in soil washing. The system is reported to operate at a throughput of 20 tons (18 metric tons) per hour. Abrasive is cleaned with water-based leachates, which are continuously recycled in the soil washing system. The end products are cleaned abrasive, which is reported to be suitable for reuse, and the leach solution, which can be treated by chemical precipitation or membrane separation.

3.2 Use Spent Abrasive as a Raw Material in Ceramic Manufacture

This section describes ways to use spent ABM and similar wastes as a raw material in making medium- or high-value ceramic products. Ceramic products made from ABM or similar wastes will be competing with products in the Standard Industrial Classification (SIC) group 32 (OMB, 1987). Economic characteristics indicating the size of the market for products in SIC group 32 are summarized in Table 3-1.

Table 3-1. Summary of Ceramic Product Market Characteristics

Industry/SIC	1987		1992
	Number of Establishments in SIC	Total Value of Shipments ($ million)	Total Value of Shipments and Inventory ($ million)
Stone, clay, and glass products/32	16,166	61,477	62,479
Flat glass/321	81	2,549	2,082
Glassware /322	522	8,339	9,055
Processed glass products/323	1,432	5,429	6,955
Cement/324	215	4,335	4,035
Structural clay products/325	598	2,915	2,864
Pottery/326	1,006	2,416	2,752
Concrete, gypsum, and plaster products/327	9,814	24,427	23,053
Cut stone and stone products/328	745	841	1,007
Misc. nonmetal mineral products/329	1,753	10,226	10,677

Source: U.S. Department of Commerce (1995, Table 1246).

The SIC group 32 has not been a strong growth or profit area for several years. The total value of shipments increased only 1.6% between 1987 and 1992. Most or all of this increase can be accounted for by inflation. Profit for each dollar of sales in 1990 was 1.8 cents. The industry showed a loss of 0.7 cent per dollar of sales in 1992 but rebounded to show a profit of 3.4 cents per dollar of sales in 1993. For comparison, the average profit for all manufacturing concerns was 5.4 cents per dollar of sales in 1993 (U.S. Department of Commerce, 1995, Table 890).

3.2.1 Description of Recycling Option

Spent ABM and similar wastestreams consisting predominantly of silica and/or alumina with low levels of metal contaminants can be processed thermally to form glass or ceramic products or be used as raw materials in ceramic manufacture. The glass or ceramic matrix can effectively immobilize many metal impurities. The metal contaminants may even impart desirable properties such as coloration or increased hardness to the product.

Formation of ceramic products may be accomplished by either sintering or melting. In both processes, prepared waste material is heated to form the ceramic. Most thermal treatment processes require feed material to be within a narrow particle size range. Size reduction and/or pelletization are usually needed to obtain the required size.

In sintering, the waste is prepared by mixing with clay or other silicates and possibly water and additives. The mixture is pressed or extruded to form bricks, pellets, or other shapes. The formed products are treated at high temperature but below the bulk melting temperature where particles join or sinter to form a solid ceramic piece.

Vitrification processes also require feed preparation. The chemical additions and mixing may be used to promote oxidation-reduction reactions to improve the properties and stability of the final product. Silica sources such as sand or clay may also be needed. Vitrification processes operate by heating the pretreated waste to melting temperatures. The molten treated waste flow exits from the melter into a waste-forming or quenching step. The melt can be formed in a metal- or sand-coated mold to form a monolithic product or quenched in a water bath to produce a frit. Vitrification to form low-value aggregates, as described in Section 3.7, uses the same basic approach but typically starts with wastes that contain complex mixtures of contaminants.

Gases released from the thermal treatment unit are processed through an emission control system. Particulates may form due to carryover, metal fuming, or anion fuming. The particulates are removed by knockout boxes, scrubbers, and/or venturi separators. Particulates are separated from the scrubbing fluid by filtration and are returned to the treatment system. Acid gases, such as sulfur dioxide from sulfates, are removed by scrubbing with sodium hydroxide.

A wide range of high- to medium-value products could be made from ABM or similar silicate or aluminate wastes. Possible products include:

- ceramic tile
- finished and rough dimension stone
- brick and structural clay items
- frit.

Ceramic tiles are thin ceramic squares or rectangles, usually with a decorative finish on one surface used for appearance in architectural applications.

Dimension stones are block, panel, or curvilinear shapes used for appearance and/or structural functions. The stone shape can range in size from the base of a pen and pencil set to large building stone.

Brick and tile shapes are made from fired clay and used for load bearing or other applications (e.g., non-load-bearing fire walls, sound absorption walls, or drainage tiles). These ceramic items generally are simple rectangular or cylindrical shapes with moderate surface finish and size tolerance requirements.

Frit is a raw material for ceramic manufacturing. A waste can be vitrified to destroy organic impurities and improve its physical properties and then further processed in an existing manufacturing plant to form products such as refractory fibers or abrasives.

3.2.2 Advantages of Recycling Option

Thermal treatment to produce useful products from wastes has the potential to reduce negative effects on human health and the environment over the product's life-cycle and to reduce the costs for management of wastes (Carter and Tsangaris, 1995). The main purpose for using the vitrification process is to convert a material that would have been a waste into a value-added product. Using waste material to replace raw materials in product manufacture decreases demand on resources and reduces the volume of waste discharged. In addition to value created by the product, costs for treatment and disposal are avoided. The end user of the resulting ceramic product may be closer or more distant, so transportation may have a positive or negative effect on the economics of waste vitrification depending on the location of the vitrification plant and the user.

The high-temperature vitrification or sintering process causes significant changes in the physical or chemical form of the matrix and the contaminants. Organic constituents such as resin in paint chips are oxidized to their mineral components. Metal contaminants are incorporated into a durable, leach-resistant mineral matrix.

3.2.3 Limitations of Recycling Option

Contaminants in the waste product will change the hardness, toughness, color, or texture of ceramic products which may reduce product performance or acceptance. Only selected wastestreams can be converted into high-value ceramic products. To provide a high-value product such as decorative finished dimension stone or frit for making high-performance refractories, the initial wastestream must contain a limited number of contaminants. For example, hydroxide sludge from treatment of plating or etching baths containing a single metal contaminant is converted by vitrification on a commercial scale to high-value products (Hazardous Waste Consultant, 1990). Purely cosmetic features usually are not strong determinants of product acceptance for the structural products but may still reduce acceptance in some applications. For example, the dark or earth tones that occur in vitrified products containing a wide range of metals are undesirable in applications where the item needs to be visible, such as railings, parking lot stops, or road barriers.

The process is capital- and energy-intensive, but the product value and avoided disposal costs will contribute to the economic viability of the option.

Volatile metals such as arsenic, mercury, or beryllium are difficult to treat and can be present only at low concentrations. Wastes containing arsenic will require some combination of pretreatment, special processing conditions, and/or off-gas treatment systems to minimize arsenic volatilization. If reducing conditions can occur in the melt, cadmium, lead, and zinc can vaporize and enter the off-gas stream (Hollander et al., 1995).

The product potentially would be used in close proximity to the general public and thus would be required to meet high standards of contaminant immobilization and performance.

3.2.4 Example Applications

3.2.4.1 Using Abrasive Blasting Media to Make Bricks. Spent ABM is an ideal candidate for beneficial reuse in the manufacture of structural fired clay products, e.g., bricks. The U.S. Navy, David Taylor Research Center in Annapolis, Maryland, has been studying this alternative for the past several years. The bricks are produced using spent ABM to meet the specifications for strength and absorption, while metals are incorporated into a chemically stable, complex silicate phase during brick firing. Data collected thus far indicate that metal leachability in the final clay product increases with decreasing particle size of the spent ABM (Thomas, 1992).

Pittsburgh Mineral and Environmental Technology performed a study of beneficial reuse of ABM from bridges for the Pennsylvania Department of Transportation. The study concluded that using spent ABM to replace sand in brick making was the most promising option. Test bricks were made with 10%, 20%, and 40% of the normal brick mix. Unprocessed ABM gave poor results. However, when the ABM was crushed and screened to reduce particle size to below 20 mesh, the test bricks were acceptable (Weyand and Sutton, 1990).

3.2.4.2 Using Foundry Slag to Make Bricks. Granulated slag from cast iron production was ground to give a Blaine specific surface area of 100 ft^2/oz (3,200 cm^2/g). The ground slag was used in combination with lime and sand to produce 1.6-in (4-cm) cubes for testing. The reported compressive strength ranged from 1,860 to 2,480 psi (12.8 to 17.1 MPa) (Malolepszy et al., 1991).

3.2.4.3 Using Incinerator Ash to Make Bricks. Research has been reported on the properties of brick made with incinerator-derived ash used in combination with cement and limestone screenings. The ash was produced by a refuse-derived-fuel facility. Two series of tests were carried out with bricks formed with 20% and 40% ash. In the two series, the cement content varied from 4% to 10% and the water content varied from 2% to 8%. The remainder of the brick composition was normal limestone sand. The reported compressive strength for the 10% cement, 40% ash, and 8% water case was 7,500 and 6,800 psi (52 MPa and 47 MPa) for air-dried and soaked curing conditions, respectively. The compressive strength increased with increased cement and ash content (Ali et al., 1992).

3.2.4.4 Using Spent Catalysts to Make Bricks. Cherokee Environmental Group of Sanford, North Carolina processes nonhazardous spent catalysts for use as aggregate in brick making. Catalysts are crushed and size-graded to form an alumina/silica sand which replaces sand in brick making.

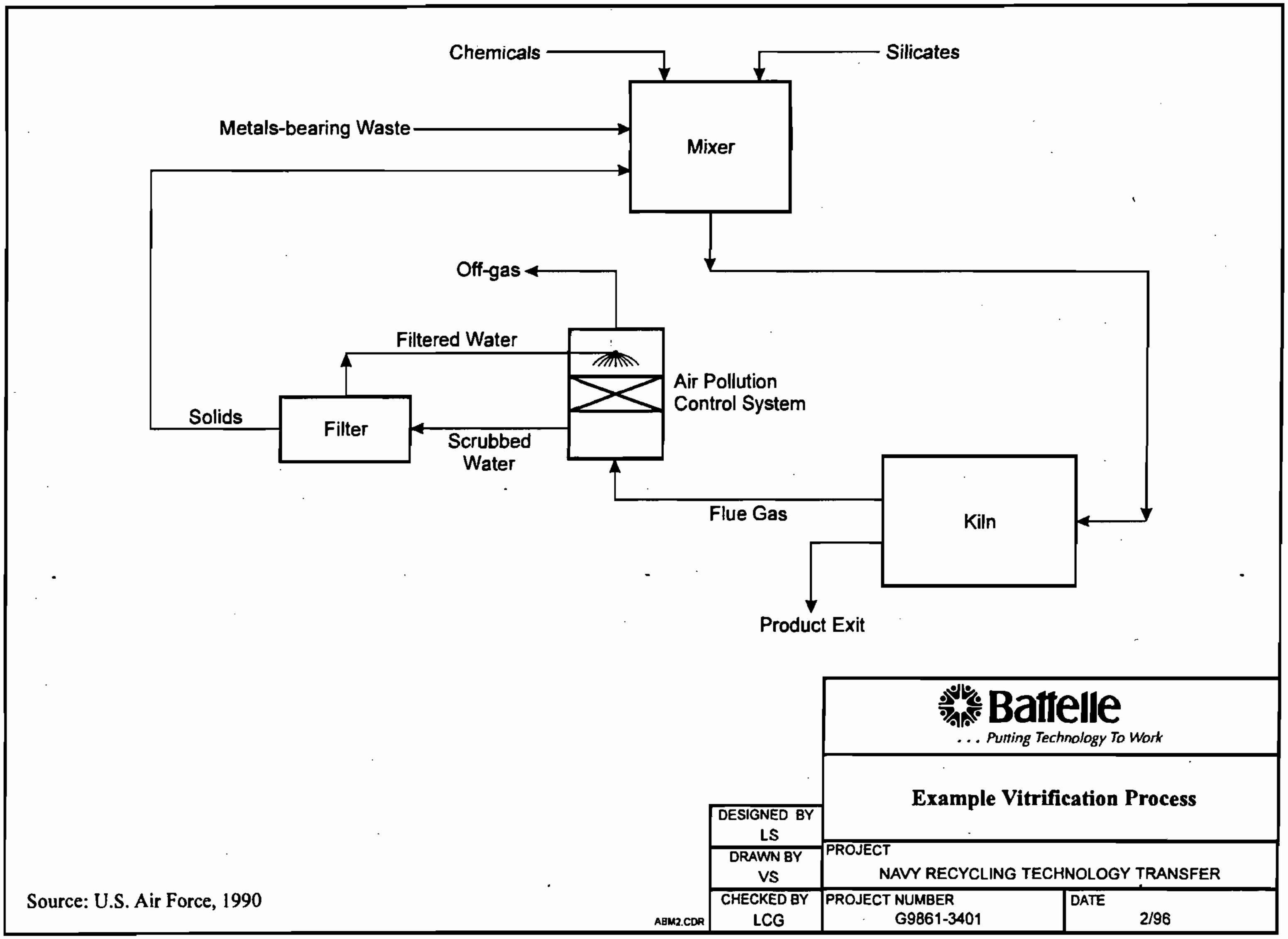
3.2.4.5 Metal-Containing Waste Sintering. The Ceramic Bonding, Inc. of Mountain View, CA provides a treatment method to convert waste into an alumina-silicate ceramic used to physically and chemically immobilize metal contaminants. The waste is mixed with a proprietary alumina silicate material and extruded into pellets. The pellets are fired at 2,000°F (1,090°C) to form a ceramic solid called Armorite™. This material reportedly is leach-resistant and is suitable for use as a ceramic making raw material or as a construction aggregate.

Waste materials amenable to treatment include filter cakes, foundry sand, ash, and sludge. The process treats inorganic wastes containing cadmium, chromium, cobalt, copper, lead, nickel, vanadium, or zinc. Metals that will volatilize under process conditions, such as mercury or arsenic, cannot be treated. Ceramic Bonding is reported to be planning to offer processing of F006 waste and some site remediation wastes as a RCRA-exempt recycler.

3.2.4.6 Metal-Containing Waste Vitrification. Pollution Control Systems of Dublin, Ohio markets a process to recycle metal-contaminated sludge wastes into feed material for architectural, abrasive, and refractory ceramic products. The company installs and operates a process system at the waste generator's site. The U.S. EPA is reported to have accepted the process as a recycling process exempt from RCRA permitting based on testing and performance data. Applicable waste types include D characteristic wastes and F and K listed wastes such as F006 and K061.

The process, as illustrated in Figure 3-2, involves three primary components:

- mixing
- vitrification
- off-gas treatment



Source: U.S. Air Force, 1990

Figure 3-2. Example Vitrification Process.

All incoming generator materials are processed on a batch basis. Prior to entering the reactor, each batch of waste is tested to determine requirements for raw materials addition. The waste is typically a sludge to which water and chemicals are added. The chemical additions and mixing promote a series of oxidation-reduction reactions to improve the properties and stability of the final product. Following the reaction phase, silica sources such as sand or clay are added. The mixed materials are transferred to a surge tank to provide continuous feeding to the vitrification operation.

Vitrification operates continuously with blended/reacted feed entering the vitrifier where it is heated to form a molten mass. The material travels through the vitrification unit to an exit overflow. The operating temperature and residence time of the vitrification unit are determined by laboratory analysis. The molten treated waste flow exits from the melter into a waste-forming or quenching step. The melt can be formed in a sand-coated mold or quenched in a water bath depending on the type of product needed. The resulting ceramic material is packaged for shipment to end users.

Gases released from the vitrification unit are processed through an emission control system. Particulates may form due to carryover, metal fuming, or anion fuming. The particulates are removed by knockout boxes, scrubbers, and/or venturi separators. Particulates are separated from the scrubbing fluid by filtration and are returned to the treatment system. Acid gases, such as sulfur dioxide from sulfates, are removed by scrubbing with sodium hydroxide to form sodium metasulfite. The sodium metasulfite reportedly is collected and sold.

3.2.4.7 Using Fly Ash to Make Clay Products. Fly ash from a coal combustion, steam-generating plant was used in combination with clay, cement, or lime to make extruded bricks. The resulting bricks were tested for shrinkage, weight loss, tensile strength, compressive strength, and mineralogy. Addition of fly ash was reported to improve the quality of the bricks due to the grain size, shape, and the pozzolanic activity of the fly ash (Temini et al., 1991).

3.3 Use Spent Abrasive as a Raw Material in Portland Cement Manufacture

This section describes use of spent ABM and similar waste as a raw material in making portland cement. Cement is made from a mixture of limestone, sand, and clay prepared and burned to form clinker which is then ground. The expected U.S. production of portland and masonry cement in 1995 is 87,300,000 tons (79,300,000 metric tons). Portland cement makes up about 96% of the total U.S. cement output (Solomon, 1995a). Many sandlike waste materials can provide useful calcium, silica, alumina, or iron inputs for cement makers. Due to the large volume of cement produced, significant quantities of spent ABM can be consumed as replacements for cement raw materials and at the same time conserve resources. The European cement industry reports that use of secondary raw materials, such as granulated blast furnace slag and coal combustion fly ash, has reduced mineral and energy resource consumption (Lawton, 1992).

3.3.1 Description of Recycling Option

Manufacture of hydraulic cement offers possibilities for recycling of contaminated waste materials. Making cement requires a significant input of energy and raw materials. Petroleum-contaminated soils are used as input to cement kilns by a variety of companies. Petroleum-contaminated soils supply both heating value and a silica source (U.S. EPA, 1992, EPA/600/R-92/096). Opportunities also exist for using nonhazardous metals-contaminated solids to make cement, particularly when the waste has a high alumina or iron oxide content.

Portland cement is made by heating mixtures containing lime, silica, alumina, and iron oxide to form clinker which is then ground. About 3% to 5% of calcium sulfate, usually as gypsum or anhydrite, is added during grinding of the clinker. The gypsum aids in the grinding process and helps control the curing rate of the cement product (Collins and Luckevich, 1992). The gypsum is intermixed during grinding of the clinker. The main constituents of portland cement are tricalcium silicate (C_3S), dicalcium silicate (C_2S), tricalcium aluminate (C_3A), and tetracalcium aluminoferrite (C_4AF).

Specifications for limestone feed for cement making require that the calcium carbonate ($CaCO_3$) content be greater than 75% and the magnesium carbonate ($MgCO_3$) content be less than 3%. Because the raw materials need to be finely ground, chert nodules and/or coarse quartz grains are undesirable (Tepordei, 1993b).

Raw material burning typically is done in a rotary kiln. The kiln rotates around an inclined axis (see Figure 3-3). The raw materials enter the raised end of the kiln and travel down the incline to the lower end. The kiln is heated by combustion of coal, gas, or oil injected at the low end of the kiln. As the raw materials move through the inclined, rotating kiln, they heat to a temperature greater than 2,600°F (1,430°C).

The residence time for solids is 1 to 4 hours, and the residence time for gases is about 10 seconds. The high temperature causes the following physical and chemical changes (U.S. EPA, 1982, EPA/600/2-82/013):

- evaporation of free water
- evolution of combined water
- evolution of carbon dioxide from carbonates
- partial fusion of the feed materials
- reactions among lime, silica, alumina, and iron to form the clinker.

During burning, lime combines with silica, alumina, and iron to form the desired cement compounds. The heating results in a product called clinker. Clinker consists of a granular solid with sizes ranging from fine sand to walnut size. The clinker is rapidly cooled, mixed with additives such as gypsum, and ground to a fine powder to produce the final cement product.

The American Society for Testing and Materials (ASTM) specifies five basic types of portland cement. Type I is intended for use when the special properties of the other types are not required. Type IA is for the same uses as Type I where air entrainment is desired. Air entrainment is a technique to improve the freeze/thaw resistance of the concrete and reduce the mix viscosity without increasing water. Type II is another general-use cement but offers decreased heat generation during curing and increased resistance to damage from sulfate salts in the soil. Type IIA is similar to Type II but is intended for use where air entrainment is desired. Type III is formulated to maximize early strength production. Type IIIA is the air entrainment version of Type III. Type IV is intended for use where the heat generation must be minimized. Type V is for use when sulfate resistance is desired. The main constituents of portland cement typically are tricalcium silicate (C_3S), dicalcium silicate (C_2S), tricalcium aluminate (C_3A), and tetracalcium aluminoferrite (C_4AF). Example compositions for the types of portland cement are shown in Table 3-2.

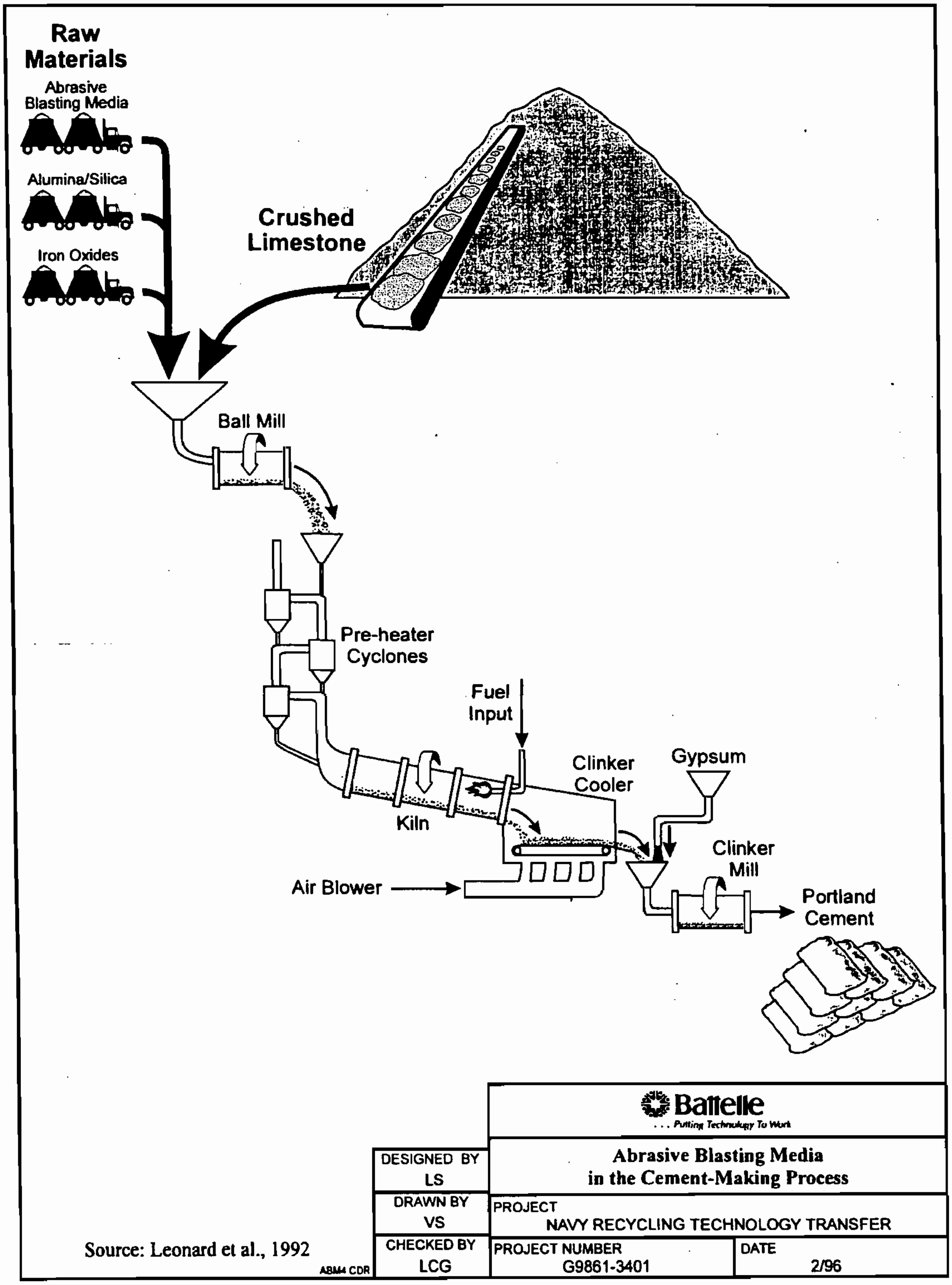


Figure 3-3. Abrasive Blasting Media in the Cement-Making Process.

Table 3-2. Examples of Compositions of Portland Cement Types

Cement Type	C_3S (wt %)	C_2S (wt %)	C_3A (wt %)	C_4AF (wt %)
I and IA	49.6	24.0	11.0	8.0
II and IIA	40.9	34.4	5.6	12.9
III and IIIA	59.3	14.1	9.3	7.9
IV	25.3	51.5	4.9	11.6
V	41.0	39.0	3.7	10.0

Source: Bogue, 1955.

3.3.2 Advantages of Recycling Option

Cement kilns have the capacity to recycle large quantities of waste. The kilns are widely distributed throughout the country, so long shipping distances can be avoided in many cases. For example, there are 11 cement manufacturers currently operating 20 portland cement kilns in the state of California. In 1989 alone, these operations reported the cumulative production of more than 10,400,000 tons (9,400,000 metric tons) of cement clinker. Due to gaseous losses during the calcining reaction, about 13,500,000 tons (12,250,000 metric tons) of mineral feedstock was required to generate the cement. Therefore, if only one tenth of 1 percent of the required feedstock for each of these kilns were dedicated to recycling of metal-bearing wastes, up to 13,500 tons (12,250 metric tons) of hazardous waste could be diverted from landfill disposal in just the state of California each year (Leonard et al., 1992).

Spent ABM and similar wastes also are good candidates for recycling as replacements for cement raw materials. Wastes high in alumina (such as bottom or fly ash, ceramics, and aluminum potliner) or iron (e.g., slag ABM, iron mill scale, foundry waste) are particularly good candidates. Silica and calcium also are beneficial ingredients, but these usually are provided in sufficient quantities by the quarry rock and therefore are not in as much demand.

Cement kilns provide high operating temperatures and long residence time, which cause significant changes in the physical and chemical form of the matrix and the contaminants. Organic contaminants are oxidized to their mineral components. Metal contaminants are incorporated into the portland cement matrix.

The high alkali reserve of the cement clinker reacts to form alkali chlorides (sodium, potassium, calcium), preventing evolution of acidic vapors in the off-gas. However, the chloride content of the wastes must be limited to avoid excessive kiln dust production. Most of the alkali chlorides vaporize and increase the quantity of kiln dust. Kiln dust containing a high proportion of alkali chlorides cannot be recycled to the cement kiln because soluble chlorides alter the setting rate of the cement product.

3.3.3 Limitations of Recycling Option

Recycling into portland cement is applicable to only certain types of wastes, based on chemical composition, contaminant levels, and other criteria (Bouse and Kamas, 1988a; 1988b):

- Aluminum, iron, and sometimes silica are the primary constituents which the kiln operator needs to purchase to supplement the naturally occurring concentrations in the quarry rock. Ores typically comprise 40 to 50% by weight of these constituents.

Therefore, waste materials should contain at least 20% or more of these constituents to be attractive substitutes for the ore materials.

- Combustion to heat the raw materials and decomposition reactions during formation of cement clinker generate large volumes of off-gas, which must be controlled and cleaned.

- Elevated concentrations of Na, K, S, Cl, Mg, and Ba can degrade the quality of cement or increase the volume of kiln dust waste produced. The plant chemist will be the final authority on whether a given waste material is compatible with the mix design.

- Recycling operations should be designed to avoid significant risk due to metals concentrations in the clinker or off-gas. Total metals concentrations in the recycled wastes should in general be <1%, and the clinker should be tested to ensure that the metals present are not highly leachable. Waste with highly toxic and volatile metals such as As or Hg should not be recycled in this manner.

Cognizant regulators should be contacted prior to proceeding with the recycling project. RCRA regulations discourage the land application of recycled hazardous materials (U.S. EPA, 1990c, Definition of Solid Waste). In most cases, special wastes or state-regulated wastes may be recyclable, subject to state or local restrictions or policies. Nonhazardous silicate and aluminate wastes are used as raw material substitutes in portland cement manufacture on a commercial scale. Using wastes containing RCRA metals may be possible, but commercial application is limited by the requirements of the Boiler and Industrial Furnace regulations.

3.3.4 Example Applications

3.3.4.1 Using Spent Abrasive Blasting Media to Make Cement. The Naval Facilities Engineering Service Center (NFESC) in Port Hueneme, California, along with Southwestern Portland Cement Co., Mare Island Naval Shipyard, Radian Corporation, and Battelle, have been studying the recycling of spent ABM as a raw material for the manufacture of portland Type I cement for construction purposes. The ABM is a silicate slag containing moderate levels of iron (Fe) and replaces some of the iron ore that normally is used in cement manufacture. The silica and alumina in the ABM are also useful ingredients in the cement product.

The spent copper slag ABM was hazardous in the state of California because of its Cu content, but is not classified as a RCRA hazardous waste. Consequently, this recycling demonstration was conducted under a Research & Development (R&D) variance issued by the California EPA.

During the demonstration tests, ABM was introduced as about 1% of the total feedstock of the kiln, and emissions monitoring was conducted to identify any fluctuations in the air emissions concentrations from the process. The final product was then subjected to physical and chemical analysis to determine the structural integrity of the product and whether the metals are bound in the crystalline structure of the cement. The results of these tests showed that the ABM in these proportions did not significantly increase the metals content of the clinker or lead to undesirable air emissions (Leonard et al., 1992).

The spent ABM at Mare Island Naval Shipyard is hazardous in the state of California and, if no recycling and/or reuse option were available, would have to be treated by stabilization/solidification and disposed of in a hazardous waste landfill. This technology makes beneficial reuse of the ABM by incorporating it into portland cement, where resulting metal concentrations are low and the metals are physically and chemically immobilized in the asphaltic concrete matrix.

Using ABM as a raw material in portland cement presents a cost savings for the waste generator and makes money for the operator of the cement kiln. In this Mare Island Naval Shipyard demonstration, the total fee charged by the kiln operator has been about \$195/ton for about 4,000 tons (3,600 metric tons) of recycled spent ABM. The kiln operator requires the fee to cover costs for the following activities associated with using the metal-contaminated ABM as raw material:

- transporting the spent ABM from the generator's site in northern California to the cement plant in southern California
- determining feedstock proportions and process modifications to accommodate the waste materials
- sampling and analyzing the clinker
- sampling and analyzing air emissions from the stack
- engaging in regulatory interaction to obtain necessary permits or variances.

The only significant cost element not included in the \$195/ton figure is the cost of ABM screening and debris disposal, which was borne by the shipyard and probably amounted to less than \$10/ton.

The unit cost for managing the Mare Island Naval Shipyard spent ABM as California hazardous waste was about \$660/ton. The waste management unit cost includes characterization, transport, and disposal in a hazardous waste landfill (including any treatment required by the landfill operator). Therefore, the cost savings to the generator are obvious and significant, and the kiln operator is being paid for a raw material that the cement plant usually has to pay for.

3.3.4.2 Using Solid Waste to Make Cement. Industrial Waste Management in St. Louis, Missouri reports the capability to use metals-contaminated waste as a raw materials substitute in cement making. Candidate raw materials are first analyzed to determine their suitability based on their value and contaminant level. The primary raw materials of interest are silica, calcium, aluminum, and iron. Good candidates for raw materials substitution typically contain 95% or more of these constituents. The company reports that its largest current source for substitute feed is fluidized-bed cracking catalyst.

Systech Resource Recovery Services in Xenia, Ohio accepts nonhazardous wastestreams containing low levels of transition metals as feedstock for cement kilns. Systech has a network of 16 cement kilns to process byproduct materials. Examples of acceptable feed materials include:

Alumina sources:

- catalysts
- ceramics and refractories
- coal ash
- adsorbents for gases and vapors

Calcium sources:

- lime sludges

Iron sources:

- coal slag
- foundry baghouse residuals
- iron mill scale

Silica sources:

- abrasives
- ceramics
- clay filters and sludges
- foundry sand
- sandblast media
- water filtration media

3.3.4.3 Using Spent Fluidized-Bed Cracking Catalyst to Make Cement. A company in Bucaramanga, Colombia has described preliminary testing of spent fluidized-bed catalyst as feed to a cement kiln. The catalyst contains about 60% silica (SiO_2), 33% alumina (Al_2O_3), 1% sodium, 2% iron, 0.03% copper, and 0.05% nickel. The catalyst is used as a replacement for clinker in the final grinding. Tests were performed with 30% and 40% catalyst replacing clinker. The resulting cement was reported to give compressive strength similar to the control cement sample. The catalyst cement set faster and required higher water-to-cement ratios to obtain workability. The authors noted that the high catalyst inputs were used to test the limits of possible additions. Input of catalyst to replace 30% of the clinker would use the annual production of catalyst in 1 week of cement making. Thus, in normal practice, lower quantities of catalyst would be used to produce a more conventional portland cement (Cardenosa et al., 1992).

3.4 Use Spent Abrasive as Concrete Aggregate

This section describes use of spent ABM and similar wastes as a portion of the aggregate in portland cement concrete. The value of ABM used as construction aggregate would be low. The average unit price for construction sand and gravel in 1993 was about $3.60/ton (free on board [FOB] at the mill) (Tepordei, 1993b). The cost for crushed stone ranges from about $6.75/ton to $8.42/ton. The cost for construction sand and gravel ranges from about $6.73/ton to $9.84/ton. These costs are current for late 1995 and apply to material delivered to a construction site in truckload quantities (ENR, 1995). The main economic advantage for this option is reduced disposal costs. Use of wastes in asphaltic concrete is described separately (see Section 3.5) due to the different characteristics required for the two different types of aggregate.

3.4.1 Description of Recycling Option

Aggregate is a mineral product from natural or manufactured sources used in concrete making. The specifications for fine and coarse aggregate are described in ASTM 33. The important features of aggregate are size grading; freedom from deleterious materials such as clay lumps, friable particles, and organic materials; and soundness.

The spent ABM could be used to form poured concrete surfaces or concrete blocks or shapes. The cement-making process is illustrated in Figure 3-4. Concrete blocks, bricks, and other shapes are made by combining and forming cement and aggregate. Concrete bricks typically are solid parallel-epipeds, whereas blocks have a central opening to reduce weight. A wide variety of specialty shapes also are made from cement and aggregate. Products in this category may be either nonreinforced or reinforced concrete products. Common examples of precast shapes include concrete barriers (New Jersey barriers); precast concrete septic tanks; precast concrete tanks, structures, and cribs; and precast concrete poles. Concrete made by substituting ABM for some of the fine aggregate would be more suitable for applications that do not require high strength such as riprap or fill for protective caissons around bridge pilings (Brabrand and Loehr, 1993).

This recycling technology is straightforward and involves little in the way of operation. Unless the reuse location is on site, the waste aggregate must be transported to the recycler's location. If the aggregate is going to be used as a construction material or as aggregate in concrete, it may be necessary to crush the waste and grade it by particle size. Storage requirements in compliance with any pertinent regulations may involve an impervious liner or bins or hoppers to prevent leaching. Special handling and worker protection also may be required to minimize exposure to dust.

3.4.2 Advantages of Recycling Option

The principal advantages to recycling spent ABM as aggregates are:

- using the spent ABM's favorable structural properties in a beneficial application
- conserving landfill space for the higher hazard waste materials
- reducing waste management cost.

Application of spent ABM as aggregate can recycle large quantities of waste. Also, the use locations are widely distributed throughout the country, so long shipping distances can be avoided in many cases.

3.4.3 Limitations of Recycling Option

Use of spent ABM as a low-value component of a product that often is placed in direct contact with the land may be construed as "use constituting disposal" rather than as a true recycling application. Regulatory agencies responsible for administration of federal and state solid and hazardous wastes should be contacted prior to proceeding with the recycling project. RCRA regulations discourage the land application of recycled hazardous materials (U.S. EPA, 1990c). In most cases special wastes or state-regulated wastes may be recyclable, subject to state or local restrictions or policies. State and local restrictions often are controlled by local agencies such as water quality boards, air quality boards, and local planning commissions. Regulatory considerations are discussed in more detail in Section 4.5.

Use of the spent grit as aggregate chemically and physically immobilizes the contaminants. However, the effectiveness of solidification/stabilization is dependent on the integrity of the cement rather than on fundamental changes in the mineral form of the matrix and contaminant.

Rounded to subangular particle shape is preferred for portland cement concrete aggregate. Spent ABM typically would have more angular particles. Concrete containing a high proportion of spent ABM could have poor mixing, pouring, and setting characteristics (see the first example in Section 3.4.4).

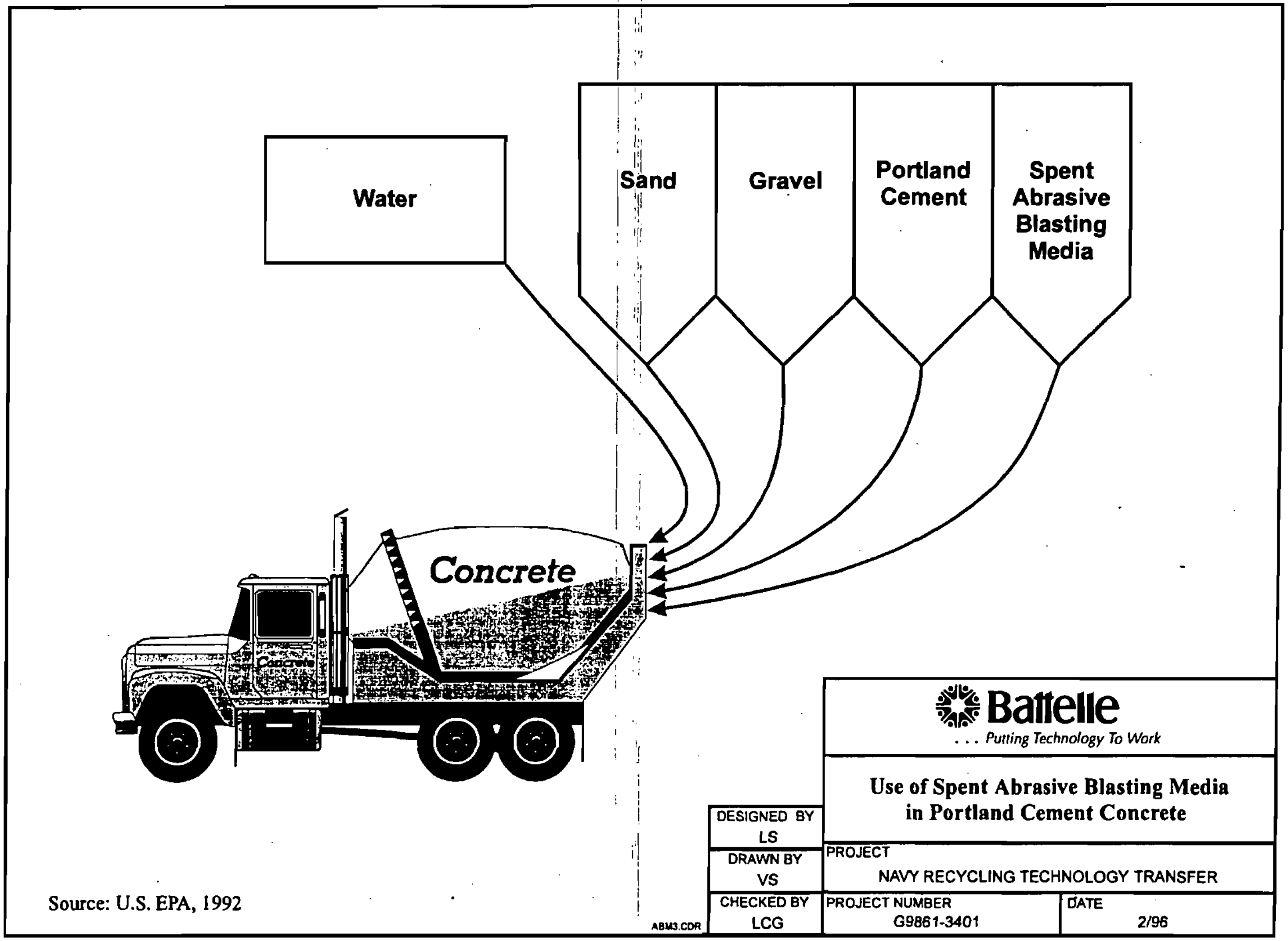


Figure 3-4. Use of Spent Abrasive Blasting Media in Portland Cement Concrete.

The alkali reactivity of the cement and aggregate is an important factor in selecting an aggregate. The concern is reaction of an alkali with the aggregate causing a volume increase and/or loss of concrete strength. The alkali causing the reaction usually is the calcium hydroxide released as cement cures. However, in some cases the alkali may come from external sources such as groundwater. There are two basic types of alkali-aggregate reactions:

- reaction of alkali with siliceous rocks or glasses
- reaction of alkali with dolomite in some carbonate rocks.

Some waste slags can exhibit excessive reactivity. For example, four zinc smelter slag samples tested by Oklahoma State University were found to be unsuitable as aggregate for portland cement due to the excessive expansion during curing caused by alkali aggregate reactions (U.S. EPA, 1990, EPA/530-SW-90-070C).

The alkali activity of a potential aggregate can be determined by one of several tests depending on the type of aggregate to be tested. The applicable tests or guides are ASTM C 227, "Test Method for Potential Alkali Reactivity of Cement-Aggregate Combinations (Mortar-Bar Method)"; C 289, "Potential Reactivity of Aggregates (Chemical Method)"; C 295, "Petrographic Examination of Aggregates for Concrete"; C 342, "Test Methods for Potential Volume Change of Cement-Aggregate Combinations"; and C 586, "Potential Alkali Reactivity of Carbonate Rocks for Concrete Aggregates (Rock Cylinder Method)." Guidance for selecting the appropriate test method is given in C 33, "Standard Specification for Concrete Aggregates."

Waste aggregate used to produce mortar or other cementitious products should have a low metallic aluminum content. Aluminum metal is reactive in the cement paste and corrodes, releasing H_2 gas, causing expansion and decreasing the strength of the cement (Garner et al., 1993).

3.4.4 Example Applications

3.4.4.1 Using Spent ABM as Aggregate in Portland Cement Concrete. Literature was found describing three studies that used spent ABM as aggregate for concrete. The test materials and locations were (1) copper slag used for ship hull blasting in Baharain (Madany et al., 1991), (2) one coal slag and one copper slag used for bridge blasting in Pennsylvania (Weyand and Sutton, 1990), and (3) an unspecified sand from bridge blasting in Texas (Brabrand and Loehr, 1993).

Concentrations of leachable metals exceeded the TCLP limits in some of the unprocessed spent ABM. The Baharain study did not test TCLP leachability. Both the spent coal and copper slag ABM in the Pennsylvania study failed the lead TCLP. In the Texas study, two separate fractions of spent ABM (sand and dust) were collected by vacuum separation. The sand passed the TCLP test but the dust had leachable levels of lead, cadmium, and chromium.

None of the studies noted problems with leachable metals from the final product, but only the Texas study reported TCLP leachability results for the cement product. In the Texas study, metals leachability from both sand and dust materials was significantly reduced by small additions of cement. More cement would be needed to meet strength requirements than would be needed to immobilize the metals.

All of the studies concluded that spent ABM could be used to form low-strength concrete for nonstructural applications. However, in all cases the strength of the product was highly variable and much reduced when ABM was used to replace sand. As a general conclusion, spent ABM is marginally suited as a substitute for the sand portion of concrete aggregate.

3.4.4.2 Aggregate Production from Fly Ash Waste. In the Netherlands, fly ash is sintered to produce a material called Lytag that is suitable as a replacement for sand and gravel in aggregate. The sintering method has four process steps:

- mixing
- pelletizing
- sintering
- final processing

The mixing step combines water and fly ash to produce a paste. The carbon content of the fly ash must be 3% to 5% to provide fuel for the sintering process. If additional carbon is needed, it can be added in the mixing step. The damped powder is formed into pellets and moved by a conveyor to a hopper, which feeds pellets onto a belt in a layer 11.8 in (30 cm) thick and 6.6 ft (2 m) wide. The belt moves horizontally and passes under an ignition hood where, once inside, the upper surface layer of pellets is ignited. Air is drawn down through the pellets so that the combustion zone moves down through the material on the belt. The combustion process results in a temperature of 2,000°F (1,100°C) that causes the pellets to sinter. In the final production step, any pellets that have sintered together are separated by crushing and are screened to produce three size fractions: 0.02 to 0.16 in (0.5 to 4 mm), 0.16 to 0.32 in (4 to 8 mm), and 0.32 to 0.47 in (8 to 12 mm). Particles over 0.47 in (12 mm) are recrushed, and particles under 0.02 in (0.5 mm) are returned to the process.

The Lytag is reported to have a glassy surface due to sintering and, thus, to be leach resistant. The performance of Lytag as concrete aggregate is reported to be competitive with gravel. Lytag is being used in construction of two large bridges and various industrial and commercial construction projects in the Netherlands (Faase et al., 1991).

3.4.4.3 Aggregate Production from Incinerator Ash. A production process is being developed to remove ferrous and nonferrous metals from incinerator ash, processing the ash to prepare aggregate for concrete. The typical range of ash composition is:

SiO_2	46 to 62%
Fe_2O_3	7.6 to 17%
Al_2O_3	5.5 to 10%
CaO	8.0 to 14%
Na_2O	3.6 to 7%
MgO	1.0 to 2%
SO_3	0.4 to 2%

The ash passes through a series of crushers, screens, and magnetic separators to remove metals. The ash is first crushed with a jaw crusher and then passed through roll crushers. Ferrous metals are removed by magnetic separators. The roll crushers flatten the softer nonferrous metal particles into platelets. Ash leaving the roll crushers is screened with a 0.9-mm (0.035-inch) sieve. The metal platelets are retained while the mineral matter passes through the screen. The mineral residues are further crushed to pass through a 0.01-in (0.3-mm) sieve. The residues are blended with clay, pelletized, and fired in a rotary kiln to produce smooth spherical aggregate. The resulting aggregate has undergone testing in concrete for up to 4.5 years (Wainwright and Robery, 1991).

3.5 Use Spent Abrasive as Asphalt

This section describes the use of spent ABM and similar wastes as a portion of the aggregate in asphaltic concrete. The value of ABM used as construction aggregate would be low. The average unit price for construction sand and gravel in 1993 was about \$3.60/ton (FOB at the mill) (Tepordei, 1993b). The cost for crushed stone ranges from about \$6.75/ton to \$8.42/ton. The cost for construction sand and gravel ranges from about \$6.73/ton to \$9.84/ton. These costs are current for late 1995 and apply to material delivered to a construction site in truckload quantities (ENR, 1995). The main economic advantage for this option is reduced disposal costs. Use of wastes in portland cement concrete is described separately (see Section 3.4) due to the different characteristics required for the two different types of aggregate.

3.5.1 Description of Recycling Option

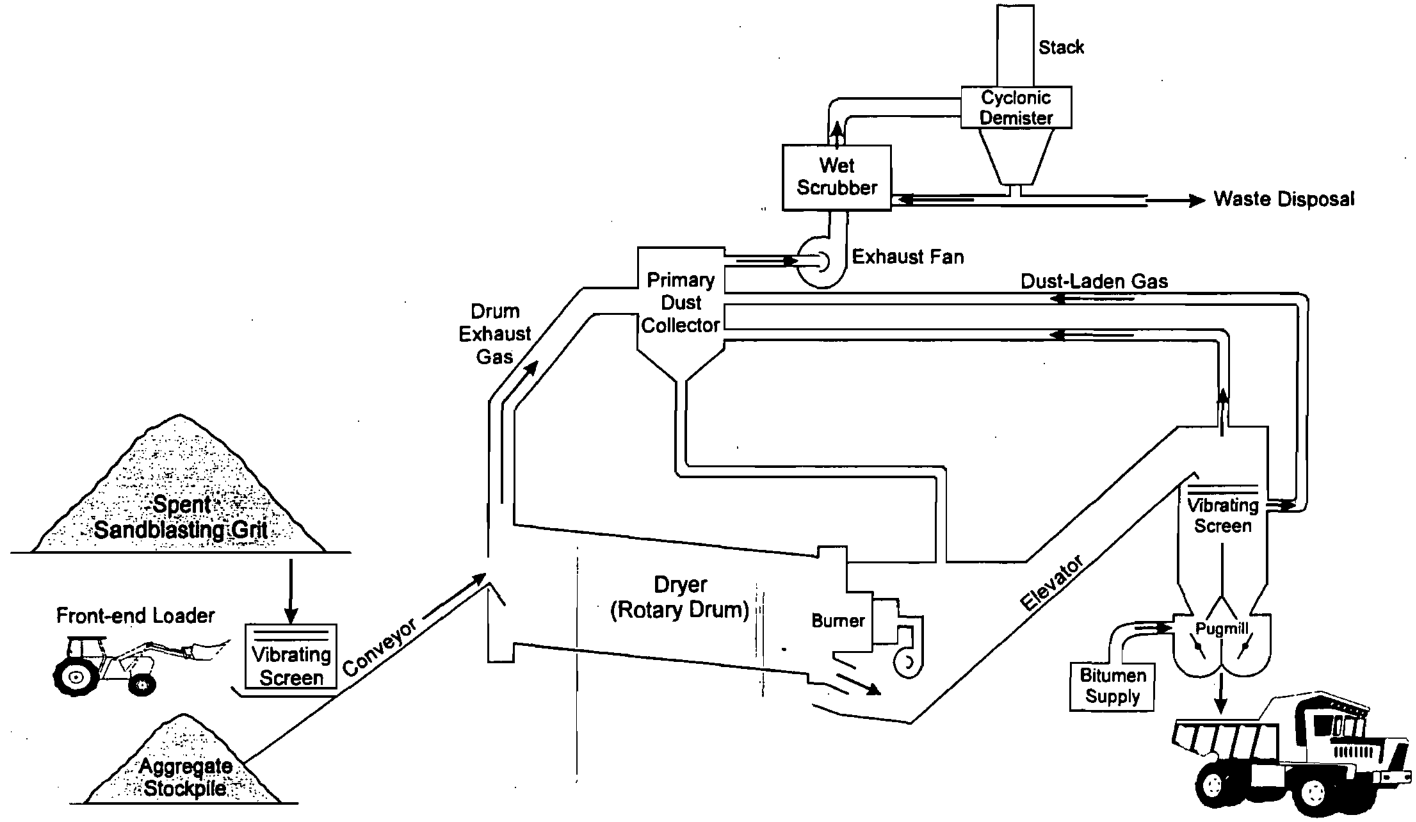
The recycling of wastes into asphaltic concrete is not a particularly new concept. A wide variety of materials have been successfully substituted for some portion of the normal graded aggregate without adverse effects on product quality. The hot mix process for asphalt production is illustrated in Figure 3-5. The most widespread example of waste used as aggregate in asphaltic concrete is reuse of reclaimed asphaltic concrete from previous paving projects. Old asphalt paving is crushed and substituted for a portion of the aggregate in either cold mix or hot mix asphaltic concrete. More than 12,000,000 tons (10,900,000 metric tons) of asphalt were recycled by 35 asphalt contractors in 1992 (ARRA, 1994). The corresponding savings were over \$600 million in landfill costs and over \$30 million for liquid asphalt and aggregate. In certain situations, the old pavement is recycled into cold or hot mix asphalt in place, thereby reducing paving costs and reducing truck traffic on the highways to transport the old aggregate back to the contractor's facility (ARRA, 1994).

Another example of waste recycling into asphalt is the recently developed concept of using glass cullet as an aggregate in asphalt. The resulting product has been termed "glassphalt" (Monroe, 1990). Glassphalt uses mixed color glass which has low value in the conventional glass recycling market. Glassphalt containing 10% glass was used in a base course lift for the first time on a project in New Jersey. Highway agencies in Connecticut, District of Columbia, New Jersey, and Virginia have been using glassphalt on a trial basis (Ahmed, 1993).

The ABM-to-asphalt recycling technology involves simply substituting the ABM for a portion of the fine-size aggregate in asphaltic concrete. As long as the metal concentrations in the spent ABM are not excessively high, the metal concentrations in the asphaltic concrete product will be very low, and any metals present will be physically and chemically immobilized in the asphalt binder. Typically, asphaltic concrete consists of 4.5 to 8% bitumen mixed with graded aggregate. The aggregate is made by mixing rock and sand to give particles ranging from fine sand to 1/2- to 1-in (13-mm to 25-mm) gravel. Depending on the mix design and the ultimate strength requirements of the product, the fine-size particle fraction may comprise 35 to 45% of the asphaltic concrete.

3.5.2 Advantages of Recycling Option

Application of spent ABM as aggregate can recycle large quantities of waste. Also, the use locations are widely distributed throughout the country so long shipping distances can be avoided in many cases.



Battelle
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DESIGNED BY J.M.	Batch Hot-Mix Asphalt Plant	
DRAWN BY V.S.	PROJECT NAVY RECYCLING TECHNOLOGY TRANSFER	
CHECKED BY L.S.	PROJECT NUMBER G9861-3401	DATE 2/96

Source: U.S. EPA, 1992

ABM3.CDR

Figure 3-5. Illustration of the Hot-Mix Process for Asphalt Making.

Applicable wastes include a wide variety of geologic materials, pavement, construction materials, ceramics, or glasses that are either aggregates or can be crushed to form aggregates. Because reuse usually is in the public domain, the wastes should contain only low levels of relatively low-hazard contaminants. The technology for reusing nonhazardous soil and sand wastes for asphalt aggregate is mature and commercially available. Oil-contaminated soil has been used as asphalt aggregate in construction projects for many years (U.S. EPA, 1992, EPA/600/R-92/096).

Sharp angular particle shape is preferred for asphaltic concrete aggregate. Spent ABM typically would have more angular particles and should provide a good substitute for the sand portion of asphalt aggregate.

3.5.3 Limitations of Recycling Option

The asphalt recycling approach is viable only for certain types of aggregates. The aggregate must comply with both performance and environmental standards such as durability, stability, chemical resistance, biological resistance, permeability, and leachability (Testa and Patton, 1994). The principal limitations pertain to risk, regulatory considerations, or technical considerations pertaining to the integrity of the asphaltic concrete product. For example:

- ABM containing solvents or other particularly hazardous or toxic constituents should not be recycled in this manner.

- ABM with high metal contents (percent level or greater) may pose hazards either to workers at the asphalt plant due to dust exposure or to the public through the asphalt product because of metals leaching.

- The presence of sulfate or metallic iron is undesirable because of swelling upon oxidation. Reduced forms of trace metals may cause similar problems, which, however, may be avoidable by recycling the ABM into a base course layer where there is minimal contact with air.

- High concentrations of silt and smaller size particles are undesirable because they have poor wetting characteristics in the bitumen matrix and may generate dusts.

- Rounded aggregates do not give good vehicle traction characteristics when used in asphaltic concrete.

The chief chemist or engineer at the asphalt plant must ensure that the ABM is compatible with the production of a high-integrity asphaltic concrete.

Use of spent ABM as a low-value component of a product that is placed in direct contact with the land may be construed as "use constituting disposal" rather than a true recycling application. Regulatory agencies responsible for administration of federal and state solid and hazardous wastes should be contacted prior to proceeding with the recycling project. RCRA regulations discourage the land application of recycled hazardous materials (U.S. EPA, 1990c). In most cases, special wastes or state-regulated wastes may be recyclable, subject to state/local restrictions or policies. State and local restrictions often are controlled by local agencies such as water quality boards, air quality boards, and local planning commissions. Regulatory considerations are discussed in more detail in Section 4.5.

Use of the spent grit as aggregate provides chemical and physical immobilization of contaminants. However, the effectiveness of solidification/stabilization is dependent on the integrity of the asphaltic concrete rather than on fundamental changes in the mineral form of the matrix and contaminant.

3.5.4 Example Applications

3.5.4.1 Using Spent ABM as Aggregate in Asphaltic Concrete. The NFESC in Port Hueneme, California has been studying the recycling of spent ABM in the form of sandblasting grit into asphaltic concrete for commercial paving purposes. The sandblasting grit is used as a "blender sand" for a portion of the fine-grained aggregate that is used to produce the asphaltic concrete. This section briefly describes the case history for the ongoing "ABM-to-asphalt" recycling project in Hunters Point, California.

The spent ABM at Hunters Point is comprised of a 4,000-yd^3 (3,060-m^3) pile of Monterrey Beach sand contaminated with small amounts of paint chips. The spent ABM was generated in ship-cleaning operations conducted at Naval Station, Treasure Island, Hunters Point Annex by Triple AAA Shipcleaning during the 1970s and 1980s. Average copper, zinc, lead, and chromium concentrations are 1,800, 1,100, 200, and 100 mg/kg, respectively. Leachable metals concentrations using the California Waste Extraction Test (WET) methodology average 140, 150, 20, and 2.0 mg/L, respectively for copper, zinc, lead, and chromium. The WET test is California's version of the RCRA TCLP. The spent ABM at Hunters Point is considered hazardous by the state because of Soluble Limit Threshold Concentration (STLC) exceedances on the WET test for copper and lead, but is not an RCRA-listed hazardous waste because it passes the TCLP.

In the ABM-to-asphalt technology demonstration at Hunters Point, an ABM concentration of 5% by weight of the final asphaltic concrete is being used so the spent ABM comprises 5% of the asphaltic concrete replacing about 1/9 to 1/7 of the normal sand portion of the concrete. Higher ABM contents are possible; theoretically the entire fine fraction of the mix design could be comprised of ABM. However, at higher ABM concentrations, there is greater potential for lower product quality or elevated leachable metals concentrations in the product.

At Hunters Point the ABM is being recycled into hot mix asphalt for normal commercial paving applications, yielding high-strength asphaltic concrete for heavily used highways. ABM can be recycled into both a base course layer or any subsequent lifts applied to the base course. ABM also can be recycled into cold mix processes, which yield a lower grade product for road repair or lower traffic area applications.

The cost of an ABM-to-asphalt recycling project will depend on a number of factors, particularly:

- tippage rate charged by the asphalt plant
- distance between the generator and the asphalt plant, which affects transportation costs
- required amount of planning, regulatory interactions, reporting, and program management

and to a lesser extent:

- analytical fees for chemical and physical analyses of asphalt test cores to show compliance with any regulatory or institutional requirements

- ABM pretreatment such as screening and debris disposal

In the Hunters Point project, the tippage rate charged by the asphalt plant is $40/ton of ABM recycled. The overall unit cost about $140/ton, including significant costs for transportation to the asphalt plant, regulatory compliance, and analytical testing of core specimens produced in the laboratory prior to full-scale recycling. In general, the recycling unit cost decreases with increasing amounts of spent ABM recycled. The following ranges are typical for most projects:

Amount ABM (tons)	Estimated Costs of Recycling (per ton)
500 - 1,500	$125 - $175
1,500 - 3,000	$100 - $150
3,000 - 6,000	$ 50 - $100

Therefore, economically, the ABM-to-asphalt recycling approach is a win-win situation for both the asphalt plant and the ABM generator. Recycling costs the generator less per ton than the cost for disposal in a hazardous waste landfill and probably less than it would cost for on-site treatment and disposal, and the asphalt plant is paid for a raw material that it ordinarily would have to buy.

3.5.4.2 Using Soil as Aggregate in Asphaltic Concrete. A review of the literature found two examples of application of metal-contaminated soils as asphalt aggregate. American Reclamation Corporation asphalt was used to stabilize soil contaminated with fuel oil and lead at a closed steel wire manufacturing plant. The contaminants reportedly were immobilized by the asphalt treatment, allowing the material to be used to pave the site after remediation was completed.

Applied Environmental Services treated soil from a railcar brake shoe manufacturing plant containing 438 mg/kg lead and 336 mg/kg zinc. The soil was excavated and treated off site at a cold mix asphalt plant. Treatment was reported to have achieved acceptable immobilization of the metals. The treated waste was returned to the site for use as paving (Testa and Patton, 1992).

3.5.4.3 Using Steel Shot as Aggregate in Asphaltic Concrete. The incorporation of steel shot ABM from bridge-blasting operations has been the subject of an ongoing demonstration project in North Carolina (Medford, 1989, 1990, and 1992). Recent results suggest that the steel shot ABM is not compatible with the asphaltic concrete product and is leading to premature failure due to the oxidation and swelling of the steel particles (Medford, 1992, personal communication).

3.5.4.4 Using Spent Foundry Sand as Aggregate in Asphaltic Concrete. Lead-contaminated foundry sands from brass foundries in Pennsylvania are being recycled into asphalt (Boyd, 1992).

3.6 Use Spent Abrasive as a Construction Material

This section describes using spent ABM or similar wastes as replacements for construction materials. Minimal preprocessing may be done to remove debris or reduce metal leachability. If the waste has high organic content, high leachable metal content, low strength, a high proportion of fines, or other undesirable properties, more aggressive processing may be needed to produce a usable product (see Section 3.7).

Crushed stone, sand, and gravel fill a wide range of needs in the construction, chemical feedstock, and other industries. The quantities used are enormous. For example, the estimated crushed stone production in the United States during the second quarter of 1995 was 367,500,000 tons (333,600,000 metric tons). The estimated production of construction sand and gravel in the United States during the second quarter of 1995 was 265,100,000 tons (240,700,000 metric tons) (Tepordei, 1995). The average unit price for construction sand and gravel in 1993 was about \$3.60/ton (FOB at the mill) (Tepordei, 1993b). The cost for crushed stone ranges from about \$6.75/ton to \$8.42/ton. The cost for construction sand and gravel ranges from about \$6.73/ton to \$9.84/ton. These costs are current for late 1995 and apply to material delivered to a construction site in truckload quantities (ENR, 1995).

3.6.1 Description of Recycling Option

Sand and gravel are granular, unconsolidated agglomerations of rocks and minerals produced mainly by natural breakdown and abrasion of rocks (Bolen, 1993). The ASTM defines sand as naturally occurring unconsolidated or poorly consolidated rock particles that pass through a Number 4-mesh U.S. standard sieve and are retained on a Number 200-mesh U.S. standard sieve. Gravel is defined as naturally occurring unconsolidated or poorly consolidated rock particles that pass through a sieve with 3-in (7.62-cm)-square openings and are retained on a Number 4-mesh U.S. standard sieve. The construction industry generally accepts this differentiation of sand and gravel based on particle size.

Sand and gravel consist of a variety of rock and mineral types, so the composition varies. Silica is the major component of most commercial sand and gravel. Feldspar, mica, and iron oxides are common minor constituents. Specifications for sand and gravel used in roadbed and concrete construction usually state strict particle size gradation and shape requirements. Other requirements with regard to physical and chemical properties may be stated depending on the soil conditions, climate, and other locality-specific conditions. The National Aggregates Association has compiled 42 ASTM specifications and test methods for aggregates, concrete, and admixtures (Tepordei, 1993a).

The ASTM and the American Association of State Highway and Transportation Officials (AASHTO) are the main national organizations setting specifications on crushed stone for use in construction (Tepordei, 1993b). However, many specifications for construction aggregates are developed by states or localities based on their specific needs. Most common specifications control size grades, soundness, shape, abrasion resistance, porosity, chemical compatibility, and content of soft particles. Due to the skid resistance imparted to road surfaces when blast furnace or steel furnace slag is used as the aggregate, many state agencies specify slag aggregate for asphalt used for roads with high traffic volume (Solomon, 1993).

The American Railroad Engineering Association sets standards for railroad ballast. The general characteristics required of a good ballast material are strength, toughness, durability, stability, drainability, cleanability, workability, and resistance to deformation.

3.6.2 Advantages of Recycling Option

Application of spent ABM in general construction can recycle large quantities of waste. Also, the use locations are widely distributed throughout the country so long shipping distances can be avoided in many cases.

When the physical and chemical characteristics allow the waste to be reused directly in a construction application, the processing is simple and uses commercially available equipment. Figure 3-6 illustrates one way of using spent ABM for contained fill. There is a well-established precedent for recycling waste materials with characteristics similar to spent ABM in the construction industry. In 1994, an estimated 19 million metric tons of iron and steel slags, with an approximate value of $130,000,000, were recycled. About 80% of the recycled slags are used in construction applications such as road base, asphalt or cement aggregate, and fill. Other applications such as mineral wool manufacture, soil conditioning, and roofing account for the other 20% of slag use (Solomon, 1995b). Other ore-processing slags have been applied as drainage material in landfill construction and railroad road beds (U.S. EPA, 1990d, EPA/530-SW-90-070C). Spent foundry sand is another potential material for use in construction as road fill, aggregate, or daily landfill cover. About 6 million tons of spent foundry sand are produced annually by U.S. foundries, of which only 4.2% is put to beneficial reuse (Smith, 1992).

3.6.3 Limitations of Recycling Option

The principal requirements for the use of waste materials as aggregates or bulk materials are (1) acceptance by regulatory agencies, the customer, and the affected public; and (2) performance. Typically, the waste material must lend some useful function to the product and meet some leach-resistance criteria and specifications for physical properties (Wisconsin Department of Natural Resources, 1993). The end use should not be simply disposal in another form (termed "use constituting disposal" or "sham recycling"). Even if regulatory requirements and technical specifications are met, there may be reluctance on the part of the customer or the public to accept the use of those materials.

Wide use of waste materials for construction applications may pose the risk or perceived risk of exposing a large population to hazardous materials, generating occupational and public health concerns. The two principal exposure pathways are through inhalation of dusts or leaching of soluble metals from the aggregate into groundwater or surface water. Any recycling project using spent ABM in construction must have documented, quantitative evidence that no significant risk is being added to either the process or the product. Test results should demonstrate negligible incremental risk to the occupational workforce or to the public during processing of the material in its reuse environment. Potential liabilities may exist for the waste generator for real or perceived health effects resulting from the reuse.

The recycled material must equal or exceed the performance of the raw material it will replace. Product specifications for construction material include strength, size grading, chemical composition and purity, and chemical reactivity.

3.6.4 Example Applications

3.6.4.1 Using Ash in Construction Applications. Ash from a refuse-to-energy facility for processing of municipal waste is treated and used for landfill road construction. About 10 to 12% portland Type II cement is added to the ash. The treated ash is formed and cured to give a monolith which is crushed by equipment at the landfill. The resulting particulate is used as a subbase material for asphalt roadways at the landfill. The treated ash is accepted at no charge by the landfill and replaces recycled asphalt subbase that previously cost the landfill $2/ton (Korn and Huitric, 1992).

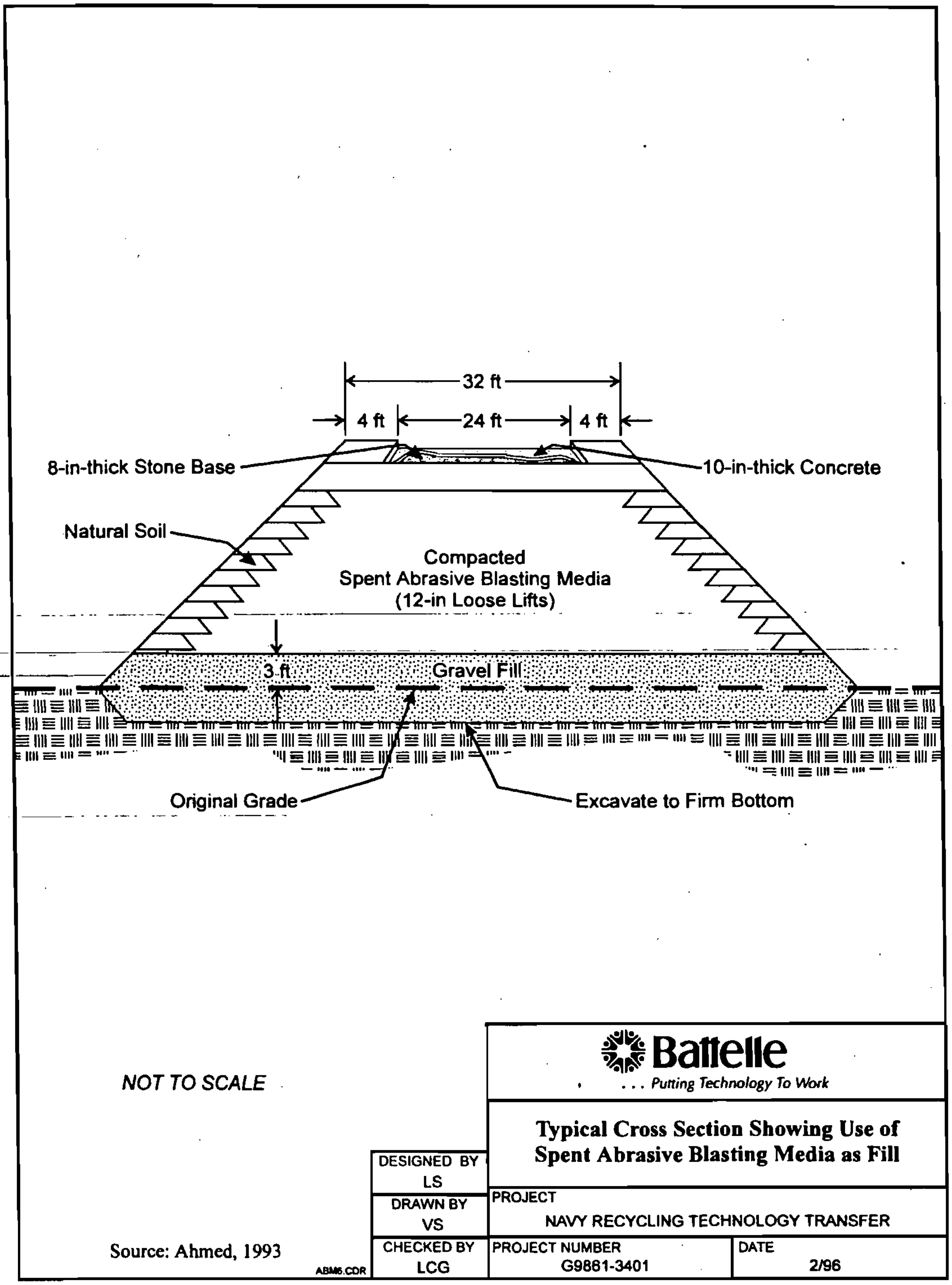


Figure 3-6. Typical Cross Section Showing Use of Spent Abrasive Blasting Media as Fill.

3.6.4.2 Beneficial Reuse of Foundry Sand. Foundry sand has been used extensively in construction applications. More complex sand and binder systems and increased concern over potential chemical hazards have resulted in a decline of such use in recent years. The Wisconsin Department of Natural Resources is developing a program to encourage responsible beneficial reuse of foundry byproducts. In particular, the state is developing fact sheets for beneficial reuse of foundry sand in applications such as these (Wisconsin DNR, 1993):

- foundation subgrade fill
- concrete and asphalt fine aggregate
- landfill daily cover
- pavement subbase fill
- contained embankment fill

3.6.4.3 Soil Recycling Demonstration. The Toronto Harbor Commissioner's soil recycling process produces reusable fill material by treating soils using a three-step process to remove organic and inorganic contaminants to produce a reusable fill material. First, soil washing reduces the volume of material to be treated by concentrating the contaminants in a fine slurry. The second step removes metals from the slurry by acidification and chelation. In the third step, chemical hydrolysis and biodegradation destroy organic contaminants concentrated in the slurry. The technology is reported to produce clean soil for reuse as fill material. A Superfund Innovative Technology Evaluation Program Demonstration took place in April and May of 1992 (U.S. Environmental Protection Agency, 1993, EPA/540/AR-93/517).

3.7 Vitrify Spent Abrasive to Form Construction Material

This section describes high-temperature processing to convert spent ABM or other wastes with a high silica content to low-value construction materials. Vitrification will destroy organic contaminants, reduce leachability of metals, and make a product with high compressive strength and a controlled particle size distribution. Thus, vitrification can be used to convert wastes with undesirable chemical and physical properties into a useful product. Thermal processing to produce high-value ceramic products is discussed in Section 3.2.

3.7.1 Description of Recycling Option

Waste vitrification is a thermal treatment technology that oxidizes, melts, and transforms a broad spectrum of wastes into a glasslike or rocklike material. The average composition of the earth's crust is compared to the composition of several glass formulations in Table 3-3. The similarity of the compositions indicates that mineral processing slags and minerals, such as those used to manufacture ABM, would be expected to be good candidates for vitrification.

Vitrification is accomplished by introducing the waste into a melting kiln or container where the waste is heated to form a liquid melt. A typical overall mass balance for vitrification using a plasma arc heat source in a reducing environment is shown in Figure 3-7.

The melting energy is derived from the oxidation of materials in the feed and from external heating of the waste material. Electrical conduction through the molten waste and plasma arc heating are two common methods for heat input. Some systems use fossil fuel heating, which reduces energy costs but increases the volume of off-gas generated.

Table 3-3. **Comparison of the Earth's Crust to Common Commercial Glasses**

Oxide Material	Average Composition of the Earth's Crust (wt%)	Typical Composition of Soda-Lime Glass (wt%)	Typical Composition of Borosilicate Glass (wt%)
SiO_2	59.7	73.3	80.4
Al_2O_3	15.5	1.5	2.3
Fe_2O_3	7.2	0.1	0.0
CaO	5.1	9.8	0.0
Na_2O	3.8	14.2	3.8
MgO	3.5	0.3	0.0
K_2O	3.1	0.6	0.6
SO_3	0.1	0.2	0.0
Cl	0.1	0.0	0.0
B_2O_3	Trace	0.0	12.9

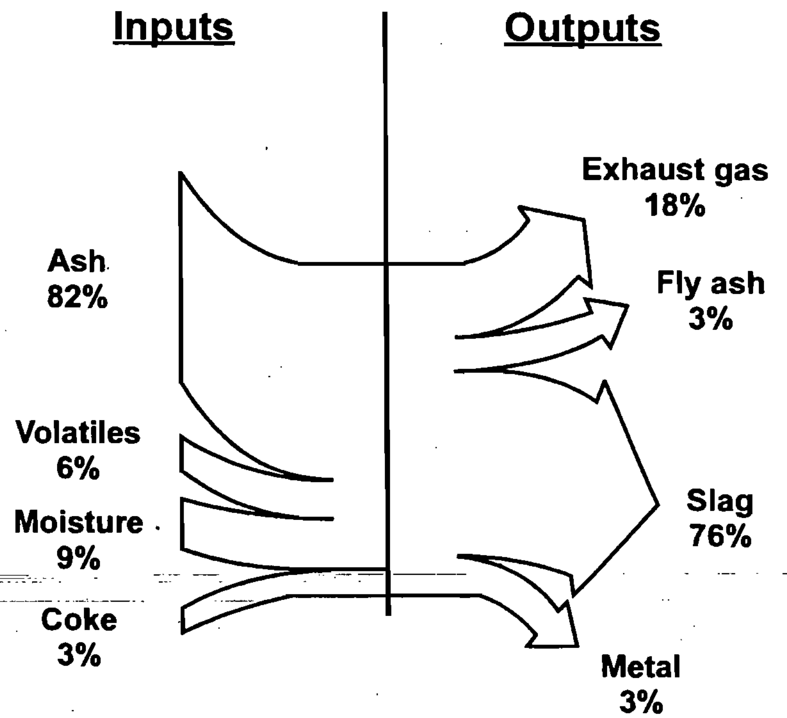
The discharged product usually provides high-volume reduction and a chemically durable material that typically passes the TCLP test as nonhazardous. The process typically collects particulates in the off-gas system and returns them to the melter feed to minimize secondary waste generation. For nonhazardous wastes, the discharged glass can be formed into useful construction materials, such as artificial aggregate, erosion-control boulders or slabs, or clean fill. Reuse of treated characteristic waste is possible (see Section 4.5.1 for a definition of hazardous characteristic). Testing will be required to demonstrate that the vitrification process removed the hazardous characteristic. However, it will be more difficult to identify markets of a material due to the previous waste code.

3.7.2 Advantages of Recycling Option

Vitrification of waste materials may be achieved over a broad range of earth and waste compositions and can immobilize many metal contaminants. The approximate solubility limit of a variety of common metal contaminants in glass is shown in Table 3-4 to indicate the general types and concentrations of metal contaminants that can be immobilized in a vitrified waste product. Examples of suitable wastes include sludge from wastewater treatment, electric arc furnace off-gas treatment residues, and baghouse dust (U.S. Air Force, 1990).

Vitrification has been adopted as the Best Demonstrated Available Technology (BDAT) for high-level radioactive wastes and for nonwastewater arsenic wastes. However, pretreatment usually is required to control arsenic volatilization during the vitrification process (U.S. EPA, 1990a, EPA/530/SW-90/059A).

The high-temperature vitrification process causes significant changes in the physical and chemical form of the matrix and the contaminants. Organic contaminants are oxidized to their mineral components. Metal contaminants are incorporated into a durable, leach-resistant mineral matrix. The discharged product is a chemically durable material that typically passes the TCLP test as nonhazardous. The process provides volume reduction (40% for soils to >99% for combustibles) (U.S. EPA, 1991, EPA/600/2-91/041).



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Material Balance for a Typical Plasma Arc Vitrification System

DESIGNED BY	PROJECT		
LS	NAVY RECYCLING TECHNOLOGY TRANSFER		
DRAWN BY VS			
CHECKED BY LCG	PROJECT NUMBER G9861-3401	DATE 2/96	

Source: Inaba, 1995

ABM5 CDR

Figure 3-7. Material Balance for a Typical Plasma Arc Vitrification System.

Table 3-4. Approximate Solubility Limit of Oxides of Metals in Silicate Glass

Element	Maximum Allowed Oxide Content (%)	Element	Maximum Allowed Oxide Content (%)
Ag	0.1	Mg	30
As	5	Mn	10
B	20	Mo	2
Ba	15	Ni	5
Be	10	Pb	30
Cd	1	Sb	2
Co	2	Se	1
Cr	2	Sn	5
Cs	25	Sr	15
Cu	5	U	20
Ga	5	Y	1
Hg	0	Zn	20

3.7.3 Limitations of Recycling Option

The vitrification process is capital and energy intensive. Processing is unlikely to break even for wastestreams when forming a low-value construction material. The main economic advantage is avoided disposal costs.

The construction material made by vitrification of spent ABM often will be placed in direct contact with the land. Even though significant chemical and physical changes occur during vitrification, use of vitrified wastes may be construed as "use constituting disposal" rather than a true recycling application. Regulatory agencies responsible for administration of federal and state solid and hazardous wastes should be contacted prior to proceeding with the recycling project. RCRA regulations discourage the land application of recycled hazardous materials (U.S. EPA, 1990c). In most cases special wastes or state-regulated wastes may be recyclable, subject to state or local restrictions/policies. State and local restrictions often are controlled by local agencies such as water quality boards, air quality boards, and local planning commissions. Regulatory considerations are discussed in more detail in Section 4.5.

Volatile metals such as arsenic, mercury, or beryllium are difficult to treat and can be present only at low concentrations. Wastes containing arsenic will require some combination of pretreatment, special processing conditions, and off-gas treatment systems to minimize arsenic volatilization. If reducing conditions can occur in the melt, cadmium, lead, and zinc can vaporize and enter the off-gas stream (Hollander et al., 1995).

3.7.4 Example Applications

3.7.4.1 Vitrification of Nonhazardous Sludge. World EnviroTech in New York, New York designs, builds, and operates thermal treatment systems to convert nonhazardous wastes such as sewage sludge to aggregate. The primary processing chamber operates at 2,400°F (1,300°C). Waste material reportedly is converted to an environmentally stable solid. The product can be either granulated (to a mainly vitreous form) or air-cooled (to a rocklike form) and is suitable for a wide range of uses as a replacement for sand and gravel. Example uses include preparing a subbase for roads, mixing in concrete as aggregate, or backfilling a pipe trench.

3.7.4.2 Waste Vitrification Process Options. Waste vitrification systems are under development or are available for hazardous and nonhazardous wastes from several vendors. Some examples of waste systems are summarized in Table 3-5.

Table 3-5. Examples of Some Waste Vitrification Process

Company/Process Name	Location	Process
Allis Mineral Systems/ Pyrokiln Encapsulation	20965 Crossroads Circle Waukesha, WI (414) 798-6265; fax (414) 798-6211	Fossil-fueled, direct-fired slagging rotary kiln[b]
Ausmelt	1331 17th Street, Suite M103 Denver, CO 80202 (303) 295-2216; fax (303) 295-7605	Fossil-fueled, direct-fired lance heater[c]
Babcock and Wilcox/ Cyclone Furnace	2200 Langhorne Drive Alliance, OH (216) 829-7394; fax (216) 829-7801	Fossil-fueled, direct-fired vortex furnace[a][b]
Battelle/Terra-Vit	Battelle Boulevard, P.O. Box 999 Mail Stop P7-41 Richland, WA 99352 (509) 376-6576	Joule-heated melter[a]
Ecotechniek/Ecogrind	Het Kwadrant 1 Maarssen, 3606 The Netherlands (31-465) 577-00; fax (31-465) 544-72	Sintering in a rotary kiln[a]
EET Corporation/Microwaste Solidification Technology	129A Perimeter Park Road Knoxville, TN 37922 (615) 691-1223; fax (615) 691-2656	Microwave heating in drum[a]
Electro-Pyrolysis Inc./ Electro-Pyrolysis	996 Old Eagle School Road, Suite 1118 Wayne, PA 19087 (215) 687-9070; fax (215) 964-8570	Direct-current arc furnace[a]
EM&C Engineering Associates/ Vitriflux	1665 Scenic Avenue, Suite 104 Costa Mesa, CA 92626 (714) 957-6429; fax (714) 957-6414	Vitrification at low temperature using flux addition[a]
ENVITCO, Inc.	8400 West Central Avenue Sylvania, OH 43560 (419) 829-2728; fax (419) 537-1369	Small-batch, joule-heated melter[c]

Table 3-5. Examples of Some Waste Vitrification Process Vendors (Continued)

Company/Process Name	Location	Process
Ferro Corporation/ Waste Vitrifier	7500 East Pleasant Valley Road Independence, OH	Joule-heated melter[b]
Multiplex Environmental/ Xtaltite	4570 Westgrove Drive, Suite 255 Addison, TX 75248 (214) 733-3378; fax (214)733-0366	Combination of hydrometal-lurgical and pyrometallurgi-cal processing to convert waste to a stable mineral form[a]
Penburthy Electromelt International, Inc.	631 South 96th Seattle, WA 98108 (206) 762-4244; fax (206) 763-9331	Joule-heated melter[c]
Plasma Technology Corporation/ Plasma Pyrolysis and Vitrification	8601 Six Forks Road, Suite 400 Raleigh, NC 27615 (919) 676-5304; fax (919) 676-5305	Plasma arc[c]
Retech/ Plasma Arc Centrifugal Treatment	100 Henry Station Road Ukiah, CA 95482 (707) 462-6522; fax (707) 462-4103	Plasma arc-heated rotating tub (centrifugal) melter[a][b]
Stir-Melter/ STIR-MELTER Systems	Ampoint Industrial Park 995 Fourth Street Perrysburg, OH 43552 (419) 536-8828; fax (419) 536-8288	Joule-heated, stirred melter[a]
Vortec Corporation/ Combustion and Melting System	3770 Ridge Pike Collegeville, PA 19426 (610) 489-2255; fax (610) 489-3185	Fossil-fueled, direct-fired vortex furnace[a][b]
Western Product Recovery Group, Inc./Coordinate Chemical Bonding and Adsorption	P.O. Box 79728 Houston, TX 77279 (713) 493-9321; fax (713) 493-9434	Sintering and partial slagging in a direct-fired rotary kiln[b]
Westinghouse Electric Corporation Science and Technology Center	1310 Beulah Road Pittsburgh, PA 15235 (412) 256-2235; fax (412) 256-1948	Plasma arc[c]

Sources:
(a) VISITT Version 4.0 (U.S. EPA, 1995, EPA/542-C-95/001).
(b) U.S. EPA, 1994, EPA/540/R-94/526.
(c) Vendor literature.

3.8 Processing in a Smelter

The metal content of spent ABM will not be sufficiently high to justify smelting to recover metals. The silica and calcium content may be useful as required slag-forming elements so that the spent ABM can be reused as flux in a pyrometallurgical process.

3.8.1 Description of Recycling Option

Pyrometallurgy is a broad term covering techniques for processing metal-bearing ores at elevated temperature. Processing at elevated temperature increases the rate of reaction and reduces the reactor volume per unit output. Elevated temperature often makes the reaction equilibrium more favorable. Pyrometallurgy, the oldest type of extractive metallurgy, dates back to the origins of recovering useful metals from ore. The earliest recorded use of pyrometallurgy was conversion of copper oxide ores to copper metal by heating with charcoal. This early type of pyrometallurgy was well established by 3,000 BC.

Pyrometallurgical processing to convert metal compounds to elemental metal usually requires a reducing agent, fluxing agents to facilitate melting and to slag off impurities, and a heat source. Figure 3-8 shows examples of oxidation and reduction smelting. The fluxing agents form a eutectic or other low-melting-point material due to the chemistry of the melt. An acceptable melting point is achieved by adding fluxing agents such as calcium oxide or by appropriate blending of the feedstocks. The most common fluxing agents in mineral smelting are silica and limestone. The spent ABM could be used to replace mineral raw materials as a source of silica. The spent ABM may contain trace metals that are recovered by the smelter, but the quantities would be incidental. The main recycling benefit from the ABM would be to provide silica.

Separating the metal from the undesirable waste components typically is accomplished by physical action based on phase separations. As the metal salts react with the reducing agent to form metal or matte, the nonmetallic portions of the ore combine with the flux to form a slag. Volatile metals such as zinc and cadmium vaporize and are collected by condensation or oxidation from the off-gas, usually as oxides due to combustion of metal fume in the flue. Dense, nonvolatile metals can be separated from the less dense silicate slag by gravity-draining the metallics from the bottom of the reaction vessel. Slag oxides are tapped from a more elevated taphole.

3.8.2 Advantages of Recycling Option

Using spent ABM or other high-silica wastes in a smelter offsets the consumption of rock while producing a leach-resistant slag. The slag is similar to the product made by vitrification (see Sections 3.2 and 3.7). Using the waste in a smelter takes advantage of existing equipment to avoid the high capital and operating cost of a vitrification unit.

3.8.3 Limitation of Recycling Option

The slag chemistry in a smelting furnace must be closely controlled to produce a low-melting mix that scavenges impurities and helps to chemically reduce metal salts in the ore to elemental metal. Silicon and calcium compounds are desirable in helping to form a slag with the correct melting point. High-melting oxides such as alumina are undesirable. The smelter operators will be required to frequently sample and analyze the wastes to ensure they are compatible with the slag chemistry.

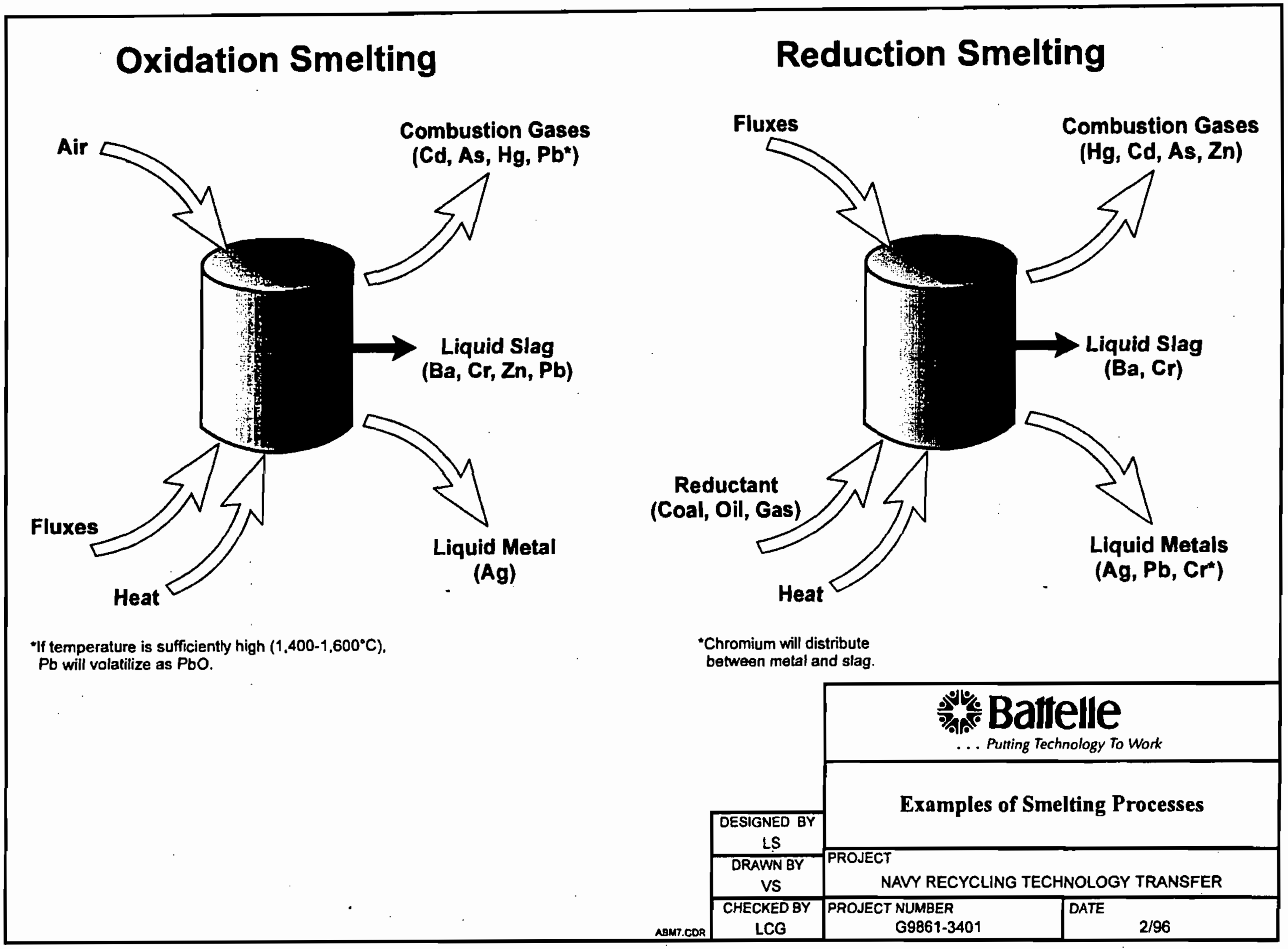

Figure 3-8. Examples of Smelting Processes.

3.8.4 Example Applications

3.8.4.1 Using Ash in Copper Smelting. Cyprus Miami Mining in Claypool, Arizona is a primary copper smelter used to process complex sulfide ores (LaChappelle and Dyas, 1993). The smelter produces copper as its main product with a small, but valuable, byproduct stream of gold and silver. Volatile metals such as lead, arsenic, and mercury are captured by acid scrubbing and sent to other facilities for recovery. The company is reported to be an exempt recycling facility with the capability of accepting D002 through D011 characteristic waste and F006 listed waste. The facility accepts selected metals; metal sludges or filter cakes; and incinerated ashes containing copper, silver, or gold. Processing ash from incineration of municipal wastewater treatment sludge provides silica as a flux and allows recovery of the trace quantities of gold and silver in the sludge. The plant also processes used foundry sand and lime residues from boiler cleaning. These materials provide fluxing agents and allow metal recovery.

3.8.4.2 Smelting Lead-Containing Wastes. The Center for Hazardous Materials Research and Exide/General Battery Corporation are demonstrating the use of secondary lead smelting to reclaim usable lead from waste materials containing between 1 and 50% lead. The characteristics of secondary lead smelters in the United States are summarized in Table 3-6. Waste containing 1 to 25% lead is treated in a reverberatory furnace to produce slag containing about 70% lead. The slag and other high-lead-content materials are fed to a blast furnace to produce lead metal products. Testing as part of the Superfund Innovative Technology Evaluation (SITE) Program has been performed on a variety of waste materials including battery cases, slags, lead dross, and lead paint chips. Materials from Superfund or other contaminated sites could be mixed with other higher grade lead material for smelting. The reported treatment cost ranges from $150/ton to $250/ton for Superfund materials (Timm and Elliott, 1993). The process has been used to treat about 1,350 tons (1,225 metric tons) of lead-bearing materials from the NL Industries Superfund site.

Table 3-6. United States Secondary Lead Smelters (November 1993) (Source: Smith et al., 1995)

Smelter Location	Year Built	Approximate Capacity MTPY[(a)]	Furnace Type[(b)]
Ponchatoula, LA	1987	8,000	BF-SRF
Boss, MO	1991	65,000	REV (Paste) SRF (Metal)
Lyon Station, PA	1964	54,000	REV-BF
Muncie, IN	1989	70,000	REV-BF
Reading, PA	1972	65,000	REV-BF
College Grove, TN	1953	10,000	BF
Eagan, MN	1948	55,000	REV-BF
Tampa, FL	1952	18,000	BF
Columbus, GA	1964	22,000	BF
Frisco, TX	1978	55,000	REV-BF
Los Angeles, CA	1981	90,000	REV-BF
Rossville, TN	1979	9,000	BF
City of Industry, CA	1950	110,000	REV
Indianapolis, IN	1972	110,000	REV-BF
Wallkill, NY	1972	70,000	REV
Troy, AL	1969	110,000	REV
Baton Rouge, LA	1960	70,000	REV-BF
Forest City, MO	1978	27,000	BF
Total secondary lead smelting capacity		1,023,000	

(a) As lead metal.
(b) BF = blast furnace; REV = reverberatory furnace; SRF = short rotary kiln.

4.0 EVALUATING RECYCLING OPTIONS FOR SPENT ABRASIVE

This section describes factors to consider when evaluating reuse and recycling options for spent ABM and other similar wastes.

4.1 Contaminant Characteristics

The types of contaminant present, their concentration, and their physical and chemical forms are major considerations in selection of a reuse or recycling option. Questions should be asked about the critical features of waste composition:

- Is the spent ABM suitable for cleaning and reuse?
- Will a mixture of metals in the waste complicate recycling?
- Will inorganic salts in the waste complicate recycling?
- Will organics in the waste complicate recycling?

The contaminant composition is determined by chemical and mineralogical analysis on a representative group of samples. The analysis should go beyond determining the concentration of the contaminants. The chemical form and speciation are important factors when considering recycling options. Matrix properties also are important (see Section 4.2).

Some fraction of the spent ABM will have the required particle size and shape to allow reuse for blasting if the impurities can be removed. Physical separation, thermal processing, or a combination of the two methods may be used to recover and restore the usable portion of the spent material.

A waste containing a limited number of contaminants generally is easier to recycle. Wastes containing a single type of metal contaminant are more likely to be suitable for higher-value uses. Segregating hazardous from nonhazardous wastes can be particularly helpful. Finding recycling options will be more difficult if the waste has a RCRA hazardous waste designation. It is often beneficial to separate spent ABM to be used for cleaning newer ships from spent ABM to be used for cleaning older ships. In 1977, the Consumer Product Safety Commission banned the use of lead-containing paints for residential use. Although there is no specific regulation banning the use of lead-containing paints for industrial coatings, lead primers have been nearly eliminated from use since the early 1980s (Leighton, 1995). Older coating materials containing lead can cause the spent ABM to be a RCRA-listed hazardous waste. If all spent ABM wastes were mixed, the volume of hazardous waste could be increased and recycling options decreased. However, plans for waste segregation should consider the desire of end users for a reliable supply of homogeneous material and the added cost of sampling and analyzing many different waste groupings (see Section 4.4.2).

Antifouling additives are a unique feature of marine coatings. The compounds used in antifouling paints for ships can introduce metal contaminants to the spent ABM. These antifouling paints serve a pest control function and must, therefore, be registered under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). Copper-based antifouling coatings traditionally were favored but were largely replaced by organotin formulations that gave more reliable protection. Use of organotin antifouling coatings has been restricted worldwide, and the FIFRA registration of organotin coatings is under review by the U.S. EPA. With the increased regulatory scrutiny, the popularity of organotin antifouling coatings has been declining (Holder and Montemarano, 1995).

Inorganic salts can interfere with specific recycling options. For example, chlorides increase the volume of kiln dust waste from cement manufacturing and chlorides or sulfates produce acidic off-gas from thermal processes.

The presence of high concentrations of organic contaminants can complicate the recycling of spent ABM, but petroleum contaminants can be acceptable with some recycling options. Organic contaminants with properties similar to bitumen (e.g., the higher-molecular-weight hydrocarbons) are compatible with asphalt. Therefore, petroleum hydrocarbons may be tolerated, if the spent ABM is to be used for asphalt. Vitrification and cement-making require energy input; therefore, the waste can contain an organic contaminant if it burns to provide energy and does not add impurities or produce unacceptable off-gas.

4.2 Waste Characteristics

The waste matrix properties will affect the acceptability of the waste material for various recycling methods. For construction applications, the material matrix is the recycled product. The waste matrix affects the compatibility of the waste matrix with the intended end use. Review of waste matrix effects is aimed at answering these types of questions:

- Is the waste matrix compatible with the existing recycling processing techniques and equipment?
- Will the waste matrix increase or decrease contaminant mobility?
- Does the matrix have value as a bulk commodity?

The potential user of a recyclable waste will prefer a material with physical and chemical properties similar to those of the conventional raw material. In general, there will be a preference for a dry granular solid with a uniform concentration. The highest possible and most permanent leaching resistance is desirable and, of course, all regulatory leaching resistance requirements must be met.

Any recycling option will require simple pretreatment of the waste to upgrade, blend, or otherwise develop more uniform or desirable characteristics for the end user. At a minimum, the waste should be passed through a large mesh screen to remove trash and oversize material. Additional physical separations processing may also be useful. For example, crushing to reduce the size of large clumps followed by screening to remove both oversize debris and undersize dust will produce a more uniform particle-size material and may increase the value or range of applicable recycling options.

More complex separation processes are available to upgrade the spent ABM. Magnetic separation can remove ferromagnetic metals. Beneficiation processes involving water-assisted physical separation such as jigging, hydrocyclone separation, or tabling separate particles based on size, shape, and density. However, the added cost of the more complex beneficiation methods is more difficult to justify when dealing with wastes that are suitable only for lower-value uses.

It is important to note that conventional materials are not totally free of trace metal impurities. The metal content of the spent ABM may be within the range of composition of the conventional material it replaces. The trace element content of soils is shown in Table 4-1 to provide a general basis for comparison.

4.3 Site Characteristics

Site characteristics such as infrastructure capabilities and support service supplies may either favor or interfere with removal or handling of the waste material. Examination of site characteristics is directed at answering these types of questions:

- Is the material accessible for removal?
- Can the contaminated solid be moved efficiently by conventional bulk material handling equipment and techniques?
- Will the on-site and off-site infrastructure support transport of the waste materials?
- Are the required utility supplies and support services available?

Removal logistics are determined by access to the contaminated site for excavation, the ability to handle excavated material, space for placement of aboveground treatment equipment, and the road and rail system on and around the site. Recycling usually requires development of storage areas to allow for pretreatment of the waste (see Section 4.2), to accumulate sufficient volumes of uniform feed to satisfy user needs, and to stockpile material between projects. The surge storage will increase space requirements and may increase regulatory concerns.

Data needed to evaluate the removal logistics include maps of the site and surroundings. Important features to consider include the general arrangement of structures and infrastructure and the location of critical environments or sensitive receptors.

Table 4-1. Trace Element Content of Soils

Element	Common Range in Soil (mg/kg)	Average Concentration in Soil (mg/kg)
Ag	0.01 to 5	0.05
As	1 to 50	5
B	2 to 100	10
Ba	100 to 3,000	430
Be	0.1 to 40	6
Cd	0.01 to 0.7	0.06
Co	1 to 40	8
Cr	1 to 1,000	100
Cs	0.3 to 25	6
Cu	2 to 100	30
Ga	0.4 to 300	30
Hg	0.01 to 0.3	0.03
Mg	600 to 6,000	5,000
Mn	20 to 3,000	600
Mo	0.2 to 5	2
Ni	5 to 500	40
Pb	2 to 200	10
Sb	2 to 10	No data
Se	0.1 to 2	0.3
Sn	2 to 200	10
Sr	50 to 1,000	200
U	0.9 to 9	1
Y	25 to 250	50
Zn	10 to 300	50

Source: U.S. Environmental Protection Agency, 1983, SW-874.

4.4 Economic Factors

Economic factors including costs, market conditions, and time available for remediation play a major role in the identification and selection of recycling options.

4.4.1 Operating and Capital Costs

A reuse or recycling option is evaluated as a competitor among a group of options. To be acceptable, an option must effectively protect human health and the environment. In most cases, once effective options are identified, the one with the lowest implementation cost is selected. The economic analysis will need to consider the capital investment required to implement the candidate options and the overall cost of the recycling versus treatment and disposal. Questions typically considered as part of the economic evaluation include:

- Is there a profitable recycling option?
- Will consideration of life-cycle cost factors improve the competitive position of recycling?
- Do intangible factors favor recycling?
- Does recycling require a major investment of capital?

The value or cost of recycling spent ABM will be determined by competition with other raw materials in the marketplace. If a paying recycling market is identified for the spent ABM, treatment and disposal options should not be considered.

There usually will be a fee associated with recycling options for spent ABM and similar wastes. Recycling options will then need to be evaluated in competition with treatment and disposal alternatives, except where treatment and disposal are precluded by land ban requirements (e.g., wastes containing high concentrations of mercury or emission control dust or sludge from electric arc furnaces K061).

The economic analysis should include both direct costs and avoided expenses through the life cycle of the alternative considered. Intangible factors such as improved public image or the potential for liability should be considered. It may be appropriate to include some correction for costs that may occur but that cannot be quantified. For example, disposal options may result in liability for cleanup at a future date.

The relative capital costs can also influence a decision. Even if one option has a lower life-cycle cost, a higher total cost option with lower capital cost may be chosen due to limited availability of capital.

4.4.2 Recycling Market

The recycled spent ABM must compete effectively with conventional products filling the same needs. The competitive position of the contaminated material should be considered to address questions such as these:

- Will the recycled product equal or exceed the performance of competing products already in the market?

- Are adequate markets available within a reasonable shipping distance?

- Will the volume of material available for recycle justify the effort required to do the recycling?

Products formed from waste materials must meet or exceed the performance specifications of existing products. For example, ASTM C 825, "Specification for Precast Concrete Barrier," describes the required characteristics of formed concrete products given in the specification for New Jersey barriers.

The barrier specification combines requirements on materials, design, manufacture, and physical performance. The materials used (cement, aggregates, air-entrainment additives, and steel reinforcement) must meet applicable ASTM specifications. The design factors specified are concrete strength and air content, dimensions, reinforcement placement, finish, lifting devices, and anchorage points. Requirements for the manufacturing steps of mixing, curing, and forming are given. Test methods and required performance are given for compressive strength and dimensional tolerance.

The form of the barrier specification illustrates one hurdle for waste-derived products. For many waste-derived products, the materials and method of manufacture are totally different from those used in making the existing product. The customer may be unwilling to accept the new manufacturing methods even when the measured physical and chemical properties are equal or superior. The customer is concerned that the quality of the product is affected in part by features or interactions too complex to be measured by physical properties alone, so the quality of the raw materials and the production process must be specified and controlled. As a result, a waste-derived product often must undergo a lengthy demonstration to prove performance in real-world applications.

The location of the site and the volume of spent ABM can influence the economic viability of recycling. The shipping, handling, and storage costs can be a significant portion of the total cost, particularly with low-unit-value aggregate or construction materials. A waste source located near the end user will reduce shipping costs.

Industrial users prefer a steady supply of consistent materials. The desire for a homogeneous feedstock often is not consistent with the realities of waste production. Both the matrix composition and the contaminant levels in wastestreams can be highly variable. Also, as discussed in Section 4.1, waste segregation can help reduce the volume of hazardous wastes produced but will increase the number of waste types. Waste segregation efforts must consider a tradeoff between reducing the volume of hazardous wastes versus the increased complexity introduced by having many waste types. When wastes are segregated in small batches, each batch must be characterized, increasing sampling and analysis costs and increasing the challenges in marketing several smaller volumes of wastes.

Preprocessing the waste to improve homogeneity is a possible approach to improving market acceptance. However, additional processing increases the cost to implement the option and the complexity of the equipment needed on site.

4.4.3 Time Available for Remediation

Evaluation of reuse and recycling options should consider the amount of time required to mobilize, operate, and demobilize the selected option in relation to the time actually available to perform the work. Consideration of the timing of the options is directed at answering these types of questions:

- Can the cleanup be completed in a time frame consistent with health, safety, and environmental protection?
- Can the cleanup be completed in a time frame consistent with the end use requirements?

The time available for remediation is controlled primarily by the need to protect human safety and health and the environment. If a toxic contaminant is present, the contaminant concentration is high, or the contaminant is mobile and near a critical ecosystem, the remediation must proceed quickly. Time available may be controlled by the value or intended end use for the site. It is undesirable to keep a high-value site out of productive use for a long period.

Identification of recycling options, definition of applicable specifications, testing to determine their suitability, and negotiating contracts to do the recycling can require more time than conventional treatment technology. If the contaminant presents an imminent danger due to hazard level, mobility, or other factors, rapid remediation is needed. The need for rapid remediation of an imminent hazard favors treatment.

The importance of the length of remediation time may be lessened if the time constraint is driven by economic or end use requirements. Depending on the site logistics and the site use, it may be possible to continue routine site operations while material is removed (and, if appropriate, while it is processed on site) for recycling. However, the need for rapid remediation still generally increases the favorability of treatment technologies.

4.5 Regulatory Considerations

Regulatory constraints describe the overall regulatory climate at the site based on federal, state, and local regulations. Typically the recycled material fills only a small portion of the user's feed material requirements. Should the regulatory requirements or liability concerns be large, the user typically has a competitive source of virgin material to replace the recycled material. As a result, regulatory issues can present a significant challenge to recycling of materials with a RCRA waste code or coming from a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) site. Examination of regulatory standards is directed at answering such questions as these:

- What contaminant control levels are required?
- Are the materials controlled by RCRA hazardous characteristics or listings?
- Are the materials controlled by state or local hazardous or industrial waste regulations?
- Can a valid reuse, reclamation, or recycling process be applied to exempt RCRA waste?

Regulatory considerations often are the most important factors influencing the viability of a particular recycling option. Therefore, before plans for recycling are pursued in depth, it is important to determine the federal, state, and local regulations that may be applied to a particular site, waste material, and/or recycling option.

Regulations pertaining to recycling vary widely from state to state; in addition, the prevailing attitude on the part of the regulator towards recycling will vary based on a number of factors, such as prior track record, perceived risk, and other factors. It is not possible here to define or predict the compliance issues that may be encountered on a project-by-project basis. The remainder of this section summarizes U.S. EPA and some examples of state regulations that pertain to the recycling of spent ABM. The discussion of state regulations and policy pertains primarily to California, Oregon, and Washington but may provide some generic perspective on the types of compliance issues that may be encountered in other states as well.

4.5.1 Federal Regulations — RCRA

One of the first steps in identifying the regulatory requirements is to determine if the spent ABM is considered a hazardous waste under RCRA. This law and the regulations issued pursuant to the law place stringent requirements on the storage, treatment, and disposal of hazardous waste. Under RCRA, a waste may be considered hazardous if it is either specifically listed (e.g., certain spent solvents from certain processes or specific chemicals) or it may be hazardous by characteristic (i.e., it is ignitable, reactive, corrosive, or "toxic" based on the TCLP). For spent ABM, it is most often the metals from the paints (e.g., lead) that cause the waste to fail the TCLP and thus be considered a RCRA hazardous waste.

Because of extensive regulatory tracking, reporting, testing, and in some cases, permitting requirements, and because of concerns for future liability, many companies are not willing to accept RCRA hazardous wastes as substitutes for their normal raw materials. Therefore, it is important to know if the waste is RCRA hazardous and to discuss any proposed reuse/recycling with the potential recycler before proceeding. In addition, the U.S. EPA or their delegated regulatory agency has authority over recycling of RCRA hazardous wastes and it is critical to determine whether the recycling option will be allowed by the regulatory agency before engaging in the process.

The regulation of recycling RCRA hazardous waste is a complex and evolving area. The U.S. EPA is considering revising the existing regulations to make legitimate recycling easier; however, these revisions are not yet in place. The regulation of recycling is still quite complex and is often determined on a case-by-case basis. An overview of the existing recycling regulations and policies is discussed below.

Rules issued by U.S. EPA on January 4, 1985 (50 FR 614) acknowledged the need to encourage safe recycling of hazardous wastes — particularly when recycling clearly reduces potential harm — while at the same time assuring the abatement of pollution and the prevention of harm to human health and the environment.

For a secondary material to be regulated under RCRA Subtitle C, a substance must first meet the definition of a "solid waste." Section 1004(27) of RCRA defines solid waste as:

> any garbage, refuse, sludge, ... and other discarded material, including solid, liquid, semisolid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations and from community activities.

A central element of this definition is that wastes are "discarded." In 1985, the U.S. EPA revised the definition of solid waste to further clarify when a secondary material that will be recycled is considered a solid waste. Under the regulatory definition of solid waste, found in 40 CFR 261.2(a-f), a secondary material is defined as a solid waste if:

- it is abandoned
- it is recycled in certain ways, or
- it has been defined as "inherently waste like."

The term "secondary material" refers to spent materials, sludges, byproducts, commercial chemical products, and scrap metals. "Spent material" is defined as a material that has been used, which as a result of contamination can no longer serve the purpose for which it was produced without further processing. When any of the five types of secondary materials are "recycled in certain ways," they may or may not be defined as solid wastes. The U.S. EPA has made distinctions between recycling that is regulated as waste management and recycling that is exempt from regulation, depending on the type of secondary material and the manner in which it is being managed.

With respect to the second item, "recycled in certain ways," secondary materials are solid wastes, and thus are subject to regulation, when they are recycled in the following four ways:

- used in a manner constituting disposal (i.e., applied to the land or used to produce a product that is placed on the land) [note that use of hazardous waste in asphalt and concrete generally is considered use constituting disposal.]

- burned for energy recovery (including use to produce a fuel)

- reclaimed (processed to recover a usable product or component or regenerated), or

- accumulated speculatively (material stored with less than 75% recycled within 1 calendar year).

The regulations state that when any of the secondary materials identified above is recycled in any of the four ways indicated, it is defined as a solid waste, with four primary exceptions:

- characteristic sludges being reclaimed
- characteristic byproducts being reclaimed
- commercial chemical products being reclaimed, or
- commercial chemical products being speculatively accumulated.

Characteristic sludges and byproducts used in any of the remaining three ways (i.e., placed on the land, burned for energy recovery, or accumulated too long before recycling) are solid wastes. Commercial chemical products that are placed on the land or burned for energy recovery also are solid wastes, unless that is their ordinary use.

In addition to the exclusions discussed above, the U.S. EPA recognized other situations that closely resemble production processes and, therefore, are excluded from regulation under the RCRA program. Materials are not solid wastes when they are legitimately recycled by being:

- used or reused as an ingredient in an industrial process to make a product, provided the materials are not first reclaimed

- used or reused as effective substitutes for commercial products provided they have not been reclaimed, or

- returned to the original process from which they were generated without first being reclaimed (material must be used as a substitute for raw material feedstock).

These materials are not considered solid waste.

Although the direct reuse provisions exempt certain materials from being solid wastes, there are limits to these exemptions. Materials that are used/reused as ingredients or substitutes for commercial products, but are also placed on the ground or incorporated into products placed on the ground (i.e., that are used in a manner constituting disposal) remain solid wastes. Also, if a material is used or reused by being burned for energy recovery or used to produce a fuel, it remains a solid waste. Finally, if a material is speculatively accumulated or is "inherently waste like," the material remains a solid waste regardless of the manner in which it is recycled.

The burden of proof that a particular material is not a solid waste and is, therefore, exempt from regulation lies with the person making the claim. This person must be able to demonstrate that there is a market for the material and that the specific use/reuse meets the condition of the exclusion. Closed-loop recycling processes also are excluded from regulation (40 CFR 261.4).

In addition, three case-by-case variances can be granted by the Regional EPA Administrator to exclude a material from classification as a "solid waste," the following two of which involve recycling:

- A material is reclaimed and then reused as a feedstock within the original primary production process in which the material was generated if the reclamation operation is an essential part of the production process, or

- A material has been reclaimed but must be reclaimed further before recovery is complete if, after initial reclamation, the resulting material is commodity-like.

The U.S. EPA has also established a policy identifying criteria that may indicate sham recycling that is actually a surrogate for hazardous waste treatment or disposal. If a person uses a secondary material as is (in a production process), that person must be able to show that the secondary material is as effective as the raw material it is replacing. Also, if the material does not contribute any necessary or significant element to a product of the production process, the recycling may be a sham. Other indicators of sham recycling are use of a secondary material in excess of the amount necessary for a particular process and the handling of a secondary material without regard to economic loss. The burden of proof for the legitimacy of a claimed regulatory exemption rests solely on the recycler.

For secondary materials subject to regulation as a solid waste and potentially as a hazardous waste, specific standards exist for some types of hazardous waste reuse or reclamation activities. Generators and transporters of recyclable materials (hazardous wastes that will be recycled) generally are subject to 40 CFR Parts 262 (generator requirements) and 263 (transporter requirements) of Subtitle C, as well as notification requirements of Section 3010 of RCRA. Additionally, recycling facilities that store recyclable materials prior to recycling are subject to notification requirements and Subtitle C hazardous waste storage requirements. However, in general, the recycling process itself currently is exempt from regulation under Subtitle C. Recycling facilities that do not store recyclable materials before recycling are subject only to Subtitle C notification and manifest requirements.

Some particular recyclable materials are not subject to the full generator, transport, and storage requirements of Subtitle C, but are only subject to the limited provisions of Part 266 (again, the actual recycling process is not regulated; only the storage prior to recycling is subject to full Subtitle C regulation). Recyclable materials regulated under Part 266 include:

- hazardous waste burned for energy recovery
- precious metal reclamation
- spent lead-acid batteries
- recyclable materials used in a manner constituting disposal.

4.5.2 State and Local Regulations

State and local requirements can vary widely. Therefore, it is important to determine what the requirements are for a specific location. For spent ABM that is not RCRA hazardous, the following regulatory agencies potentially could have cognizance:

- state air board or air quality management district
- state water board
- state environmental protection agency (or department of environmental protection)
- county department of public health (or similar agency, if applicable)
- city department of public health (or similar agency, if applicable).

The names of these organizations may vary widely from region to region, and the above list is not necessarily complete. A list of addresses and phone numbers of state environmental regulatory agencies, and a list of U.S. EPA information hotlines and other sources of regulatory information pertaining to recycling are provided in Appendix B.

Some states have established requirements that are more stringent than those of the federal government for determining what waste is considered hazardous. Thus, spent ABM that is not hazardous under RCRA potentially could be considered hazardous by a particular state and must be handled and disposed of according to the state or local requirements. For example, California requires a slightly different testing procedures for determining toxic metals content and leachability. Also, the state has established lower concentrations for toxic metals and includes several additional metals such as copper that are not regulated under RCRA.

4.5.2.1 Summary of California EPA Policy Regarding "Use in a Manner Constituting Disposal." California is one of a handful of states that have promulgated policy pertaining to recycling hazardous wastes into construction materials and specifying acceptance criteria for the types of wastes or byproducts that may be recycled. On August 18, 1995, the California EPA, Department of Toxic Substances Control (DTSC), Alternative Technology Division in Sacramento issued a management memo dated August 1995 for "The Use of Recyclable Materials in Asphalt Concrete and Concrete (Use Constituting Disposal or UCD)" (Appendix C). The purpose of this policy is to encourage the recycling of suitable wastes into construction materials and to establish conditions to assure that the recycling occurs safely and can be monitored as necessary to prevent abuses. Several of these conditions, which are described more fully in Appendix C, are as follows:

- The policy applies only to non-RCRA (California-only) hazardous wastes.

- For wastes failing the California WET test, the contaminant in the resulting construction material needs to be "chemically-bound." The effect of contaminant dilution by other ingredients in the construction materials needs to be accounted for by increasing the measured leachable concentration by the dilution factor so that the component of immobilization due to chemical binding can be assessed. The WET soluble metal content of the asphalt-treated ABM must adhere to STLC standards after accounting for the effect of dilution.

- Recyclable materials should add no significant hazard to public health or the environment, either in the recycling process or in the final product.

- The recyclable materials must be used beneficially; that is, the material must meet accepted performance standards such as Caltrans (California Department of Transportation) specifications and must be made for commercial use.

Clearly, compliance with these criteria will involve some testing and evaluation. Demonstrating compliance with the metals leaching criteria will require laboratory or field treatability tests to evaluate the extent of metals immobilization due to asphaltic binder ingredients. Compliance with the criteria pertaining to hazards posed by the recycling process or product may require the performance of a quantitative risk assessment.

4.5.2.2 California Hazardous Waste Management Compliance Issues. The regulations summarized above specify when a hazardous byproduct is recyclable. Once that recyclability is demonstrated, for category 2 and 3 wastes, it will still be necessary to manage that recycling project in compliance with applicable state, local, and/or U.S. EPA waste management regulations.

As in the previous sections, it is not possible to define these regulations and policies for every region, as they will vary significantly from region to region. However, it is instructive to indicate the types of compliance issues that may exist, using California as an example.

In California, hazardous waste control requirements are set forth in the California Health and Safety Code, Division 20, Chapter 6.5, Section 25100 et seq. and regulations have been adopted to implement this section of the statutory code. Recyclable materials are subject to these requirements unless a variance is issued by the California DTSC or unless the material is excluded or exempted from classification as a waste under Section 25143.2(b), (c), or (d) or California's hazardous waste management regulations (adopted pursuant to Sections 25150 and 25151).

Materials exempted or excluded under Section 25143.2, subdivisions (b) or (d), must be managed in accordance with the requirements for management of a recyclable material specified in 25143.9. Under 25143.9(a), if a material is held in a container or tank, the container or tank must be labeled, marked, and placarded in accordance with DTSC hazardous waste labeling, marking, and placarding requirements applicable to generators, except that the container or tank would be labeled or marked clearly with the words "Excluded Recyclable Material" instead of the words "Hazardous Waste," and manifest document numbers would not be applicable.

Under 25143.9(b), the owner or operator of the business location where the material is located must have a business plan that meets the California requirements given in Section 25504, including but not limited to, emergency response plans and procedures, as described in subdivision (b) of Section 25504, which specifically address the material meet the DTSC's emergency response and contingency requirements that are applicable to generators of hazardous waste.

Section 25143.9(c) requires that the recyclable material be stored and handled in accordance with all local ordinances and codes governing the storage and handling of the hazardous material, including but not limited to, fire codes. If a local jurisdiction does not have an ordinance or code requiring secondary containment for hazardous material storage areas, then the material must be stored in tanks, waste piles, or containers meeting the DTSC's interim status regulations establishing design standards applicable to tanks, waste piles, or containers storing hazardous waste. Finally, under Section 25143.9(d), there are additional requirements if the material is being exported to a foreign country.

Although recyclable materials are not required to comply with the same regulations applied to hazardous waste generators, there is a statutory provision that affects the length of time that recyclable materials can be stored. Under Section 25413.2(e), materials that are accumulated speculatively do not qualify for the exemptions under Section 25143.2. Because California has not specified a definition of speculative accumulation, the definition established by the U.S. EPA in 40 CFR 261.1(c)(8) applies. Under this definition, a recyclable material is not accumulated speculatively if the person accumulating it can show that the material is potentially recyclable and has a feasible means of being recycled; and that during the calendar year (commencing on January 1), the amount of material that is recycled or transferred to a different site for recycling equals at least 75% by weight or volume of the amount of that material accumulated at the beginning of the period.

Persons recycling more than 100 kilograms per month of recyclable material are required to provide reports to the local health officer or other local public officer authorized to implement the statute (see Section 25143.10). The following information is required to be provided in writing every 2 years:

- the name, site address, mailing address, and telephone number of the owner or operator of any facility that recycles the material
- the name and address of the generator of the recyclable material
- documentation that the requirements of any exemptions or exclusions pursuant to Section 25143.2 are met including, but not limited to, all of the following:
  - where a person who recycles the material is not the same person who generated the recyclable material, documentation that there is a known market for disposition of the recyclable material and any products manufactured from the recyclable material.
  - where the basis for the exclusion is that the recyclable material is used or reused to make a product or as a safe and effective substitute for a commercial product, a general description of the material and products, identification of the constituents or group of constituents, and their approximate concentrations, which would render the material or product hazardous under the regulation adopted pursuant to Sections 25140 and 25141, if it were a waste, and the means by which the material is beneficially used.

This information must be provided in the format developed by the California Conference of Directors of Environmental Health in consultation with the DTSC. Also, if the person recycling the material is not the same person who generated the recyclable material, then the person who recycles the material is required to provide the generator with a copy of the information listed above.

If the exclusion of the recyclable material is questioned and the regulatory authority brings action against owner or operator using the recyclable material, the burden of proof that the exclusion is valid lies with the owner or operator, not with the agency. The owner or operator would be required to provide information on the management of the material and to maintain adequate records to demonstrate that there is a market for disposition of the material (Section 25143.2, subdivision (f)).

4.5.2.3 Spent ABM Reuse in Washington and Oregon. The states of Washington and Oregon each have state regulations that potentially could favor recycling of state-only hazardous waste because of restrictions on landfilling such materials. A brief summary of these regulations is discussed below.

Washington's Dangerous Waste Guidelines (Washington Administrative Code [WAC] Chapter 173-303) have adopted TCLP testing parameters that are identical to the federal regulations specified under RCRA. However, Washington Department of Ecology Technical Information Memorandum (TIM)

86-1 specifies additional analytical testing requirements for foundry slag and baghouse wastes from the sandblasting industry. TIM 86-1 specifies three additional metals: copper, nickel, and zinc. This memorandum stipulates that if the cumulative concentrations of these three metals in their soluble form exceeds 5 parts per million (ppm), then additional criteria under aquatic toxicity testing must be reviewed prior to disposal through a municipal facility. These criteria may not apply if the materials are recycled or used in additional industrial processes. It is not clear how this would apply to spent ABM; however, recycling potentially could be more favorable if the presence of these metals caused disposal costs to be greater.

The Oregon Hazardous Waste Guidelines (Oregon Administrative Rules (OAR) Chapter 340) also have adopted the federal TCLP criteria for heavy metals. However, the Oregon Department of Environmental Quality has recently promulgated legislation for the management of ABM from ship repair activities. This segment of legislation specifically targets the ship repair industry and the use of antifouling paints. Under this regulation, spent antifouling residues may be considered pesticides. Because antifouling paints are potential pesticides, and sandblast grit waste containing such is subject to Oregon's Aquatic Toxicity Test (OAR 340-101-033). If the sandblast grit fails the original TCLP parameters, the material is then classified as a federally regulated hazardous waste and an aquatic toxicity test is not necessary; it must be managed as a hazardous waste. If the waste passes the TCLP test and fails the aquatic toxicity test, it is classified as an Oregon State-Only dangerous waste and must be managed as a hazardous waste. Upon further review of this legislation, this rule is applicable to materials primarily managed and disposed through municipal landfill facilities and does not include those wastes managed through a legitimate recycling or reuse program. The Department of Environmental Quality does allow disposal of spent grit that fails the aquatic toxicity test if the solid waste landfill meets design criteria specified in 40 CFR 258.40.

5.0 SUMMARY AND CONCLUSIONS

Section 2 describes physical and chemical aspects of new and spent ABM, Section 3 discusses some specific approaches to recycling spent ABM, and Section 4 describes factors to consider when reviewing and selecting recycling options. These sections outline some guideposts to possible markets for your spent ABM or similar wastes and indicate factors to consider when searching for recycling options. The analysis is a complex task which must be done for a specific waste material.

Due to the lack of a clear definition of what constitutes valid recycling, the user needs to be particularly careful when identifying options for hazardous material recycling. The ultimate interpretation rests with the federal and local regulators.

Once the potential markets are identified, some basis must be found for establishing specifications for materials. Reliable materials commerce requires some acceptable standards describing the composition, quality, and properties of recycled materials. The specifications may be based on the material origin, composition, end use performance, or other characteristics. Potential end users may avoid recycled material if they are uncertain about the impurity levels or how well the quality of the material will be controlled.

In general, developing a specification will require negotiation between the supplier and user. Some guidance is available in the form of ASTM or other specifications that include or can be applied to recycled materials. The U.S. EPA, under the provisions of RCRA, is encouraging government agencies to allow use of recycled materials. However, most existing specifications are written to ignore or possibly even preclude recycled materials. Creative use of existing specification may be needed to reach a definition of material composition and properties that is acceptable to the buyer and seller.

Material characterization for recycling requires a somewhat different outlook and approach than is typical for waste treatment studies. Waste characterization for waste treatment and disposal usually focuses mainly on the amounts of contaminant present. The mineral form of the contaminant and the composition and form of the matrix are considered only in light of how they may affect the performance of treatment or disposal options. Recycling requires thinking of the entire body of waste material as a product. As a result, its total composition, chemical speciation, and physical form need to be established early in the characterization process.

Waste materials, particularly those from CERCLA sites, usually have highly variable compositions. End users prefer a reliable stream of materials with predictable composition. The waste supplier may, therefore, need to provide pretreatment to homogenize and sample the material to prepare a product that is acceptable for the user.

In the face of competition for traditional raw materials sources, the waste generator or supplier often needs to take an active role to seek out uses for the waste material. Recycling can succeed only if there are markets for the waste material. In general, users of recycled materials are in a buyer's market. A large new source of waste materials available for recycling can saturate end use markets. These elements can help in finding a home for waste materials:

- established and effective specifications
- creative efforts to identify possible uses

- providing a reliable supply of consistent material
- programs to improve public awareness of recycling potential.

These seem daunting tasks that lie beyond the scope of normal waste processing and disposal. However, significant benefits can be achieved in reduced liability and possibly reduced cost if the waste material is recycled rather than sent for disposal.

The individual waste generator can contribute, but efforts are needed from a variety of groups to help expand recycling of industrial wastes. The task is not impossible. Europe has installed an infrastructure for recycling a variety of industrial wastes. Technologies and systems are growing in the United States to support recycling.

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APPENDIX A

ABRASIVE BLASTING MEDIA QUALIFIED FOR USE ON U.S. NAVY SHIPS

QUALIFICATIONS CERTIFIED
MAY 1990

QPL-22262-18
20 June 1995
SUPERSEDING
QPL-22262-17
21 May 1993

QUALIFIED PRODUCTS LIST

OF

FSC 5350

PRODUCTS QUALIFIED UNDER MILITARY SPECIFICATION

MIL-A-22262

ABRASIVE BLASTING MEDIA
SHIP HULL BLAST CLEANING

This list has been prepared for use by or for the Government in the acquisition of products covered by the subject specification and such listing of a product is not intended to and does not connote indorsement of the product by the Department of Defense. All products listed herein have been qualified under the requirements for the product as specified in the latest effective issue of the applicable specification. This list is subject to change without notice; revision or amendment of this list will be issued as necessary. The listing of a product does not release the contractor from compliance with the specification requirements.

THE ACTIVITY RESPONSIBLE FOR THIS QUALIFIED PRODUCTS LIST IS THE NAVAL SEA SYSTEMS COMMAND, SEA 03R42, 2531 JEFFERSON DAVIS HWY, ARLINGTON, VA 22242-5160.

GOVERNMENT DESIGNATION	MANUFACTURER'S DESIGNATION	TEST OR QUALIFICATION REFERENCE	MANUFACTURER'S NAME AND ADDRESS
	BARTON 1640 GARNET	NAVSHIPYD, MARE 9631, Ser 134.6/62 and NEHC Rpt. 6266, Ser 34Bdbm 06015	Barton Mines Corp. P.O. Box 400 North Creek, NY 12853 Plant: Hudson River Plant Route 28 North Creek, NY 12853
	STARBLAST XL	NAVSHIPYD, MARE 9631, Ser 134.6/79 and NEHC Rpt. 6260, Ser 34Bnhp/2014	E.I. du Pont de Nemours & Co., Inc. Chestnut Run Plaza Building 709 Wilmington, DE 19880-0709 Plant: Florida Plant Route 230 Starke, FL 32091

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GOVERNMENT DESIGNATION	MANUFACTURER'S DESIGNATION	TEST OR QUALIFICATION REFERENCE	MANUFACTURER'S NAME AND ADDRESS
	Emerald Creek Garnet	NAVSHIPYD, MARE 9631, Ser 134.6/ 158 and NEHC Rpt. 6270, Ser 342/0548	Emerald Creek Garnet P.O. Box 190 Fernwood, ID 83830 Plant: Route 4 Emerald Creek Road Fernwood, ID 83830
	Black Diamond	NAVSHIPYD, MARE 9631, Ser 134.6/ 151 and NEHC Rpt. 4121, Ser 34Bvs/ 02176	Foster Dixiana Corp. P.O. Box 2005 Columbia, SC 29202 Plant: 5360 Bainbridge Blvd. Chesapeake, VA 23320
	Black Diamond (CX-8)	NAVSHIPYD, MARE 9631, Ser 134.6/ 56 and NEHC Rpt 4123, Ser 34Dndb/ 01007	Foster Dixiana Corp. P.O. Box 2005 Columbia, SC 29202 Plant: Hardeeville Ind. Park - Hwy. 321 Hardeeville, SC 29927
	ROM 30x60 Garnet Abrasive GMA 30X60 GMA 60 mesh GMA 80 mesh	NAVSHIPYD, MARE 9631, Ser 134.6/ 178 and NEHC Rpt. 6270, Ser 34Bns 06336	Garnet Millers Assoc. Pty. Ltd. (GMA), c/o Barton Mines Corp., Suite 190 1658 Cole Blvd. Golden, CO 80401 Plant: Gould Road Geraldton, WA 6530 Australia
	CAMEL BLACK	NAVSHIPYD, MARE 9631, Ser 134.6/95 and NECH Rpt. 6270 Ser 34B/4697	Genstar Stone Products Company Executive Plaza IV Hunt Valley, MD 21031-1091 Plant: 10300 Pulaski Highway White Marsh, MD 21162

QPL-22262-18

GOVERNMENT DESIGNATION	MANUFACTURER'S DESIGNATION	TEST OR QUALIFICATION REFERENCE	MANUFACTURER'S NAME AND ADDRESS
	GREEN DIAMOND	NAVSHIPYD, MARE 9631, Ser 134.6/61 and NEHC Rpt. 6270, Ser 34Baj/06016	Glenbrook Nickel Co. 5094 Glenbrook Loop Rd P.O. Box 85 Riddle, OR 97469 Plant: 6th & E Street Riddle, OR 97469
	Kleen Blast	NAVSHIPYD, MARE ISLAND Rpt. 9631 Ser 134.6/34 & NEHC Rpt. 6270 Ser 42p/08213	Kleen Blast Abrasives 2400 Old Crow Canyon Road, #AZ San Ramon, CA 94583 Plant: Pacific Abrasive and Supply West Carson Rd. Grand Forks, B.C. Canada VOH 1-HO
	Sharpshot M-60 Sharpshot F-80	NAVSHIPYD, MARE ISLAND Rpt. 9631 Ser 134.6/67 & NEHC Rpt. 6266 Ser 422mb/12025	Minerals Research & Recovery of Arizona, Inc. 4565 South Palo Verde Suite #203 Tucson, AZ 85714 Plant: Highway 85 Ajo, AZ 85321
	Ferro-Blast/ Best Grit 73	NAVSHIPYD, MARE Rpts. 9631, Ser 134.6/25 & 9631, Ser 134.6/169 and NEHC Rpt. 4121, Ser 34Bm/12187	RDM Multi-Enterprises, Inc. P.O. Box 179 Anaconda, MT 59711 Plant: 1/2 Mile East of Anaconda on Montana Highway #1 Anaconda, MT 59711

QPL-22262-18

GOVERNMENT DESIGNATION	MANUFACTURER'S DESIGNATION	TEST OR QUALIFICATION REFERENCE	MANUFACTURER'S NAME AND ADDRESS
	Black Beauty 1240 2040	NAVSHIPYD, MARE 9631, Ser 134.6/ 181 and NEHC Rpt. 6720, Ser 422hc/ 03299	Reed Minerals Div. Harsco Corporation 8149 Kennedy Avenue Highland, IN 46322 Plant: State Road 176 Drakesboro, KY 42337
	Black Beauty 1040 1243 2043	NAVSHIPYD, MARE Rpts. 9631, Ser 134.6/202 & Sér 134.6/ 224 & NEHC Rpt. 6720, Ser 34Bvs/11513	Reed Minerals Div. Harsco Corporation 8149 Kennedy Avenue Highland, IN 46322 Plant: River Rd. at Merrimack Power Station Concord (Bow), NH 03302
	Stan-Blast	NAVSHIPYD, MARE 9631, Ser 134.6/ 48 and NEHC Rpt. 6270, Ser 422c/ 08253	Stan-Blast Abrasives Company, Inc. 2525 South Shore Blvd. Suite 301 League City, TX 77573 Plant: 5712 Port Industrial Galveston, TX 77552
	Stan-Blast	NAVSHIPYD, MARE 9631, Ser 134.6/ 132 and NEHC Rpt. 6270, Ser 422c/ 08253	Stan-Blast Abrasives Company, Inc. 2525 South Shore Blvd. Suite 301 League City, TX 77573 Plant: 3300 River Road Harvey, LA 70059
	Black Blast	NAVSHIPYD, MARE 9631, Ser 134.6/ 11 and NEHC Rpt. 4121, Ser 34Bns/ 11017	Virginia Materials P.O. Box 7400 Norfolk, VA 23509 Plant: 3306 Peterson Street Norfolk, VA 23509

APPENDIX B

LISTING OF REGULATORY INFORMATION SOURCES

HAZARDOUS WASTE CONTACTS

ALABAMA
Alabama Dept of Environmental Management
Land Division
1751 Federal Drive
Montgomery, AL 36130
334-271-7730

ALASKA
Dept. of Environmental Conservation
410 Willoughby Avenue, Suite 105
Juneau, AK 99801-1795
Program Manager: 907-465-5150
Northern Regional Office (Fairbanks): 907-451-2360
South-Central Regional Office (Juneau): 907-563-6529
Southeast Regional Office (Juneau): 907-465-5350

ARIZONA
Arizona Dept. of Environmental Quality
Waste Programs Bureau
3033 North Central Avenue
Phoenix, AZ 85012
602-207-2300

ARKANSAS
Dept. of Pollution Control and Ecology
Hazardous Waste Division
P.O. Box 8913
8001 National Drive
Little Rock, AR 72219-8913
501-562-7444

CALIFORNIA
California EPA
Dept. of Toxic Substances Control
400 P Street, 4th Floor
P.O. Box 806
Sacramento, CA 95812-0806
916-322-0504

California EPA
State Water Resources Control Board
Water Resources Control Board
P.O. Box 100
Sacramento, CA 95812-0100
916-657-2390

COLORADO
Public and Environment Dept.
Hazardous Materials and Waste Management Division
4300 Cherry Creek Drive South
Denver, CO 80222
303-692-3300

CONNECTICUT
Dept. of Environmental Protection
Waste Management Bureau
Waste Engineering and Enforcement Division
79 Elm Street
Hartford, CT 06106
203-424-3023

Connecticut Resource
Recovery Authority
179 Allyn Street, Suite 603
Professional Building
Hartford, CT 06103
203-549-6390

DELAWARE
Dept. of Natural Resources and Environmental Control
Division of Air and Waste Management
Hazardous Waste Office
89 King's Highway
P.0. Box 1041
Dover, DE 19903
302-739-3689

DISTRICT OF COLUMBIA
Dept. of Consumer and Regulatory Affairs
Environmental Regulation Administration
Pesticides and Hazardous Waste Management Branch
2100 Martin Luther King Avenue, SE, Suite 203
Washington, DC 20020
202-645-6617

FLORIDA
Environmental Protection Dept.
Waste Management Division
Solid and Hazardous Waste Bureau
3900 Commonwealth Boulevard
Tallahassee, FL 32399
904-488-0300

GEORGIA
Georgia Dept. of Natural Resources
Environmental Protection Division
Hazardous Waste Management Branch
Floyd Towers East, Suite 1154
205 Butler Street, SE
Atlanta, GA 30334
404-656-7802

HAWAII
Dept. of Health
Solid and Hazardous Waste Branch
5 Waterfront Plaza, Suite 250
919 Ala Moana Boulevard
Honolulu, HI 96813
808-586-4225

IDAHO
Dept of Health and Welfare
Division of Environmental Quality
280 North 8th Street
Boise, ID 83720
208-334-5840

ILLINOIS

Energy and Natural Resources Dept.
Solid Waste and Renewable Resources Division
325 West Adams Street, Room 300
Springfield, IL 62704
217-785-2800

INDIANA
Dept. of Environmental Management
Office of Solid and Hazardous Waste
100 North Senate Avenue
Indianapolis, IN 46206
317-232-3210

IOWA
Dept. of Natural Resources
Waste Management Assistance Division
Wallace State Office Building
900 East Grand
DesMoines, IA 50319
515-281-8975

KANSAS
Dept. of Health and Environment
Bureau of Waste Management
Forbes Field, Building 740
Topeka, KS 66620
913-296-1612

KENTUCKY
Natural Resources and Environmental Protection Cabinet
Division of Waste Management
18 Reilly Road
Frankfort, KY 40601
502-564-4245

LOUISIANA
Dept. of Environmental Quality
Solid and Hazardous Waste Division
11720 Airline Highway
Baton Rouge, LA 70817
504-765-0249

MAINE
Dept. of Environmental Protection
Bureau of Hazardous Materials and Solid Waste Control
State House Station #17
Augusta, ME 04333
207-289-2651

MARYLAND
Environment Dept.
Waste Management Administration
2500 Broening Highway
Baltimore, MD 21201
410-631-3304

MASSACHUSETTS
Dept. of Environmental Protection
Hazardous Waste Division
One Winter Street, 5th Floor
Boston, MA 02108
617-292-5853

MICHIGAN
Michigan Dept. of Natural Resources
Waste Management Division
P.O. Box 30241
Lansing, MI 48909
517-373-2730

MINNESOTA
Pollution Control Agency
Hazardous Waste Division
520 Lafayette Road North
St. Paul, MN 55155
612-297-8502

MISSISSIPPI
Dept. of Environmental Quality
Division of Solid and Hazardous Waste Management
P.O. Box 10385
Jackson, MS 39289
601-961-5047

MISSOURI
Dept. of Natural Resources
Waste Management Program
P.O. Box 176
Jefferson City, MO 65102
314-751-3176
Missouri Natural Resources Hotline: 800-334-6946

MONTANA
Dept. of Health and Environmental Sciences
Waste Management Division
Cogswell Building, Room B 201
Helena, MT 59620
406-444-1430

NEBRASKA
Environmental Quality Dept.
P.O. Box 98922
Lincoln, NE 68509
402-471-2186

NEVADA
Conservation and Natural Resources Dept.
Division of Environmental Protection
Waste Management Program
123 West Nye
Carson City, NV 89710
702-687-4670

NEW HAMPSHIRE
Dept. of Environmental Services
Waste Management Division
Health and Welfare Building
6 Hazen Drive
Concord, NH 03301
603-271-3406

NEW JERSEY
Dept. of Environmental Protection and Energy
Solid Waste Management
401 East State Street, CN-423
Trenton, NJ 08625
609-530-8591

NEW MEXICO
Environmental Improvement Division
Hazardous Waste Bureau
P.O. Box 26110
Santa Fe, NM 87502
505-827-2775

NEW YORK
Dept. of Environmental Conservation
Division of Hazardous Substances Regulation
50 Wolf Road, Room 229
Albany, NY 12233
518-457-6934
SQG Hotline: 800-462-6553

NORTH CAROLINA
Dept. of Environmental, Health, and Natural Resources
Hazardous Waste Section
P.O. Box 27687
Raleigh, NC 27611
919-715-4140

NORTH DAKOTA
Dept. of Health
Consolidated Laboratories
Division of Waste Management
P.O. Box 5520
1200 Missouri Avenue, Room 302
Bismark, ND 58502
701-328-5166

OHIO
Ohio EPA
Division of Hazardous Waste
P.O. Box 1049
Columbus, OH 43216
614-644-2917

OKLAHOMA
Environmental Quality Dept.
Waste Management Division
1000 NE Tenth Street
Oklahoma City, OK 73117
405-271-7041

OREGON
Dept. of Environmental Quality
Hazardous Waste Division
811 SW. Sixth Avenue
Portland, OR 97204
503-229-6585

PENNSYLVANIA
Dept. of Environmental Resources
Bureau of Waste Management
Director's Office
P.O. Box 2063
Harrisburg, PA 17105
717-787-9870

RHODE ISLAND
Dept. of Environmental Management
Division of Air and Hazardous Materials
291 Promenade Street
Providence, RI 02908
401-277-4700

SOUTH CAROLINA
Dept. of Health and Environmental Control
Bureau of Solid and Hazardous Waste Management
2600 Bull Street
Columbia, SC 29201
803-734-5202

SOUTH DAKOTA
Dept. of Environment and Natural Resources
Office of Waste Management
500 East Capital Avenue
Pierre, SD 57501
605-773-3351

TENNESSEE
Environment and Conservation Dept.
Solid Waste Management Division
401 Church Street, 21st Floor
Nashville, TN 37248
615-532-0780

TEXAS
Natural Resource Conservation Commission
Industrial and Hazardous Waste Division
P.O. Box 13087
Capital Station
Austin, TX 78711
512-239-2324

UTAH
Dept. of Environmental Quality
Division of Solid and Hazardous Waste
P.O. Box 144810
Salt Lake City, UT 84114
801-538-6170

VERMONT
Natural Resources Agency
Environmental Conservation Dept.
Hazardous Material Division
103 South Main Street
Waterbury, VT 05676
802-241-3888

VIRGINIA
Natural Resources Office
Environment Quality Dept.
629 East Main Street
Richmond, VA 23219
804-762-4020
Hazardous Waste Hotline: 800-552-2075

WASHINGTON
Dept. of Ecology
Solid and Hazardous Waste Program
P.O. Box 47600, Row 6, Building 4
Olympia, WA 98504
360-407-6103

WEST VIRGINIA
Environmental Protection Bureau
Waste Management Division
1356 Hansford Street
Charleston, WV 25301
304-558-5929

WISCONSIN
Dept. of Natural Resources
Solid and Hazardous Waste Management
P.O. Box 7921
Madison, WI 53707
608-266-1327

WYOMING
Dept. of Environmental Quality
Solid Waste Management Division
Herschler Building
122 West 25th Street
Cheyenne, WY 82002
307-777-7752

ADDITIONAL SOURCES OF INFORMATION

1. Phone & Hotline Information

- RCRA/Superfund Hotline
  1-800-424-9346 (in Washington, DC 260-3000)
- EPA Small Business Ombudsman Hotline
  1-800-368-5888 (in Washington, DC 557-1938)
- National Response Center
  1-800-494-8802 (in Washington, DC 260-2675)
- Transportation of Hazardous Materials
  202-366-4488
- Toxic Substance Control Act (TSCA) Assistance Service
  202-554-1404
- Center for Hazardous Materials Research (CHMR) Hotline
  1-800-334-2467

2. EPA Documents

- EPA/530-SW-86-019, September 1986, *Understanding the Small Quantity Generator, Hazardous Waste Generator.*
- EPA/530-SW-037, November 1986, *Solving the Hazardous Waste Problem — EPA's RCRA Program.*

3. ***Journal of Protective Coatings & Linings*** (available from Technology Publishing Co., 2300 Wharton St., Suite 310, Pittsburgh, PA 15203 [800-837-8303])

4. Other Publications

- *Bridge Paint Removal, Containment & Disposal*, Synthesis Report 20-05/20-09, 1992. Transportation Research Board, 2101 Constitution Ave., Washington, DC 20418
- *Removal of Lead-Based Bridge Paints*, NCHRP Report 265, December 1983, Transportation Research Board.
- *Industrial Lead Paint Removal Handbook*, SSPC 91-18, November 1991. Available from SSPC, 4400 Fifth Ave., Pittsburgh, PA 15213.

APPENDIX C

THE USE OF RECYCLABLE MATERIALS IN ASPHALT CONCRETE AND CONCRETE USE CONSTITUTING DISPOSAL OR UCD

HAZARDOUS WASTE MANAGEMENT PROGRAM

MANAGEMENT MEMO

MANAGEMENT MEMO #: EO-95-010-MM

TITLE: USE CONSTITUTING DISPOSAL

AFFECTED PROGRAMS: Hazardous Waste Management Program
Site Mitigation Program

ISSUE:

The Department of Toxic Substances Control (DTSC) is now developing regulations to address the "use constituting disposal" restriction as it pertains to recyclable materials that are non-RCRA hazardous wastes in section 25143.2(e)(2) of the Health and Safety Code (HSC). A "non-RCRA" waste is hazardous waste that is regulated in California but is not a Resource Conservation and Recovery Act (RCRA) waste. A RCRA hazardous waste is any waste identified as a hazardous waste in Part 261, Subchapter I, Chapter 1 of Title 40 of the Code of Federal Regulations (40 CFR). The "use constituting disposal" restriction affects the eligibility of recyclable materials for the exclusions and exemptions provided under HSC section 25143.2. The purpose of this management memo is to provide interim guidance on how to interpret "use constituting disposal," and therefore determine if a waste is subject to regulation pursuant to HSC section 25143.2(e)(2), until the regulations are adopted.

BACKGROUND:

HSC section 25143.2 addresses exclusions and exemptions for recyclable materials that are managed in a specified manner. Note that a recyclable material is defined as a hazardous waste that is capable of being recycled.[1] HSC section 25143.2 also lists conditions under which the recyclable materials must be fully regulated as hazardous wastes, regardless of the exclusions from classification as a waste and the exemptions from facility permitting requirements granted in this section. One such condition is when the materials are "used in a manner constituting disposal." This restriction is addressed separately for RCRA wastes and non-RCRA wastes.

Under California law, there is no definition for "use constituting disposal." The U.S. Environmental Protection Agency (U.S. EPA) has defined "use constituting disposal" to mean placing recyclable materials or products derived from recyclable

[1] Ref. HSC section 25120.5.

materials on the land.[2] Under federal regulations, recyclable materials that are used in a manner constituting disposal are subject to regulation as solid wastes. At the same time, the U.S. EPA does not currently regulate products containing recyclable materials that are placed on the land if the recyclable materials have undergone a chemical reaction in producing the product so as to be physically inseparable from the product and the product meets the applicable treatment standards (or applicable prohibition levels where no treatment standards have been established) in subpart D, part 268, 40 CFR.

Since 1987, the DTSC has applied a set of criteria to recyclable materials placed on the land in determining whether or not such materials are "used in a manner constituting disposal." If these criteria are met, the recyclable materials are not regulated pursuant to HSC section 25143.2(e)(2) and may be eligible for the exclusions and exemptions under HSC section 25143.2 (b), (c) or (d). **The DTSC's criteria apply only to non-RCRA wastes.** The DTSC is currently writing regulations to address the issue of recyclable materials that are placed on the land ("use constituting disposal"). This management memo clarifies the criteria applied by the DTSC pending adoption of these regulations.

ACTION:

The following, <u>which applies only to non-RCRA wastes</u>, is the DTSC's present interpretation of the "use constituting disposal" restriction, i.e., of which recyclable materials are subject to regulation, in HSC section 25143.2(e)(2). This interpretation applies only until regulations addressing recyclable materials used in a manner constituting disposal or placed on the land are adopted.

A recyclable material that is placed on the land or used to produce a product which is placed on the land is regulated pursuant to HSC section 25143.2(e)(2) unless all applicable criteria listed below are met.

1. This criterion applies to situations where the recyclable material is used as an ingredient in the manufacture of a product. Hazardous constituents in the recyclable material whose concentrations are greater than or equal to the

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[2] Ref. 50 Federal Register 618, January 4, 1985, and 40 CFR 266.20.

regulatory Soluble Threshold Limit Concentrations (STLCs)[3] shall have chemically reacted or become physically bound so as not to leach from the product containing the recyclable material. Specifically, the hazardous constituents shall not leach out in concentrations that would exceed the applicable STLC, once the effect of dilution by other ingredients (as explained below) has been taken into account.

In order to meet this requirement, the following procedures must be used to evaluate the recyclable material and the product:

(a) Sampling and analysis:

(1) Sampling shall be conducted according to the sampling methods described in Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, 3rd edition, 1986, or one of the sampling methods listed in ~~Appendix I, Chapter 11,~~ Division 4.5, Title 22, California Code of Regulations (22 CCR); and

(2) Analysis shall be conducted according to the Waste Extraction Test (WET)~~, Appendix II,~~ Chapter 11, Division 4.5, 22 CCR, or an alternative test method approved pursuant to 22 CCR section 66260.21

(b) In order to demonstrate that the hazardous constituents in the recyclable material are bound in the product so that they would not exceed the applicable STLC, even when eliminating the effect of dilution by other ingredients, the following calculations must be used.

The concentration of the hazardous constituents in the final product, as determined by the WET, must be multiplied by the dilution factor inherent in combining the recyclable material with other materials. The dilution factor is calculated by dividing the weight of the final product made with the recyclable material by the weight of the recyclable material used in the product, or

[3] As set forth in sections 66261.24(a)(2)(A) and (a)(2)(B), Division 4.5, Title 22 of the California Code of Regulations (22 CCR).

$$\frac{\text{weight of final product}}{\text{weight of recyclable material}} = \text{dilution factor}$$

If the ingredients in the product that are not recyclable materials contain the same hazardous constituents present in the recyclable material, the hazardous constituents in the ingredients that are not recyclable materials may be subtracted from the concentration of hazardous constituents in the final product, adjusted for dilution.

The final calculation of the hazardous constituents present in the product, as determined by taking into account the effects of dilution and, where applicable, the effects of hazardous constituents in ingredients that are not recyclable materials, must be less than the applicable STLC.

The following is an example of how these calculations can be done.

A ton of spent sandblast grit, which is hazardous due to a mean soluble lead concentration of 12 mg/L, is combined with nineteen tons of other aggregate and asphalt to produce twenty tons of asphaltic concrete. The dilution factor is thus 20 (twenty tons of final product, including the recyclable material, divided by the original one ton of recyclable material). The asphaltic concrete is then subjected to the WET and yields mean results for lead of 0.05 mg/l. This number is then multiplied by the dilution factor, 20, for a result of 1.00 mg/l. The aggregate that is not a recyclable material was tested with the WET and found to have a concentration of 0.05 mg/l lead. This concentration can be subtracted from 1 mg/l to give you 0.95 mg/l. This final calculation does not exceed the STLC for lead of 5 mg/l and therefore meets the criterion.

2. A recyclable material used as a substitute for a commercial product or a product containing a recyclable material shall not contain constituents that cause the product to exhibit hazardous characteristics pursuant to Chapter 11, Division 4.5, CCR 22, other than those constituents that are also found in the same or greater concentrations in a comparable commercial product. The only exception to this requirement is if the person claiming an exclusion obtains

the DTSC's written concurrence prior to using the recyclable material that:

(a) the concentrations of hazardous constituents greater than those present in a comparable commercial product improve the quality of the product made from the recyclable material and do not increase the hazards to public health or the environment of that product; or

(b) if no comparable commercial product exists, the hazardous constituents in the recyclable material that cause the product to exhibit a characteristic of a hazardous waste are beneficial to the product and do not cause the product to pose a threat to public health or the environment.

3. The recyclable material must be used beneficially, as demonstrated by both of the following conditions:

(a) Prior to use, the recyclable material and the product containing that material must each be certified by a qualified independent engineer registered in the state of California[4] to meet the applicable standards or specifications for the intended use of the recyclable material or product of the American Society for Testing and Materials (ASTM), the American Association of State Highway and Transportation Officials (AASHTO), the American National Standards Institute (ANSI), the Uniform Building Code (UBC), or the standards of a government agency having jurisdiction over the construction applications of that recyclable material or product. A nationally recognized industry standard, other than those mentioned, may be used with the prior written approval of the DTSC.

(b) There shall be no indications of sham recycling, including, but not limited to, use of the recyclable material or a product containing a recyclable material in excess of what is necessary to accomplish its function, handling of the recyclable material in a manner inconsistent with the economic value of the

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[4] By "qualified independent engineer", we mean an engineer whose registration (e.g., civil, mechanical, structural, etc.) is appropriate for the product she/he is certifying and who is not an employee of the person claiming an exclusion or exemption pursuant to HSC 25143.2.

material, or insufficient use of the recyclable material to accomplish its function.

Non-RCRA hazardous wastes managed according to the applicable criteria above will not be regulated pursuant to HSC 25143.2(e) and may therefore qualify for the exclusions and exemptions in HSC section 25143.2 if the requirements of a specific exclusion or exemption are met and none of the other provisions of subdivision (e) apply.

Examples of recyclable materials used in products placed on the land are spent sandblast grit, contaminated soils, foundry sands, ash, and demolition wastes, which may be used, among other things, as asphalt treated road base, landfill cover material, or aggregate in Portland cement concrete or an asphaltic concrete.

Use of recyclable materials as fertilizer, soil amendment, agricultural mineral, or an auxiliary soil and plant substance, with or without combination with other materials, is not covered by this management memo and is regulated separately.[5] Used oil is also not covered by this management memo.[6]

This management memo will stay in effect until the promulgation of regulations regarding management requirements for recyclable materials that are placed on the land, i.e., used in a manner constituting disposal, or until it is replaced by a subsequent management memo or DTSC policy.

DISTRIBUTION:

Cal/EPA Access Bulletin Board System
Hazardous Waste Management Program Policy Mailing List

ATTACHMENTS: None

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[5] Ref. Article 8, Chapter 16, 22 CCR.

[6] Ref. Article 13, Chapter 6.5, Division 20 of the Health and Safety Code.

CONTACT:

Ms. Jessie Schnell
Resource Recovery Section
State Regulatory Program Division
Hazardous Waste Management Program HQ-10
Department of Toxic Substances Control
P.O. Box 806
Sacramento, California 95812-0806
Phone: (916)322-1003/CALNET 492-1003

8/18/95
Date

Ted N. Rauh
Deputy Director

Best Management Practices for Waste Abrasive Blasting Media

August 1998

Timothy G. Townsend
University of Florida

State University System of Florida
FLORIDA CENTER
FOR SOLID AND HAZARDOUS WASTE MANAGEMENT
2207 NW 13 Street, Suite D
Gainesville, FL 32609

Report #98-8

BEST MANAGEMENT PRACTICES FOR WASTE ABRASIVE BLASTING MEDIA

Timothy G. Townsend, Principal Investigator
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August, 1998

ACKNOWLEDGEMENTS

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This report was prepared by Jenna Jambeck Carlson with research assistance from Allan Brantley, William Craven, Yong-Chul Jang, Brian Messick, Thabet Tolaymat, and William Weber.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ABBREVIATIONS AND ACRONYMS

ABM	Abrasive Blasting Media
CFR	Code of Federal Regulations
DOT	Department of Transportation
EPA	Environmental Protection Agency
FDEP	Florida Department of Environmental Protection
FSCG	Florida Soil Cleanup Goal
SPLP	Synthetic Precipitation Leaching Procedure
TAG	Technical Advisory Group
TCLP	Toxicity Characteristic Leaching Procedure

ABSTRACT

Used abrasive blasting media is a solid waste produced by many industries including the military, transportation departments, ship maintenance facilities, and sandblasting contractors. The military and transportation departments are large enough to maintain organized management programs for this waste stream. Smaller operations, however, including ship maintenance facilities and sandblasting contractors are often unaware of proper management responsibilities. A research project was conducted to study several types of waste abrasive blasting media (ABM), with a special focus on waste ABM produced by ship maintenance facilities and sandblasting contractors.

The ABM waste stream was typically found to be non-hazardous. For the ship maintenance facility and sandblasting contractor waste, some groundwater guidance concentrations and risk-based direct exposure standards were exceeded. Metals that exceeded Florida's risk-based soil cleanup target levels (SCTL) in ship maintenance facility samples included arsenic, copper, and iron. Sample collected from the general contractor facilities did not exceed residential SCTLs. In leaching tests (using the Synthetic Precipitation Leaching Procedure), ship maintenance facility ABM waste exceeded groundwater guidance concentrations (GWGC) for zinc (a secondary standard), and occasional for copper, iron, and lead. Leaching from general contractor waste ABM was limited to iron (a secondary standard) and on rare occasion cadmium. Management options for their waste streams were reviewed.

This research also produced a Best Management Practices document for use by abrasive blasting industry professionals. The development of this document included input from industry professionals, regulators and consulting engineers. The information presented includes identifying proper regulatory requirements, environmental measurements, and management options.

EXECUTIVE SUMMARY

This report summarizes research conducted on solid waste produced by the abrasive blasting industry. Samples were collected from a variety of producers of abrasive blasting media (ABM) waste. This waste was examined in terms of total metal content as well as leachability of metals. The analytical results were compared to Florida's groundwater guidance concentrations and risk-based soil cleanup target levels. A "Best Management Practices" document was developed to assist regulators and the abrasive blasting industry in the management of this waste stream.

Background

Abrasive blasting is a process used by many industries to remove paint and other coatings from primarily metal surfaces. The solid waste produced contains the original abrasive material and any material that was present on the structural surface. The management of solid waste from abrasive blasting is a relatively new concern for many industries. This is especially true in cases where the media is non-hazardous in nature. In some cases it is not even recognized as a solid waste.

The largest generators of waste ABM include the ship maintenance industry, the transportation industry (bridge blasting), and military operations. Other generators include general sandblasting contractors, metal fabricators, autoshops and airports. The management of ABM waste can be challenging for both small and large generators. Generators must characterize the waste as hazardous or non-hazardous before it can be properly disposed or recycled. The regulations for generators of hazardous waste are well defined for most scenarios, but the proper management practices for non-hazardous ABM waste typically are not.

Because of the soil-like properties of this waste, some operations have allowed the material to remain on the job-site in a manner that the waste becomes incorporated as part of the existing site soil. This practice is not typically permitted under state regulatory requirements, and generators of abrasive blasting solid waste are going to face increased scrutiny as the management of nonhazardous industrial waste receives greater attention from the regulatory community. It is therefore essential that proper management practices be outlined for integrated management of abrasive blasting solid waste.

Even though raw ABM may contain heavy metals, the traditional concern with ABM waste has been from metal contaminants introduced by the paint removal process. Coatings and paint contain various constituents, including binders, solvents, additives, primary pigments, and extenders. These constituents are composed of both organic and inorganic chemicals. Typically the organic components are the binders and solvents, but additives, pigments and extenders may also be synthetic organic compounds. The inorganic components, usually composed of a metallic compound, are commonly primary pigments, additives, and extenders.

The principal pigment in use today is titanium dioxide, which is a white pigment made popular because of fashion concerns. In the past, a common pigment used was lead silicate or sulfate. The toxicity and regulation of this metal has required the phasing out of the use of lead for many applications. However, lead contaminated ABM waste may still be encountered if an older coating is removed from a surface. Other highly toxic pigments, including cadmium and chromium, are normally used in specific industrial applications.

Research Methodology and Results

This document is the final report for the project "Best Management Practices for Waste Abrasive Blasting Media" sponsored by the Florida Center for Solid and Hazardous Waste Management. This research follows up a previous report written by the authors entitled "Disposal and Reuse Options for Spent Sandblast Grit." Previous research involved a compilation of existing literature, industry information, and regulatory waste characterization data. The abrasive blasting industry and the common types of abrasive blast media (ABM) were examined, data regarding chemical characterization were summarized, and management options were reviewed.

The research reported here involved the collection of additional chemical characteristic data. This characterization was performed by sampling various generators of waste ABM and analyzing the ABM for total metals concentration, as well as leachable metals concentration through the Toxicity Characteristic Leaching Procedure (TCLP), the Synthetic Precipitation Leaching Procedure (SPLP), and a leaching column study. Sample's locations are presented in Figure ES-1. The results of these analyses helped to characterize waste ABM and aided the development of the Best Management Practices (BMP) document.

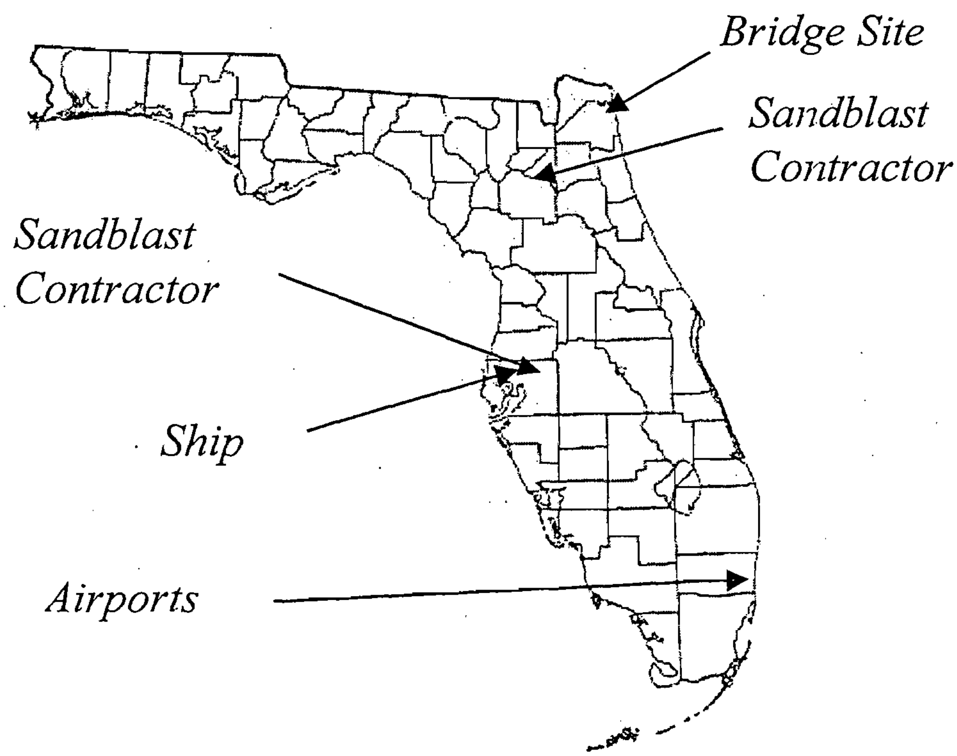

Figure ES-1. Sampling Locations

The ABM waste stream was typically found to be non-hazardous. For the ship maintenance facility and sandblasting contractor waste, some groundwater guidance concentrations and risk-based direct exposure standards were exceeded. Metals that exceeded Florida's risk-based soil cleanup target levels (SCTL) in ship maintenance facility samples included arsenic, copper, and iron. Sample collected from the general contractor facilities did not exceed residential SCTLs. The leachability of waste ABM must be considered in terms of potential groundwater contamination. The SPLP test, an assay used to simulate rainfall conditions, was used to examine the leachability of waste ABM samples collected. Lysimeter studies were also completed to further examine leaching characteristics. For the ship maintenance facilities, iron, copper, and zinc exceeded their respective groundwater guidance concentrations in some leachate samples. One sample exceeded the standard for lead. Iron also leached above the limits for the sandblasting contractor media. One sample of the contractor media leached above the standard for cadmium. Occasionally lead and cadmium exceeded a drinking water standard for both ship maintenance facility and sandblasting contractor waste. Table ES-1 and ES-2 summarize the analytical results for the ship maintenance facility and general contractor waste ABM, respectively. Results are presented in terms of possible exceedance of residential and industrial direct exposure SCTLs, and Florida Groundwater Guidance Concentrations.

Table ES-1. Potential Concerns with Ship Maintenance Facility Waste ABM

Metal	Direct Exposure Residential	Direct Exposure Industrial	Groundwater-Leaching
Arsenic	Yes	Possibly	No
Cadmium	No	No	No
Chromium	No	No	No
Copper	Yes	No	Possibly
Iron	Yes	No	Possibly
Lead	No	No	Possibly
Nickel	No	No	No
Selenium	No	No	No
Zinc	No	No	Yes

Table ES-2. Potential Concerns with Sandblasting Contractor Waste ABM

Metal	Direct Exposure Residential	Direct Exposure Industrial	Groundwater-Leaching
Arsenic	No	No	No
Cadmium	No	No	Possibly
Chromium	No	No	No
Copper	No	No	No
Iron	No	No	Yes
Lead	No	No	No
Nickel	No	No	No
Selenium	No	No	No
Zinc	No	No	Yes

Best Management Practices

Further development and input to the Best Management Practices document was provided by a technical advisory group (TAG). The TAG consisted of abrasive blasting industry professionals, Florida Department of Environmental Protection (FDEP) regulators, and consulting engineers. The TAG met throughout the research and discussed topics of concern to all parties involved. A Best Management Practices guide was drafted and reviewed by the TAG. TAG members made comments that were incorporated into the final document.

This research developed a management strategy outlining the steps that can be taken by a generator to properly manage waste ABM. The research studied several types of waste ABM, but concentrated on the ship maintenance facility and sandblasting contractor waste. The abrasive blasting media encountered during this research was typically non-hazardous. The FDEP file reviews also confirmed this. However, when paints with higher metal contents are blasted, the waste may take on the hazardous characteristic for toxicity. The rules for the management of hazardous waste must be followed and these are clearly stated in the Code of Federal Regulations.

When waste ABM is non-hazardous, other considerations may be made to assess the safety of human health and the environment. Direct exposure risk through ingestion, inhalation, and dermal contact may be considered. Direct exposure limits are typically risk-based numbers utilized by regulators in assessing the contamination of soil at a site or to regulate the placement of materials on the land. If waste ABM is in consideration of being placed on the land or allowed to accumulate on site in a manner where human contact may occur, the direct exposure risk must be assessed.

Because this waste stream does exceed some groundwater guidance concentrations, the production of leachate must be minimized. The best way to minimize leachate production is to not produce it in the first place. Leachate production may be prevented by covering the waste with a plastic cover or by keeping it under a roof or overhang. Storage on an impervious surface, like concrete is also recommended. Because direct exposure limits may also occasionally be exceeded, waste should not be placed in an area likely to result in human contact. Waste ABM may be disposed of in a lined landfill or recycled in a manner which will not produce leachate when the waste exceeds groundwater guidance concentrations. An excellent recycling option for the coals slag used media is at a cement kiln. The media contains minerals needed as feedstock in the cement-making process. Other recycling options include as aggregate in concrete or asphalt.

KEY WORDS

Abrasive Blasting Media

Sandblast Grit

Solid Waste

Hazardous Waste

Leachate

Toxicity Characteristic Leaching Procedure (TCLP)

Synthetic Precipitation Leaching Procedure (SPLP)

Leaching Columns

Beneficial Reuse

1. INTRODUCTION

1.1 OVERVIEW

This document is the final report for the project "Best Management Practices for Waste Abrasive Blasting Media" sponsored by the Florida Center for Solid and Hazardous Waste Management. This research follows up a previous report written by the authors entitled "Disposal and Reuse Options for Spent Sandblast Grit" (Townsend and Carlson, 1997). Previous research involved a compilation of existing literature, industry information, and regulatory waste characterization data. The abrasive blasting industry and the common types of abrasive blast media (ABM) were examined, data regarding chemical characterization were summarized, and management options were reviewed.

The research reported here involved the collection of additional chemical characteristic data. This characterization was performed by sampling waste ABM from various generators and analyzing these samples for total metals concentration, as well as leachable metals concentration using the Toxicity Characteristic Leaching Procedure (TCLP), the Synthetic Precipitation Leaching Procedure (SPLP), and a leaching column study. The results of these analyses helped to characterize waste ABM and aided the development of a *Best Management Practices* document.

Further development and input to the *Best Management Practices* document was provided by a technical advisory group (TAG). The TAG consisted of abrasive blasting industry professionals, Florida Department of Environmental Protection (FDEP) regulators, and consulting engineers. The TAG met throughout the research and discussed topics of concern to all parties involved. A Best Management Practices guide was drafted and reviewed by the TAG. TAG members made comments that were incorporated into the final document.

1.2 ORGANIZATION OF DOCUMENT

This report begins with a presentation of background information and an update of previous research in Chapter 2. Chapter 3 discusses sampling and analytical methodology. This chapter covers the locations sampled and the types of ABM encountered as well as how these wastes were generated. Chapter 4 presents the results of chemical analyses performed on the samples collected. The sample results for waste from ship maintenance facilities and sandblasting contractors have also been discussed in greater detail as part of a University of Florida Master of Engineering thesis regarding characterizing these two waste streams (Carlson, 1998).

The development of *Best Management Practices for Waste Abrasive Blasting Media* is discussed in Chapter 5. The actual document is contained in Appendix C. A final summary and a set of conclusions are presented in Chapter 6.

2. BACKGROUND

2.1 SUMMARY OF EXISTING INFORMATION

This project was a follow up and continuation of a previous project regarding disposal and reuse options for spent sandblast grit (Townsend and Carlson, 1997). The first project involved a compilation of existing literature, industry information, and regulatory waste characterization data. The abrasive blasting industry was discussed, the common types of ABM were examined, data regarding chemical characterization were summarized, and management options were reviewed. Pertinent sections of this previous work are reviewed here.

2.1.1 Abrasive Blasting

Abrasive blasting is a process used by many industries to remove paint and other coatings from primarily metal surfaces. The solid waste produced contains the original abrasive material and any material that was present on the structural surface. The management of solid waste from abrasive blasting is a relatively new concern for many industries. This is especially true in cases where the media is non-hazardous in nature. In such cases, waste ABM is many times not even recognized as a solid waste.

The largest generators of waste abrasive blasting media (ABM) include the ship maintenance industry, the transportation industry (bridge blasting), and military operations. Other generators include general sandblasting contractors, metal fabricators, autoshops, and airports. The management of ABM waste can be challenging for both small and large generators. Generators must characterize the waste as hazardous or non-hazardous before it can be properly disposed or recycled. The regulations for generators of hazardous waste are well defined for most scenarios, but the proper management practices for non-hazardous ABM waste typically are not.

Because of the soil-like properties of ABM waste, some operations have allowed the material to remain on the job-site in a manner that the waste becomes incorporated as part of the existing site soil. This practice is not typically permitted under state regulatory requirements, and generators of abrasive blasting solid waste are going to face increased scrutiny as the management of nonhazardous industrial waste receives greater attention from the regulatory community. It is therefore essential that proper management practices be outlined for integrated management of abrasive blasting solid waste.

2.1.1.1 Common Media Used and Applications

The two most common types of media encountered during this study were silica sand and coal slag. These two types of media are very good for general all-purpose blasting applications. These media are sold in several gradations for lighter to heavier blasting processes. Other types of media that are sometimes used include steel shot, plastic, and biodegradable media like walnut shells. Table 2-1 shows the most common types of media and their uses, as well as the industries that typically handle the blasting operation.

Table 2-1. Applications of Abrasive Blasting Media

APPLICATION	MEDIA	INDUSTRY
Military Ships and Airplanes	Coals Slag, Plastic, Glass Bead	Military
Bridges	Steel Shot/Grit, Coal Slag	DOT (may sub-contract but still oversees mgmt.)
Ships/Barges	Coal Slag, Copper Slag	Ship Maintenance Facilities/Marinas
Airplanes/Parts	Plastic, Glass Bead	Airplane Maintenance Facility
Autos	Silica Sand, Plastic	Auto Body Shops
Semi-trailers	Silica Sand	Sandblasting Contractor
Scaffolding	Silica Sand	Sandblasting Contractor
Heavy Machinery	Silica Sand	Sandblasting Contractor
Water Tanks/Towers	Silica Sand, Coal Slag	Sandblasting Contractor
Railroad Cars	Silica Sand, Coal Slag	Sandblasting Contractor/Rail Facility

2.1.2 Concern with Waste ABM

In the past, waste ABM may have remained on the blasting site, typically on the ground where metals and other contaminants could leach off and/or accumulate. This practice is not allowed under typical regulatory policies if the waste may cause the contamination of groundwater or cause a human health risk through exposure. All colored coatings contain pigments, and most pigments contain heavy metals. These metals inevitably become part of the waste ABM. Heavy metals are sometimes even found in unused media such as coal slag. The proper management of this waste is therefore necessary. Because of the soil-like properties of waste ABM, it many times can be mistaken as a soil, which it is not. This material is a solid waste that must be properly handled according to federal, state, and local regulations.

2.1.2.1 Origination of Metals in ABM Waste

As an explanation of why heavy metals may occur in unused media such as coal slag, a brief discussion on the properties of coal slag follows. Other media, including copper slag and nickel slag, may also contain heavy metals inherent to the media. Coal slag is produced during the coal burning process when the bottom ash/slag (molten material) produced from the hot temperatures of coal combustion is rapidly quenched, shattering apart to create small irregular shaped particles. These particles are then graded and sold as ABM.

The major constituents of coal ash, aluminum and silicon, almost always occur in a virtually insoluble form of aluminosilicate (Wu and Chen, 1987). In general, the largest quantity of soluble material in coal ash is composed of calcium, magnesium, potassium, sodium sulfates, and anhydrous oxides. The soluble matter also includes several parts per million of iron, nickel, and zinc sulfates, as well as trace amounts of chromium, copper, lead, arsenic, and cadmium (Hart and DeLaney, 1978). The amount of trace metal contaminants in this slag media is variable and dependant on the type and grade of coal burned as well as the plant operating procedures and conditions (Wu and Chen, 1987). The metal content of the unused slag media may thus play a role in determining management requirements.

Even though some types of raw ABM may contain heavy metals, the traditional concern with ABM waste has been from metal contaminants introduced by the paint removal process. Coatings and paint contain various constituents, including binders, solvents, additives, primary pigments, and extenders. These constituents include both organic and inorganic chemicals. Typically the organic components serve as the binders and solvents, but additives, pigments and extenders may also be synthetic organic compounds. The inorganic components, usually composed of a metallic compound, include the primary pigments, additives, and extenders (Lambourne, 1987).

The principal pigment in use today is titanium dioxide (a white pigment made popular because of fashion concerns). In the past, two commonly used pigments were lead silicate and lead sulfate (Lambourne, 1987). The toxicity of lead has required the phasing out of its use for many applications (Stoffer, 1997). However, lead contaminated ABM waste may still be encountered if an older coating is removed from a ship surface. Other highly toxic pigments, including cadmium and chromium, are used in specific industrial applications where needed, but are being phased out of more general use (Lambourne, 1987).

Pigments are not the only metallic component of paints and coatings. Coatings and paints for ships also include additives such as anti-corrosive agents and biocides. Anti-corrosive agents help extend the life of the paint in the harsh marine environment and biocides minimize the growth of algae and barnacles (Munger, 1984). Controversial biocides include mercury and the butyltin compounds, including tributyltin. Because of its acute toxicity, mercury has been phased out and is often prohibited as use as a biocide (Munger, 1984). The butyltin compounds remain in use and have been found to bioaccumulate in the blubber of some marine animals (Kannan et al., 1997). To control the leaching of this compound in the aquatic environment, the *Organotin Antifouling Paint Control Act of 1988* (United States Code, 1988) limits the use of tributyltin to ships over 25-ft in length (except for aluminum hulls) and limits the overall leaching rate of a coating. However, there are currently no direct exposures, primary or secondary drinking water standards for these organic compounds.

Table 2-2 presents a list of common metals used for pigments, anti-corrosive agents, and biocides. The heavy metals evaluated in this research focused on the metals listed in the table, as well as other trace metals sometimes encountered in the unused coal slag media.

Table 2-2. Application of Metals in Ship Coatings.

Metal	Pigment Color	Anti-corrosive	Biocide
Cadmium	Orange, Yellow, Red	Good (Red Compounds)	N/A
Chromium	Orange, Yellow, Green	Good (Green Compounds)	N/A
Copper	Red	Good	Yes
Iron	Blue, Yellow, Red, Black, Brown	Good	N/A
Lead	White, Red, Blue	Good	N/A
Nickel	Yellow	Good	N/A
Zinc	White, Yellow	Excellent	N/A

N/A = Not Applicable

2.1.3 Literature Review Findings

The literature review from the previous report on disposal and reuse options for spent sandblast grit (Townsend and Carlson, 1997) found that many recycling options are currently being utilized or explored for this waste stream.

The most attractive option for recycling nonhazardous spent coal slag and silica sand ABM is use for the production of Portland cement (U.S. EPA, 1994). Cement is made from limestone (or other sources of calcium carbonate), silica, aluminum, and iron oxides. These minerals may be provided by clay, diatomaceous earth, inorganic wastes, or other sources, and sometimes has to be imported. Typical Portland Cement is made up of 22% silica oxide, 65% calcium oxide, 6.5% aluminum oxide, and 6.5% iron oxide (Hagerman 1997).

The cement mix percentages may come from any material containing the required constituents. Spent coal slag and silica sand ABM can be used in this process because of their high aluminum, iron, and silica components. There is a profit motive for the cement kilns to accept waste ABM. The kilns get paid to take a feedstock that would normally have to be purchased, and the waste generator pays less than landfill tipping fees to dispose of the waste ABM. One issue, which must be addressed for this recycling option, is the storage of the waste ABM. The cement manufacturer must comply with all of the required management practices for storage as the generator does. This may require storing waste ABM on an impervious pad. Storage issues will be reviewed later in discussions of *Best Management Practices*.

Waste ABM may also be recycled as aggregate in the production of asphalt concrete and portland cement concrete. The waste ABM may be substituted for the normally used aggregate in entirety, or more likely as a percentage of the aggregate used. Some properties, including ABM shape and metals content, may make this recycling process less favorable (Heath et al. 1996). This option was most commonly explored in the literature. In North Carolina a case study was completed that successfully used blasting sand in asphalt concrete (Medford, 1989). A field demonstration of "Recycling

Spent Sandblasting Grit into Asphaltic Concrete" was also completed by the Naval Facilities Engineering Center in Port Hueneme, California (Means et al. 1996).

Recycling and stabilization of hazardous and nonhazardous spent blasting sand was explored in the literature by Salt et al. (1996) in "Recycling Contaminated Spent Blasting Abrasives in Portland Cement Mortars," along with Brabrand and Loehr in "Solidification/Stabilization of Spent Abrasives and Use as Nonstructural Concrete." Hazardous waste minimization options were examined in the literature (Sowell, 1989) along with using blasting additives to lower the production of hazardous waste (Vincent 1995) and to increase recycling options.

Plastic media may be recycled once it has been used. Companies around the United States such as *U.S. Technology* located in Ohio lease plastic media to ABM users. The media is shipped to the user in drums and the spent media is returned to these same drums and shipped back to U.S. Technology for recycling. The plastic media can be recycled into counter tops and vanities. It has been proposed that organic ABM such as walnut shells and plastic media may be burned for their fuel value.

2.1.4 Regulatory File Review Findings

A file review was completed of the district solid waste sections of the Florida Department of Environmental Protection (FDEP) as part of the previous report (Townsend and Carlson, 1997). Added to this compilation of analytical data was some district hazardous waste section FDEP information. A current summary of the entire file review data follows.

2.1.4.1 Updated Chemical Characteristic Database

The types of blasting applications encountered included shipyards, bridge blasting, autoshops, railcar yards, and airports. While a few instances of organic chemical testing were found, heavy metals were the primary pollutants of concern. TCLP was performed in some cases, and total metal analyses were conducted in others.

Combining all of the FDEP data resulted in a total of 155 analytical results, with 44% of the results from one ship blasting site. Out of these tests, only 8 (or 5%) found the waste ABM to be hazardous by federal standards. Half of these samples were hazardous because the TCLP lead concentrations were above the 5 mg/l limit, and the other half were over the 1 mg/L limit for Cadmium.

2.1.5 National Survey Findings/Management Practices

In a survey of all fifty state regulatory agencies to find any specific policies pertaining to spent ABM waste, most indicated that applicable hazardous waste regulations would apply. Seven states (14% of respondents) have either a special waste policy or recommendations, management practices, or specifically regulate the disposal and recycling of waste ABM. For example, Virginia has a "Discarded Sand Blast Grit Policy." California has its own hazardous waste regulations and policies regarding

"Requirements for Recyclable Materials Placed on the Land." Lastly, Michigan has "Recommendations for Abrasive Blasting of Water Towers and Other Steel Structures."

A phone survey of Florida Counties was also conducted. Both Dade and Broward Counties have Best Management Practices for Marine Facilities which include the management of abrasive blasting media at these facilities.

2.2 BEST MANAGEMENT PRACTICES RESEARCH

Technical advisory group meetings were held throughout the duration of this project. A best management practices document was produced which included input from industry professionals, regulators, engineering consultants, as well as private companies involved in the management of this waste stream.

2.2.1 Industry Input

Industry concerns varied with the type of industry utilizing abrasive blasting. The authors attended a health and safety officer meeting for shipping industry personnel at the Port of Tampa to gather input on management practices. Concerns expressed by port officials included the fact that inconsistent regulations were imposed by governing regulatory agencies. The port officials expressed a desire to manage their waste in the correct manner, but received varied input as the best way to do this. The *Best Management Practices* guide was therefore developed with the goal of providing a tool for use by both regulators and industry. The guide would attempt to outline consistent policy and would help make sure the industry is aware of all pertinent and relevant regulations.

The general contractor industry expressed these and other concerns. General sandblasting contractors are often small businesses. A goal was therefore also established for the BMP document to identify the necessary testing procedures for generators of waste ABM. Any useful information on how to specify laboratory procedures and appropriate detection limits were also targeted.

2.2.2 Regulatory Input

Regulators from the Florida Department of Environmental Protection were included as part of the Technical Advisory Group, along with engineers and abrasive blasting industry professionals. These individuals all provided input into the format of this research. A discussion of regulatory practices in this industry follows. This discussion is also based on a review of applicable regulations and literature regarding waste management and reuse.

A number of regulatory issues must be addressed in regard to the management of any solid waste, including waste ABM. The regulatory steps that must typically be evaluated for management have been previously summarized (Carlson and Townsend, 1998). Federal regulations require a generator to characterize waste produced as hazardous or non-hazardous. A hazardous waste must be managed according to federal regulations. Waste ABM is not a listed hazardous waste and the characteristic most likely to be encountered that would classify the waste as hazardous is the toxicity characteristic.

2.2.2.1 Hazardous Characteristic

The toxicity characteristic leaching procedure (TCLP) is the assay prescribed by the EPA to determine whether a solid waste is hazardous by toxicity characteristic (U.S. EPA, 1992). In this test, a solid waste is extracted using an acetic acid based leaching solution, with a pH that is dependent on the alkalinity of the waste (2.88 or 4.93). The leaching solution is designed to simulate acids resulting from anaerobic conditions within a MSW landfill. TCLP leachate concentration limits have been established for a number of metals and organic compounds. If the leachate concentration from a waste is at or above these limits, it is hazardous by the toxicity characteristic. Past research has indicated that organic compounds are not usually encountered when dealing with waste ABM (Townsend and Carlson, 1997).

2.2.2.2 Direct Human Exposure Limits

A non-hazardous waste is still a solid waste and must be managed appropriately. Waste ABM tested as nonhazardous may be disposed in a lined sanitary landfill without additional testing. The issue becomes more complicated when waste is accumulated, disposed on-site, land applied, or disposed in an unlined facility. In this case, the waste should be evaluated to assess possible risk to human health through direct exposure. This is more of a concern for situations when the waste is disposed of by land application and human contact is likely, or where during a facility's operation (or in the future) human contact is likely. Direct exposure includes ingestion, dermal contact, and inhalation.

To assess the direct exposure risk of waste ABM, the total metal concentration is measured (mg/kg). The heavy metal concentrations in samples of waste ABM may be compared to risk-based exposure standards to determine what reuse or disposal options are appropriate. The Florida Department of Environmental protection has developed *Soil Cleanup Target Levels* (SCTLs, formerly known as Soil Cleanup Goals). The SCTLs were designed for assessment of contaminated sites contaminated sites contaminated sites contaminated sites and were developed using a risk-assessment methodology. This risk-based methodology was conducted using procedures described in a document published by the U.S. EPA (U.S. EPA, 1996). Table 2-3 contains Florida SCTLs for heavy metals for both residential and industrial reuse settings.

Direct exposure limits are a set of risk-based concentrations, but they are goals and not regulations. These limits are tools that can be used from several perspectives, including assessing the contamination or cleanliness of a site, as well as for determining boundaries for land application of materials.

2.2.2.3 Impact on Groundwater

In addition to direct exposure to humans from chemicals in waste ABM, the risk to groundwater through leaching must also be evaluated. This can be done through two ways, either through a theoretical leaching model based on total metal concentration or

Table 2-3. Risk-Based Standards for Total Metal Concentrations.

Metal	Residential SCTL (mg/kg)	Industrial SCTL (mg/kg)
Arsenic	0.8	3.7
Barium	105	87,000
Cadmium	75	1300
Chromium	290	430
Copper	105	12,000
Iron	23,000	490,000
Lead	500	920
Mercury	3.7	28
Nickel	105	28,000
Selenium	390	10,000
Silver	390	9,100
Zinc	23,000	560,000

through leaching tests which measure the metal concentration a material will release in under laboratory-simulated conditions. In either case, established groundwater guidance concentrations are used to assess acceptable risk.

The theoretical model will be discussed first. First, an appropriate groundwater standard or guidance concentration was multiplied by a dilution attenuation factor (DAF) of 20.To obtain a target leachate concentration, this DAF was selected by a "weight of evidence" approach by EPA (U.S. EPA, 1996). This DAF accounted for dilution and attenuation in the environment for a 0.5-acre area. A total metal concentration was then calculated that would result in a pore water leachate equal to target leachate concentration. The model for this calculation incorporated a partition coefficient for each compound of interest. Figure 2-1 is the equation used by the U.S. EPA to calculate the total metal concentration from the target leachate concentration. Florida has adopted this approach as well as the default values associated with it.

$$C_t = C_w \left(K_d + \frac{\theta_w + \theta_a H'}{\rho_b} \right)$$

Where C_t=screening level in soil (mg/kg)
C_w=target soil leachate concentration (mg/L)
K_d=soil-water partition coefficient (L/kg)
θ_w=water-filled soil porosity (FL default 0.3)
θ_a=air-filled soil porosity (FL default 0.13)
ρ_b=dry soil bulk density (FL Default 1.5 kg/L)
H'=dimensionless Henry's Law Constant (H-atm-m^3/mol x 41(Conversion Factor))

Figure 2-1. U.S. EPA Soil Screening Guidance Theoretical Leaching Equation

The EPA recognized that partition coefficients, especially for metals, are affected by many environmental factors. The K_d may be affected by pH, oxidation-reduction potential, iron oxide content, soil organic matter content, cation exchange capacity, and major ion chemistry, among others (U.S. EPA, 1996). The use of these theoretical values, especially for a waste material, should be viewed with these uncertainties in mind.

The second method to determine potential risk to groundwater is through batch leaching tests, which simulate the leaching of materials in environmental conditions. The concentration of a chemical in the leachate produced by the leaching test is compared to the appropriate groundwater standard or guidance concentration. If the measured concentration is greater than the appropriate regulatory level, the waste is considered to present a risk to groundwater.

Although the TCLP test is primarily used to determine hazardous characteristics, it is sometimes used by states to determine the potential impact of a waste on groundwater when the waste is stored or disposed in non-landfill conditions (U.S. EPA, 1992). A more suitable test for this scenario is the synthetic precipitation leaching procedure (SPLP). The SPLP assay uses a leaching solution made from nitric and sulfuric acid that simulates acid rain with a pH of 4.20 (sites located east of the Mississippi River). It is the preferred choice by many regulators for determining impacts of waste on groundwater (WDNR, 1997). Other than the leaching solution, which simulates rainfall and is less aggressive than the TCLP solution, all other aspects of the test remain the same as the TCLP test. Table 2-4 contains Florida's groundwater guidance concentrations and theoretical soil target levels (for leaching) for twelve metals.

Table 2-4. Guidelines for Leachable Metal Concentrations.

Metal	FL Groundwater Guidance Concentration (ug/L)	FL Theoretical Leach. (mg/kg)
Arsenic	50	29
Barium	2,000	1,600
Cadmium	5	8
Chromium	100	38
Copper	1,000	-
Iron	300	-
Lead	15	-
Mercury	2	23
Nickel	100	130
Selenium	50	5
Silver	100	34
Zinc	5,000	12,000

3.SAMPLE COLLECTION, ANALYSIS & METHODOLOGY

Samples were collected using methodology outlined in the FDEP standard operating procedures (Section 4.0) and as outlined in the UF Solid and Hazardous Waste Research Group Comprehensive Quality Assurance for Field Sampling (COMPQAPP# 960218). Since metals were the primary pollutant of interest, nitric acid rinsed plastic containers were used. The sites where samples were collected are outlined in Table 3-1.

Table 3-1. ABM Waste Sample Collection

Site	Date Sampled	Media	Description	Samples Collected
Commercial Building Renovation Site	8/18/97	Coal Slag	Painted Highway Sign Posts and Building	2
Bridge Blasting Site	6/11/97	Coal Slag	Contained Blasting Site	3
Airport Maintenance Shops (1-3)	6/23/97	Sand/Plastic	Blast Cabinet Waste	3
Ship Blasting Site	9/4/97	Coal Slag	Dry Dock Ship Blasting	2
Ship Blasting Sites (2-4)	1/9/98	Coal Slag	Dry Dock Ship Blasting	26
Sandblasting Contractor Sites (2-3)	1/8/98	Silica Sand	Heavy Machinery	10
Sandblasting Contractor Site (4)	1/19/98	Silica Sand	Scaffolding	5

Samples of unused ABM were also obtained for analysis. Samples of the materials were purchased in 50 lb bags from Standard Sand and Silica. As discussed previously, in some cases metals may exist in the unused ABM which could possibly classify the material as hazardous (very rare) or limit reuse options. Table 3-2 presents the unused media obtained for analysis.

Table 3-2. Unused Media

UNUSED MEDIA
Silica Sand
Coal Slag
Garnet
Starblast
Steel Shot
Glass Bead
Aluminum Oxide

3.1 CHARACTERIZATION OF ABM WASTE

The previous report was a compilation of existing data from the literature and regulatory files (Townsend and Carlson, 1997). A preliminary characterization of raw and used abrasive blasting media was completed on this available data. To further this characterization, used abrasive blasting media samples were collected from a variety of sites throughout the state of Florida. To obtain a variety of samples, the sites were selected based on the type of media used and blasting operation employed.

3.1.1 Sites Sampled

The sites sampled not only varied in geographic location, but also varied by industry and types of media utilized. Samples were obtained from airport facilities, a Department of Transportation bridge blast site, ship blasting sites, and general contractor sites. Figure 3-1 is a map of locations sampled throughout Florida.

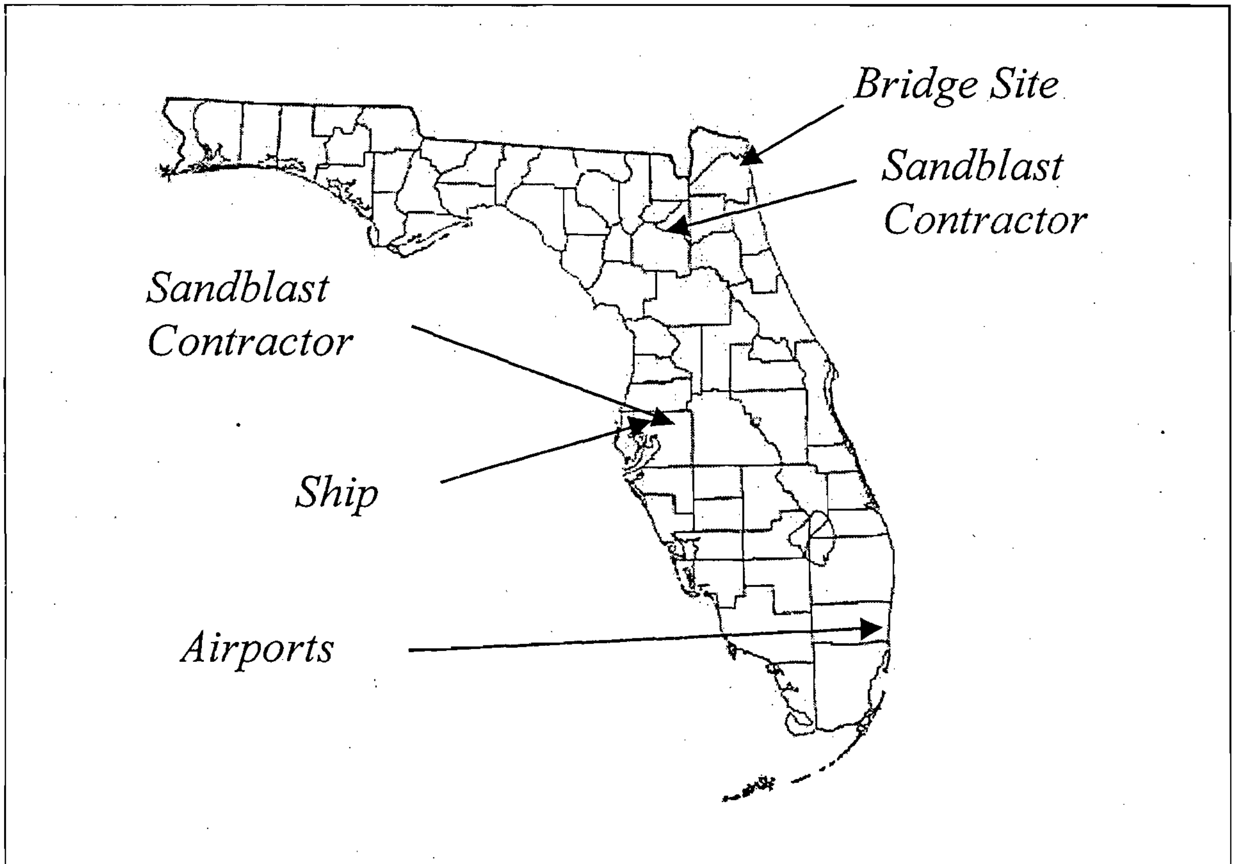

Figure 3-1. Sampling Locations

3.1.1.1 Airport Waste ABM Site

On June 23, 1997, three separate airport maintenance facilities at a small airport were sampled. One sample was collected from each site and thought to be representative of the waste generated at that site. Each site utilized a blast cabinet where media was recycled and reused until it was spent. The media used included plastic media and silica sand. The equipment cleaned with abrasive blasting media consisted of small airplane parts.

3.1.1.2 Bridge Blast Waste ABM Site

On June 11, 1997 a Florida Department of Transportation bridge maintenance site was sampled. The waste pile on site was a small circular pile 10 feet in diameter and 4 feet in depth at the center. Three samples were taken from three different sections around the pile at the center of each side. The media used at this site was coal slag media. The storage pile was located away from the blasting area and kept covered by a plastic sheet.

3.1.1.3 Sandblasting Contractor Site 1

This general contractor site was sampled on August 18, 1997. The contractor was blasting a commercial site which consisted of highway sign posts and the side of a painted building. Two composite samples were obtained from this site. The first sample was taken from under the three sign posts and the other was taken from along the entire side of the building where waste ABM was present. The media utilized at this site was coal slag.

3.1.1.4 Sandblasting Contractor Site 2

This site was sampled on January 8, 1998. This site was a sandblasting operation site with all blasting taking place out-of-doors. The primary media utilized was silica sand. The site was approximately two acres square. A total of six samples were collected from random locations in the pile. Samples were collected in 3.5 gallon containers.

3.1.1.5 Sandblasting Contractor Site 3

The third general contractor site sampled on January 8, was a site which blasted heavy machinery in a large holding bay with a concrete floor. The media used was silica sand. The bay was approximately 20 feet wide by 40 feet long with used grit piled in each corner. A total of four samples were obtained, one from each corner. The volume of sample taken was a 5 gallon container.

3.1.1.6 Sandblasting Contractor Site 4

The final general contractor site sampled on January 20, used silica sand and blasted out-of-doors. A building was under construction to house objects for blasting in the future. The area in which blasting took place was a 10 feet by 15 feet square, although some amount of media was spread over the entire site. The main blasting area was sampled for a total of five samples, one from each corner and one in the middle. The media utilized at this site was silica sand. The volume of each sample was approximately the volume of a 3.5 gallon container.

3.1.1.7 Ship Blast Site 1

On September 4, 1997, a ship blast site with a 50-ton stockpile of coal slag media waiting to be shipped to a cement kiln for recycling was sampled. The pile was approximately 50 feet long, 15 feet wide, and 10 feet deep. Two composite samples were collected in 5-gallon containers by sampling eight times around the entire pile. The top waste ABM material was removed and samples were taken from approximately 1.5 ft. deep. On January 9, 1998, this site had another smaller pile also waiting to be recycled at a cement kiln. This pile was about 30 tons and 40 feet long, 12 feet wide, and 10 feet deep. A total of twelve samples were collected at this time. Six samples were taken from around the pile, with a duplicate sample taken at each sample area. The samples were collected in 3.5-gallon containers.

3.1.1.8 Ship Blast Site 2

This ship blast site was sampled on January 9, 1998. The stockpile was approximately 60 tons, and not of uniform shape. Six samples were collected from this site in 3.5-gallon containers. The samples were collected from random areas around the entire pile. The media utilized at this ship blasting site was coal slag.

3.1.1.9 Ship Blast Site 3

This ship blast site consisted of a few stockpiles of media in a storage area adjacent to the working area. Two piles were sampled in this storage area. Six samples were taken from a 40-ton pile and two composite samples were taken from a 20-ton pile. The volume of each sample collected was approximately 3.5 gallons. Grass and plants were visible growing on these piles of media. The media utilized at this site was coal slag.

3.2 ANALYSIS OF WASTE ABM

The waste ABM was tested for both total metal concentrations and leachable metal concentrations. These metal concentrations were then compared to both state and federal regulatory limits and goals. The total concentrations (mg/kg) of various metal species were analyzed using standard digestion techniques followed by analysis of an atomic absorption spectrophotometer. Leaching was evaluated using both batch tests and column tests (see Section 3.3).

The two primary batch leaching methodologies used were the toxicity characteristic leaching procedure (TCLP) and the synthetic precipitation leaching procedure (SPLP). The TCLP test is the assay prescribed by the EPA to determine whether a solid waste is hazardous by toxicity characteristic in this procedure. A waste sample is size-reduced to a particle size below 9.5mm, and added to a leaching solution at a 20:1 liquid to solid ratio. The leaching solution is an acetic acid based solution, with a pH dependent on the buffering capacity of the waste (2.88 or 4.93). The mixture is mixed for 18 hours in a rotary extractor, the leachate is filtered, and then preserved and stored according to the parameter of interest (preserved at a pH of <2 for metals). The TCLP leaching solution is designed to simulate anaerobic conditions within a landfill.

Although the TCLP test is primarily used to determine hazardous characteristics, it is sometimes used to determine the impact of a waste on groundwater when the waste is stored or disposed in nonlandfill conditions. A more suitable test for this scenario is SPLP. The SPLP assay uses a leaching solution that simulates acid rain with a pH of 4.20 (sites located east of the Mississippi River). It is the preferred choice by many regulators for determining impacts of waste on groundwater. Other than the leaching solution, all other aspects of the test remain the same as the TCLP test.

3.3 CHEMICAL ANALYSIS

Chemical analysis of ABM samples and the leachate produced from them were conducted in the UF Environmental Engineering Science Solid and Hazardous Waste Laboratory (COMPQAPP# 960218). The methods used for the digestion and analysis of the samples are presented in Table 3-3 (U.S. EPA, 1986). Samples were analyzed on a Perkin Elmer 5100 atomic absorption spectrophotometer equipped with a flame and a graphite furnace. In addition to analysis for heavy metals, the leachates from the column tests were analyzed for a number of general water quality parameters (Table 3.3).

Table 3-3. Analytical Methods

Analysis	Method #
TCLP Extraction	EPA 1311
SPLP Extraction	EPA 1312
Total Metals Digestion	EPA 3050
Leachate Digestion (Flame)	EPA 3010
Leachate Digestion (Furnace)	EPA 3020
Alkalinity	Stnd. Method 2320
Anions	Stnd. Method 9056
Cations	EPA 300.7
Conductivity	Stnd. Method 2510
Dissolved Oxygen	Stnd. Method 4500-OG
pH	Stnd. Method 4500
Oxidation Reduction Potential	Stnd. Method 2580B
Total Dissolved Solids	Stnd. Method 2540C
Nonpurgeable Organic Carbon	Stnd. Method 5310B

APHA, 1995 U.S. EPA, 1986

3.4 LEACHING COLUMNS (LYSIMETERS)

To further investigate the leaching mechanisms of waste ABM, leaching columns, commonly called lysimeters, were filled with ABM from four different sites. Two other columns were filled with the raw media to observe background metal concentrations from unused media. A blank column, with only the drainage material was also used in the experiment to make sure no contamination came from the gravel or the column. Figure 3-2 is a diagram of a filled lysimeter.

3.4.1 Filling Process

The lysimeters were filled starting from the bottom with a stainless steel screen followed by acid rinsed gravel. This process was repeated three times and then the waste (approximately 3 ft.) was placed on top. The gravel served as drainage material for the leachate so that it was not stored in the waste stream after it filtered through the column. The lysimeters were approximately 3.5 ft tall and 6 inches in diameter.

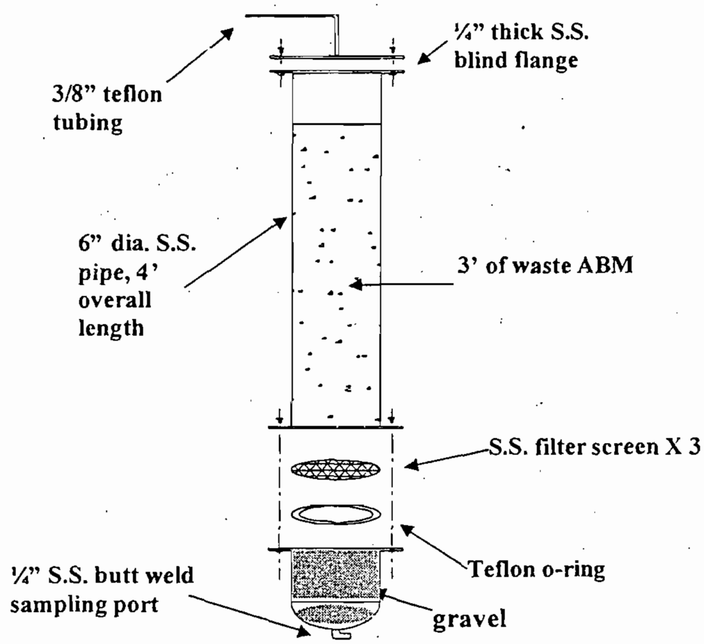

Figure 3-2. Diagram of Lysimeter Apparatus (Brantley, 1998)

The lysimeters were constructed of all stainless steel and Teflon tubing. The waste was loaded by creating a composite sample from each site and loading them into each column. Mixing a bowl of waste from each sample container formed composite samples. These bowls were weighed separately and the total weight of each lysimeter recorded. Table 3-4 presents the lysimeter number and the type of sample contained in each. Sub-samples of approximately 300 g were taken from the waste as it was loaded into the columns. These sub-samples were utilized for other tests including total metals analyses.

Table 3-4 Lysimeter Sample Information

Lysimeter	Site	Sample	Sample Wt. (kg)	Bulk Density (kg/m^3)
1	SM-A	Coal Slag	26	1477
2	SM-ADuplicate	Coal Slag	27	1495
3	SC-B	Silica Sand	28	1591
4	SM-B	Coal Slag	26	1369
5	SC-A	Silica Sand	31	1716
6	Unused	Raw Coal Slag	28	1591
7	Unused	Raw Silica Sand	29	1627
8	Control Blank	-	N/A	N/A

SM=Ship Maintenance Facility, SC=Sandblasting Contractor

3.4.2 Lysimeter Leaching

Rainfall conditions were simulated in the lysimeter by adding 1 liter of SPLP solution with a pH of 4.2 into the lysimeter every other day. The leachate was added at a rate of 50 ml per minute, which was equivalent to 5 cm of total rainfall over the surface area of the waste. Every other day before the new SPLP solution was added, the leachate produced from the previous addition was drained. The volume of leachate was recorded and general water quality parameters of the leachate were measured at this time. These parameters included pH, conductivity, oxygen reduction potential, and dissolved oxygen. Portions of unpreserved leachate were saved for total dissolved solids, alkalinity, and anion analysis. Another portion was preserved for metal analysis with nitric acid. And a third potion was preserved with sulfuric acid for nonpurgeable organic carbon (NPOC) and cation analysis.

4. RESULTS

The results of the samples analyzed are presented in chronological order. The first set of analyses (preliminary characterization) included all of the samples collected during 1997, including unused media. These samples were tested for four metals of highest concern: lead, zinc, cadmium, and chromium. Tables summarizing the results as well as a discussion follows.

The second set of analytical results are presented in terms of specific types of ABM, where the results are presented followed by a discussion. These results are from the compilation of ship maintenance facility data and sandblasting contractor site data (Carlson, 1998). These two industries were examined closer because little was previously known about these two particular ABM waste streams.

Following the discussion of the ship maintenance facilities and sandblasting contractor sites, the lysimeter (leaching column) data is presented. The lysimeter experiment further examined the leaching mechanisms of the two waste streams. The column leaching study results are then compared to the batch results from both the TCLP and SPLP leaching tests.

4.1 PRELIMINARY CHARACTERIZATION: TOTAL METAL AND LEACHING RESULTS

The results for the first set of analyses are summarized in Tables 4-1 through 4-4. These tables include total metal results as well as batch leaching results for TCLP and SPLP (when completed). Leaching tests that were not completed are not presented in the table. The leaching percentage is calculated from the percentage of metal concentration leached when compared to the total metal concentration.

Table 4-1. Analytical Results for Lead

Sample	Total Lead (mg/kg)	TCLP Leachate (mg/L)	SPLP Leachate (mg/L)	% Leaching TCLP	% Leaching SPLP
Black Beauty*	<50	<1.0	<0.010	-	-
Glass Bead*	<50	<1.0	0.180	-	-
Aluminum Oxide	<50	<1.0	<0.010	-	-
Starblast*	<50	<1.0	<0.010	-	-
Steel Shot*	67	<1.0	<0.010	<30	<0.30%
Silica Sand*	<50	<1.0	<0.010	-	-
Garnet*	<50	<1.0	<0.010	-	-
Bridge Blast /A	182	<1.0	-	<11	-
Bridge Blast /B	233	<1.0	-	<8.6	-
Bridge Blast /C	215	<1.0	-	<9.3	-
Airport 1	102	<1.0	-	<19	-
Airport 2	1,525	30	-	39	-
Airport 3	238	6	-	50	-
GC / A	-	-	<0.010	-	-
GC / B	-	-	0.022	-	-
Ship Blast /A	-	-	<0.010	-	-
Ship Blast /B	-	-	<0.010	-	-

Table 4-2. Analytical Results for Cadmium

Sample	Total Cadmium (mg/kg)	TCLP Leachate (mg/L)	% Leaching TCLP
Black Beauty*	<5	<0.10	-
Glass Bead*	<5	<0.10	-
Aluminum Oxide*	<5	<0.10	-
Starblast*	<5	<0.10	-
Steel Shot*	<5	<0.10	-
Silica Sand*	<5	<0.10	-
Garnet*	<5	<0.10	-
Bridge Blast /A	<5	<0.10	-
Bridge Blast /B	<5	<0.10	-
Bridge Blast /C	<5	<0.10	-
Airport 1	3200	166	103%
Airport 2	50	1	40%
Airport 3	11.6	0.45	77%

*Unused Media

Table 4-3. Analytical Results for Chromium

Sample	Total Chromium (mg/kg)	TCLP Leachate (mg/L)	% Leaching TCLP
Black Beauty*	174	<1.0	<11
Glass Bead*	<50	<1.0	-
Aluminum Oxide	<50	<1.0	-
Starblast	<50	<1.0	-
Steel Shot	1476	<1.0	<2
Silica Sand*	<50	<1.0	-
Garnet*	67	<1.0	<30
Bridge Blast /A	159	<1.0	<13
Bridge Blast /B	185	<1.0	<11
Bridge Blast /C	175	<1.0	<12
Airport 1	1250	21	34
Airport 2	93	<1.0	<22
Airport 3	<50	<1.0	-
GC / A	<50	<1.0	-
GC / B	<50	<1.0	-
Ship Blast /A	<50	<1.0	-
Ship Blast /B	55	<1.0	<36

*Unused Media

Table 4-4. Analytical Results for Zinc

Sample	Total Zinc (mg/kg)	TCLP Leachate (mg/L)	SPLP Leachate (mg/L)	% Leaching TCLP	% Leaching SPLP
Black Beauty*	58	<0.1	-	<9%	-
Glass Bead*	42	0.87	-	17%	-
Aluminum Oxide*	<5	<0.1	-	-	-
Starblast*	<5	<0.1	-	-	-
Steel Shot*	41	<0.1	-	<12%	-
Silica Sand*	20	<0.1	-	<25%	-
Garnet*	21	<0.1	-	<24%	-
Bridge Blast /A	28,025	588	-	42%	-
Bridge Blast /B	37,280	597	-	32%	-
Bridge Blast /C	35,528	595	4.2	33%	0.23
Airport 1	3100	62	7.5	40%	4.8
Airport 2	99	1.9	<0.05	38%	<1.0
Airport 3	47	1.5	0.430	64%	18

*Unused Media

As discussed earlier, previous research indicated that waste ABM is typically non-hazardous. The analytical results above are similar to data found in the FDEP file search. The three airport maintenance samples were hazardous (two for lead, one for cadmium, and one for chromium). Half of the hazardous samples in the FDEP file search were from airport maintenance shops, which were hazardous for cadmium. The characteristics shown by these wastes are a product of the materials blasted. The waste was smaller in size and powder-like. This ABM was likely cycled through the blast cabinet several times, possibly concentrating the metal contaminants. These wastes were stored in drums at each site.

For the four metals analyzed, the risk based goals for clean soil were not exceeded for almost all of the samples. In all but one case, the hazardous wastes were over the residential limits for the metals that caused them to be hazardous. The bridge blast samples contained high amounts of zinc, which were just over the residential cleanup goal, but lower than the industrial cleanup goal. This waste was contained on site in a covered area before it was taken for proper disposal. The ship blast waste and raw materials did not contain high amounts of total metals for lead, cadmium, chromium, or zinc.

Regulators commonly compare SPLP sample leaching to groundwater standards because the test simulates leaching in non-landfilled conditions. A few SPLP samples analyzed for lead were over the 0.015 mg/L limit, along with the samples with high TCLP leaching metals. All of the TCLP and SPLP samples analyzed for zinc remained below the ground water guidance concentration of 5,000 mg/L. Analyses presented in the next section provide a more detailed look at leaching of waste ABM compared with ground water limits.

The percent leaching for metals in the TCLP analyses varied between 17 and 77 percent. This is a wide range of leaching values that may depend on the size of waste, concentration of contaminants, the differing leachability of some metals, or other characteristics of the waste. The SPLP samples analyzed leached between 0.23 to 18 percent. These leaching percentages varied somewhat, but were similar to the ranges seen in future sections with the more extensive batch and lysimeter studies. The SPLP samples analyzed leached less than the TCLP procedure on the same sample. These results coincided with the data for the second set of batch tests.

4.2 RESULTS AND DISCUSSION OF SHIP MAINTENANCE FACILITIES

4.2.1 Results

The results presented here include the tests to determine if the waste ABM samples from the ship blasting facilities were hazardous or not (TCLP), the tests used to assess the leachability of the waste in the natural environment (SPLP), and the results of total metal content of the waste.

4.2.1.1 TCLP Leaching

The composite samples from each ship maintenance facility were analyzed using the TCLP test to determine whether or not they were hazardous by toxicity characteristic. Table 4-5 contains the TCLP limits and results from this study. All of the samples tested were below the hazardous waste leaching limit and were therefore non-hazardous for the toxicity characteristic.

Table 4-5. TCLP Limits and Results

	As	Ba	Cd	Cr	Pb	Hg	Se	Ag
TCLP Limit	**5.0**	**100.0**	**1.0**	**5.0**	**5.0**	**0.2**	**1.0**	**5.0**
Det. Limit	.001	10	.001	.100	.010	.001	.010	1
Ship Site A	BDL	BDL	.004	BDL	.103	BDL	BDL	BDL
Ship Site B	BDL	BDL	.004	BDL	.171	BDL	BDL	BDL
Ship Site C	BDL	BDL	.005	BDL	.155	BDL	BDL	BDL

*Units mg/L, BDL=Below Detection Limit

4.2.1.2. TOTAL METALS

Table 4-6 presents an overview of the total metal data for each metal including the detection limits, the percent of samples above the detection limit, and the maximum and minimum concentration for each metal. All metals analyzed for were 100% detected, except for cadmium and selenium, which were below the detection limit for all samples. The standard deviations for the arithmetic means of some data sets were high and variable so a log transformation was performed. The transformation was performed to make the variances uniform to facilitate future comparisons (Berthouex and Brown, 1994). The geometric means and standard deviations are used when the distributions were lognormal. Figures 4-1 through 4-4 show the histograms for the distributions of zinc, lead, copper, and iron. Lognormal distribution lines are plotted on the zinc, lead, and copper figures for comparison. A normal distribution line is plotted on the iron histogram for comparison.

Table 4-6. Total Metal Content in Ship Maintenance Waste ABM (mg/kg).

	As	Cd	Cr	Cu	Fe	Pb	Ni	Se	Zn
No. of Samples	23	23	23	23	23	23	23	23	23
Detection Limit	0.05	2.5	5	25	5	25	5	0.5	5
% Detects	100%	0%	100%	100%	100%	100%	100%	0%	100%
Minimum	0.23	N/A	39.7	62.19	42,881	25.6	41.7	N/A	119.7
Maximum	4.46	N/A	135.3	4,131	109,479	446	100.8	N/A	8,885
Geo. Mean	1.07	N/A	76.6	607.6	53,084	77.3	58.2	N/A	1,262
Geo. Std. Dev.	0.68	N/A	1.50	2.88	1.28	2.06	1.21	N/A	3.04
Arith. Mean	1.72	N/A	82.6	1,007	54,909	102	59.3	N/A	2,054
Arith. Stnd. Dev.	1.29	N/A	31.0	1,100	17,008	94.0	12.3	N/A	2006

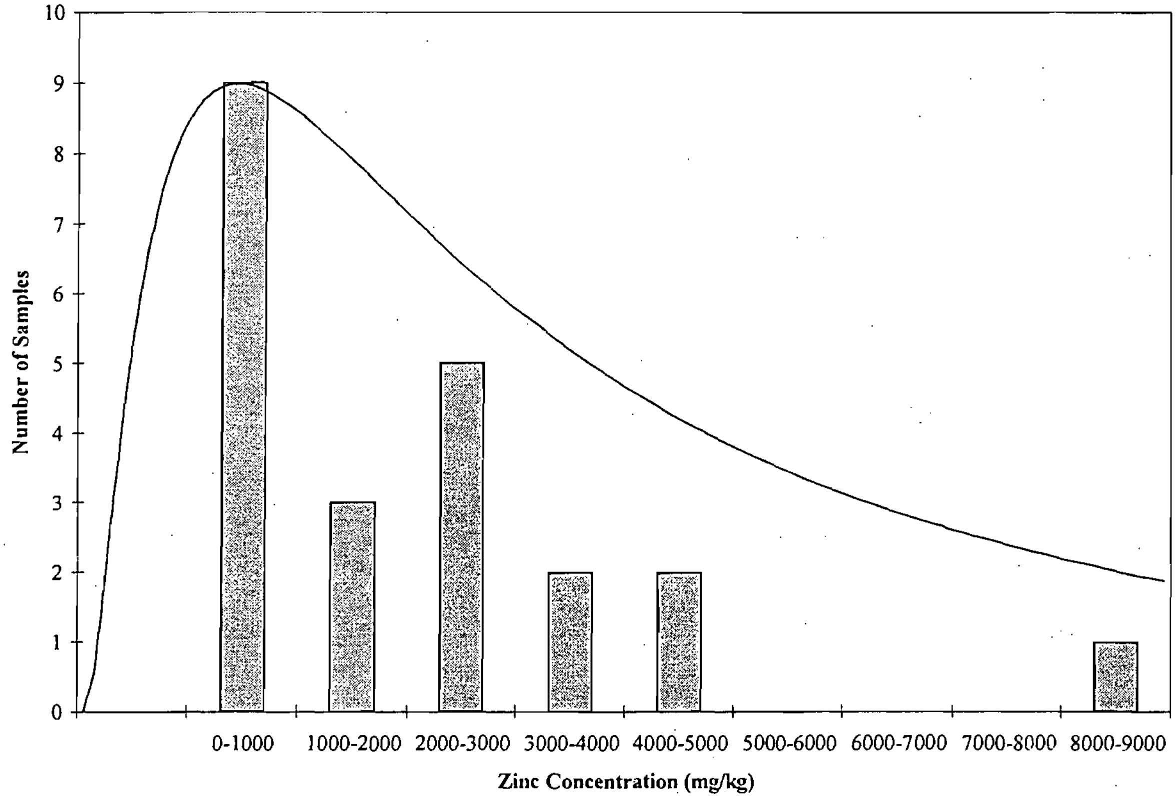

Figure4-1. Zinc Histogram and Lognormal Distribution

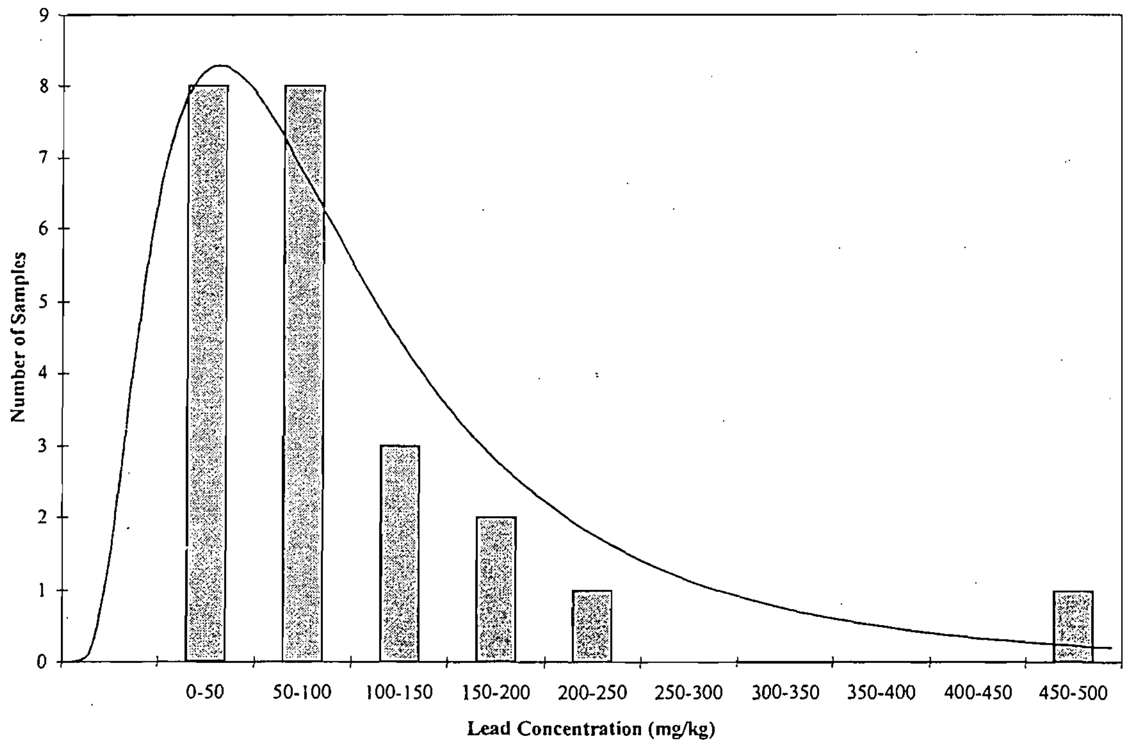

Figure 4-2. Lead Histogram and Lognormal Distribution.

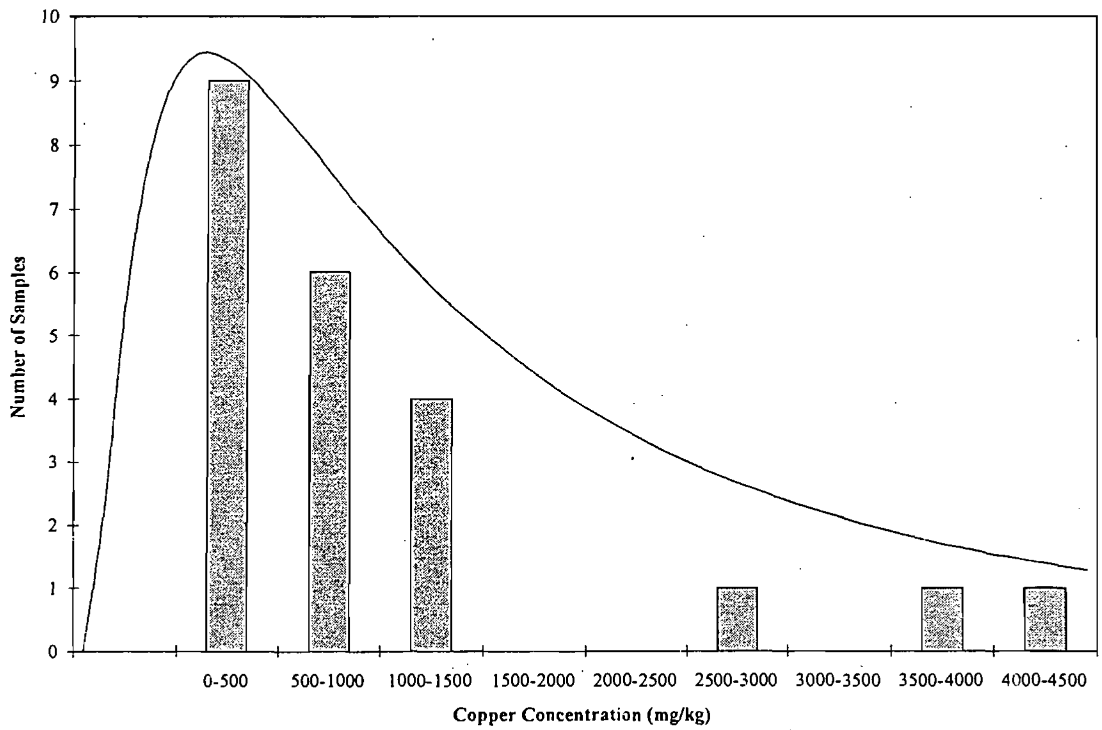

Figure 4-3. Copper Histogram and Lognormal Distribution.

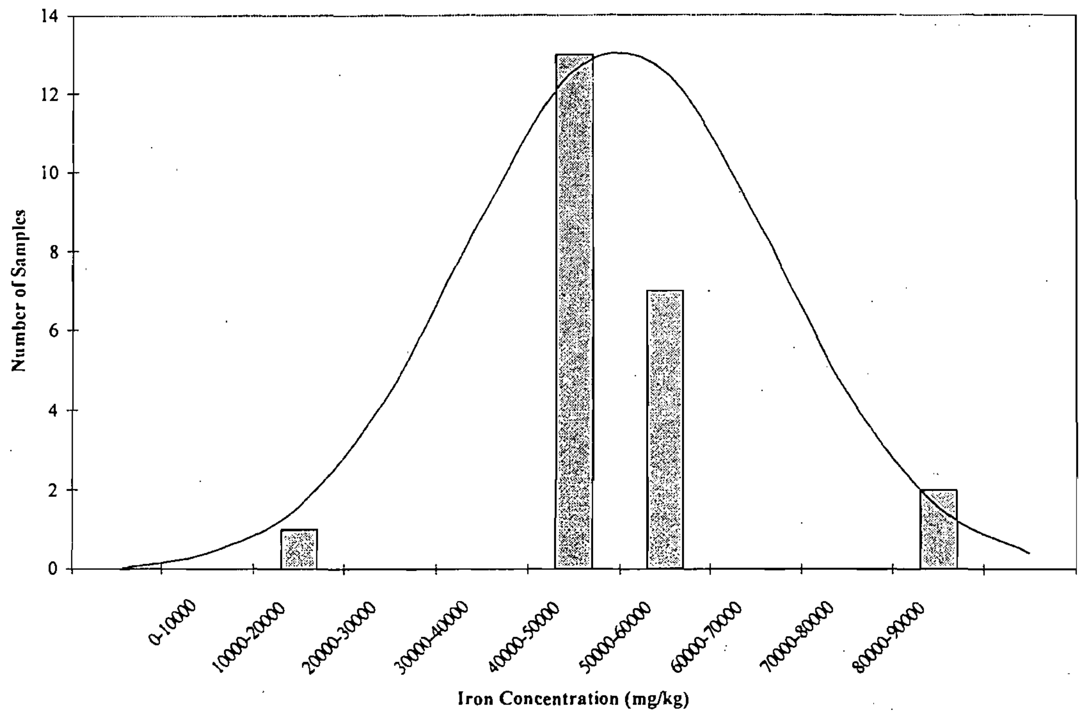

Figure 4-4. Iron Histogram and Normal Distribution.

As discussed earlier, raw coal slag media may contain heavy metals, which contribute to the metal content of this waste stream. Figure 4-5 compares the concentrations of metals in the raw and used media. Note that the ship blast ABM sites used coal slag.

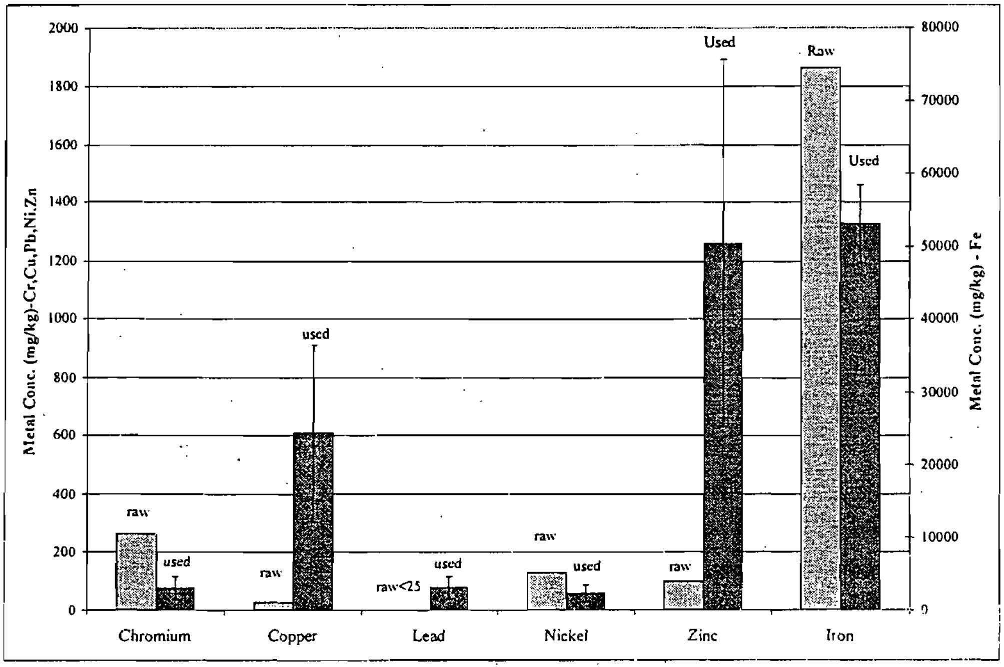

Figure 4-5. Comparison of Raw and Used Media

A 95% confidence interval was constructed for each geometric mean for the used data. The raw media data fell outside the confidence intervals. The bar graph shows that most of the copper, zinc, and lead resulted from the blasting process while the chromium, nickel, and iron concentrations resulted from the unused coal slag. The raw media can be extremely variable (Townsend and Carlson, 1998) and users should take care to obtain this media from a reliable supplier.

4.2.1.3 SPLP LEACHING

The SPLP test was performed on all samples collected to assess the potential impact of the waste on groundwater. Table 4-7 lists the leachable metal content of the ABM samples for the SPLP test.

Table 4-7. Leachable Metal Content in Waste ABM (mg/L).

	As[2]	Cd	Cr	Cu	Fe	Pb	Ni	Se[2]	Zn
No. of Samples	3	22	22	22	22	22	22	3	22
Detection Limit	.010	0.001	0.100	0.200	0.100	0.010	0.100	0.010	0.100
% Detects	0%	74%	0%	95.4%	59%	26%	0%	0%	100%
Minimum	N/A	<.001	N/A	<0.2	<0.1	<.010	N/A	N/A	0.81
Maximum	N/A	0.002	N/A	2.91	0.71	0.041	N/A	N/A	26.97
Geo. Mean[1]	N/A	0.001	N/A	0.72	0.16	0.006	N/A	N/A	5.84
Geo. Std. Dev.	N/A	0.001	N/A	0.46	0.17	0.008	N/A	N/A	1.28
Arith. Mean[1]	N/A	0.001	N/A	1.00	0.25	0.008	N/A	N/A	8.92
Arith. Stnd. Dev.	N/A	.0001	N/A	0.83	0.21	0.008	N/A	N/A	7.67

[1]Average calculated by using ½ the detection limit for undetected samples
[2]Analysis on composite sample from each site.

4.2.2 Discussion

4.2.2.1 Hazardous Characteristic

Waste ABM from ship blasting operations is not a listed hazardous waste and does not normally exhibit the characteristics of corrosivity, reactivity, and ignitability. The hazardous waste characteristic that ABM may possess is toxicity. The TCLP test was used to test for this characteristic. The composite sample from each site tested below the TCLP limits for the eight heavy metals listed in 40 CFR 261. These results showed that the samples collected were not hazardous for the toxicity characteristic.

4.2.2.2 Direct Human Exposure

The total metal concentrations of the ship blasting waste ABM samples were compared to the *Florida Soil Cleanup Target Levels*. As discussed previously, these goals are tools for assessing the contamination or cleanliness of soil or waste. Exceedance of such risk-based standards may control applicable reuse or disposal options.

Sixty-five percent of the samples were above the 0.8 mg/kg residential limit for arsenic, while two samples (9%) were over the industrial limit of 3.7 mg/kg. The residential goal for copper, 105 mg/kg, was exceeded by all but one sample. However, no samples exceeded the industrial goal of 12,000 mg/kg. One hundred percent of the samples exceeded the 23,000 mg/kg residential goal for iron, but none exceeded the industrial goal of 490,000 mg/kg.

These waste materials were located in industrial areas, so the industrial soil cleanup goals would apply assuming necessary institutional controls for maintaining industrial status were placed. As long as there is the possibility of direct exposure (present or future), the soil cleanup goals would apply. The unused media did not exceed the industrial goal for arsenic, nickel, and iron at 2.36 mg/L, 129.5 mg/L, and 74,571 mg/L respectively, but did exceed the residential goals for all three metals. Both the arithmetic and geometric mean for all of the metal data was below the industrial Florida SCTLs. Table 4-8 summarizes the total metal data along with the Florida SCTLs.

Table 4-8. Summary of Total Metal Limits and Comparative Results.

	As	Cd	Cr	Cu	Fe	Pb	Ni	Se	Zn
Res. SCG (mg/kg)	0.8	75	290	105	23,000	500	105	390	23,000
Ind. SCG (mg/kg)	3.7	1300	430	12,000	490,000	920	28,000	9,100	560,000
No. Res. Out of 23	15	0	0	22	23	0	0	0	0
No. Ind. Out of 23	2	0	0	0	0	0	0	0	0

4.2.2.3. Risk to Groundwater

The groundwater guidance concentrations (GWGC) are regulations that can be enforced by FDEP. In this study, four metals exceeded ground water guidance concentrations. One sample exceeded the 0.015 mg/L limit for lead at 0.41 mg/L. Both the arithmetic and geometric mean of the lead data were under the standard. Other samples exceeded the 1.0 mg/L and the 0.3 mg/L limits for copper and iron, respectively. Neither the arithmetic nor geometric mean for copper or iron exceeded the standards. Half of the samples, as well as both the geometric and arithmetic mean exceeded the 5.0 mg/L limit for zinc.

Table 4-9. Summary of Leaching Limits and Comparative Results.

	As	Cd	Cr	Cu	Fe	Pb	Ni	Se	Zn
GWGC (mg/L)	.05	.005	0.1	1.0	0.3	0.015	0.1	.05	5.0
No. above GWGC (out of 22)	0*	0	0	8	7	1	0	0*	11

*out of 3

4.2.2.4 Correlation of Data

The same sample that was highest for lead was the same sample that exceeded the primary groundwater guidance concentration for lead. This is an indication of the correlation between total metal content and leachable metal content. To investigate leaching characteristics further, a correlation test was performed on the samples exhibiting leaching behavior (i.e. those samples with detectable measurements in both total and leachable concentrations). Figures 4-6 and 4-7 show the relationship and correlation between total metal and leachable metal concentrations for zinc and copper. The correlation coefficients were 0.82 and 0.72 for zinc and copper respectively. Some scatter was present in the correlation, which suggested that the leaching mechanisms of this waste stream were complex and not always predictable. A similar correlation for iron produced a correlation coefficient of less than 0.1. This indicated the leaching variability of metals, and that each metal may behave in a different manner.

The batch tests may not be a correct representation of what will actually occur in the environment, but they do provide some indication as to the leachability of waste ABM. The range of percent leaching (of total metal concentration) for zinc was 1.5-18.6%. The range of percent leaching for copper was <0.8-9.3%. The percent leaching for iron was much lower than zinc or copper and ranged from <0.004-0.03%. As seen earlier, much of the iron content was from the media, which may account for the lower leaching rate and the lack of correlation.

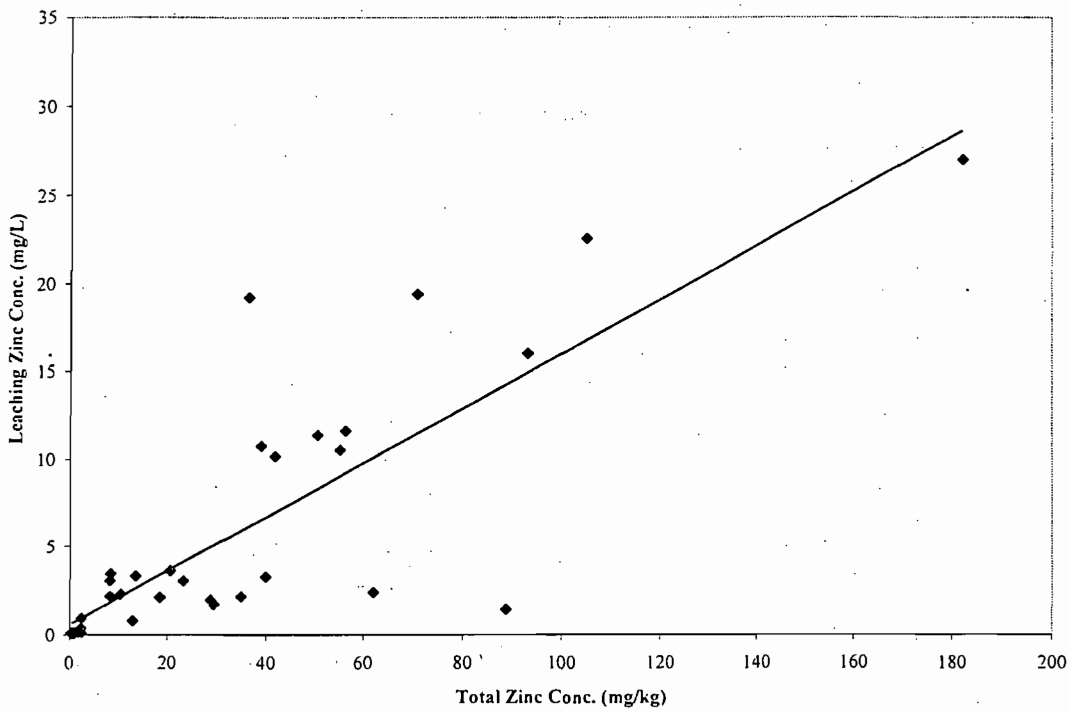

Figure 4-6. Correlation of Leachable and Total Metals for Zinc

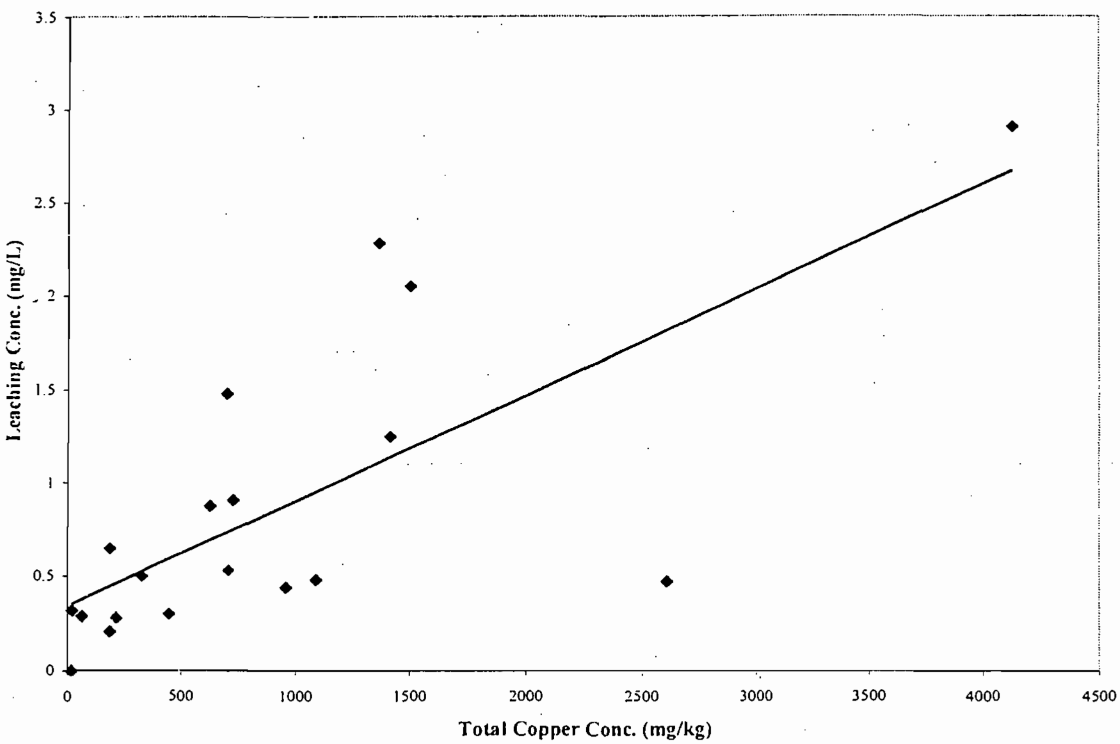

Figure 4-7. Correlation of Leaching and Total Metals for Copper

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4.2.2.5 Implication for Management

The concern over the management of the ship maintenance facility waste stream is relatively new. In the past, this waste was many times left on site or allowed to fall into the water. With knowledge of environmental impacts and regulatory standards increasing, the management of this waste stream can become complicated and costly.

The abrasive blasting media itself has some metal content (typically coal slag) and the paint removed with this media creates additional metal concentration. Typically those metals are the ones used as pigments, anti-corrosives, and biocides in marine paint. Many ship maintenance facilities have knowledge of the process they use and are typically blasting ships that they painted. The facilities are then aware of the metals in the paint and need to know how to best manage the waste stream created by the blasting process. If an unknown ship is blasted, the paint/coating may be tested first to see which metals may be of concern in the waste stream. Table 4-10 is a summary of possible concerns found with the ship maintenance facility waste ABM in this study.

Table 4-10. Potential Concerns with Ship Maintenance Facility Waste ABM

Metal	Direct Exposure Residential	Direct Exposure Industrial	Groundwater-Leaching
Arsenic	Yes	Possibly	No
Cadmium	No	No	No
Chromium	No	No	No
Copper	Yes	No	Possibly
Iron	Yes	No	Possibly
Lead	No	No	Possibly
Nickel	No	No	No
Selenium	No	No	No
Zinc	No	No	Yes

When a non-hazardous waste is produced, it typically may go to a lined municipal solid waste facility or other comparable facility. Disposal at a landfill can be costly, so other less costly options may have to be considered. Recycling operations are available for abrasive blasting waste. A promising recycling process was used by two of the maintenance facilities sampled for this study. These facilities recycled the waste produced in a cement kiln. The coal slag contains ingredients used in feedstock for the production of portland cement. Other recycling options include use as aggregate in asphalt or concrete (Townsend and Carlson, 1997).

The results of the research of these three ship maintenance facilities indicated that this waste stream has the potential to exceed secondary drinking water standards. This waste would typically not be allowed to be disposed of on-site unless a permit is issued. If stockpiling the waste is needed before transportation to a disposal or recycling facility, care must be taken to not pollute the site if contaminants are known or suspected in the used media. Leachate must be controlled and minimized during the storage of this waste.

4.3 RESULTS AND DISCUSSION OF SANDBLASTING CONTRACTORS

4.3.1 Results

The results of the chemical analyses on the sandblasting contractor samples are grouped into three areas: TCLP results, the total metal content, and SPLP metal leachability. These results are compared to both federal and state regulations and guidelines.

4.3.1.1 TCLP Results

The composite samples from each sandblasting contractor facility were tested to see if they were hazardous. Table 4-11 contains the TCLP limits and results from this study.

Table 4-11. TCLP Limits and Results.

	As	Ba	Cd	Cr	Pb	Hg	Se	Ag
TCLP Limit	**5**	**100**	**1**	**5**	**5**	**0.2**	**1**	**5**
Det. Limit	.001	10	.001	.100	.010	.001	.010	1
Sndblst Site A	BDL	BDL	.001	BDL	BDL	BDL	BDL	BDL
Sndblst Site B	BDL	BDL	.015	BDL	BDL	BDL	BDL	BDL
Sndblst Site C	BDL	BDL	.009	BDL	.020	BDL	BDL	BDL

*Units mg/L, BDL=Below Detection Limit

4.3.1.2 Total Metal Results

Table 4-12 contains the total metal concentrations examined for each sample as well as the detection limits, the percent of samples above the detection limit, the range of values found, and two different averages and standard deviations for each metal. The distribution (normal, log-normal) of the data can affect the averages and standard deviation of each data set. Figures 4-8 through 4-11 present the histograms including a line representing a lognormal distribution for zinc, lead, chromium, and nickel.

Table 4-12. Total Metal Content in Sandblasting Contractor Waste ABM.

(mg/kg)	As	Cd	Cr	Cu	Fe	Pb	Ni	Se	Zn
No. of Samples	15	15	15	15	15	15	15	15	15
Detection Limit	0.05	2.5	5	25	5	25	5	0.5	5
% Detects	27%	0%	100%	0%	100%	67%	100%	0%	100%
Minimum	<.05	N/A	12.6	N/A	826.8	<25	4.78	N/A	24.3
Maximum	.08	N/A	59.1	N/A	2,801	99.5	53.1	N/A	4,328
Geo. Mean[1]	.05	N/A	32.8	N/A	1,300	36.6	13.2	N/A	211.1
Geo. Std. Dev.[1]	.04	N/A	1.56	N/A	1.42	2.26	2.21	N/A	5.83
Arith. Mean[1]	.06	N/A	35.6	N/A	1,380	47.3	18.1	N/A	759.6
Arith. Stnd. Dev.[1]	.04	N/A	13.3	N/A	523	29.4	16.1	N/A	1,173

[1]Calculated with undetected samples at ½ detection limit.

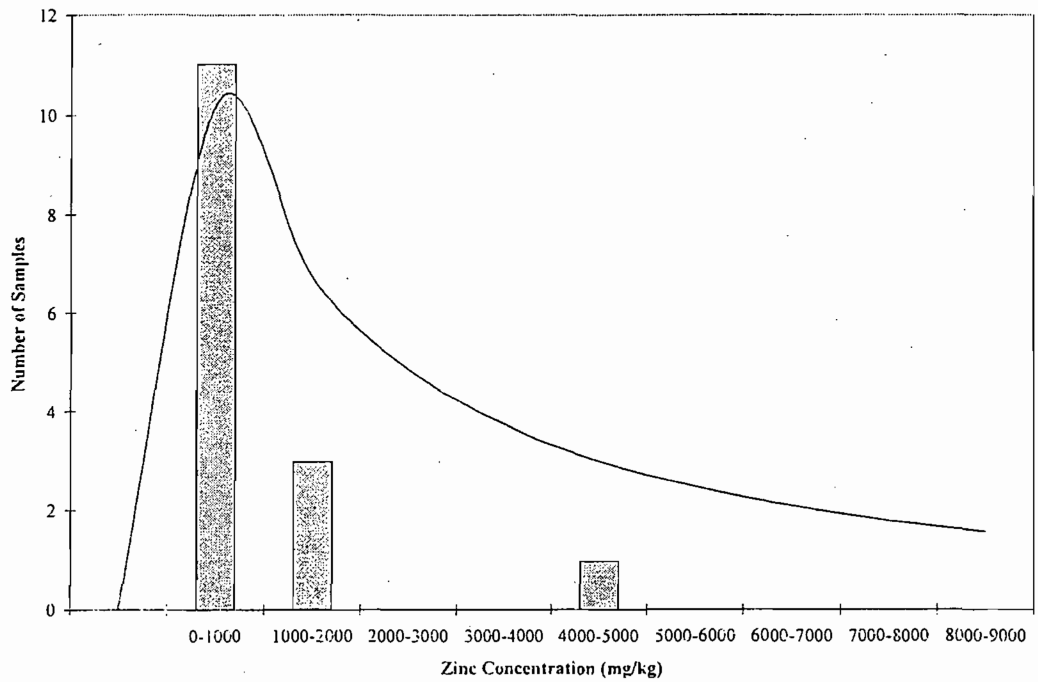

Figure 4-8. Zinc Histogram and Lognormal Distribution.

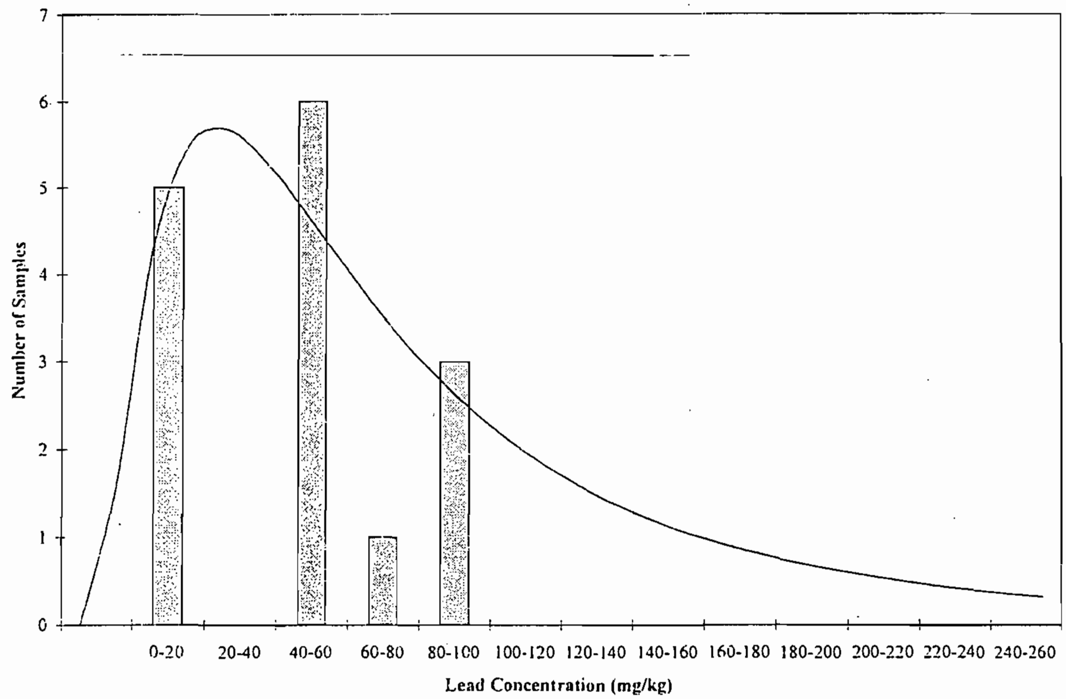

Figure 4-9. Lead Histogram and Lognormal Distribution.

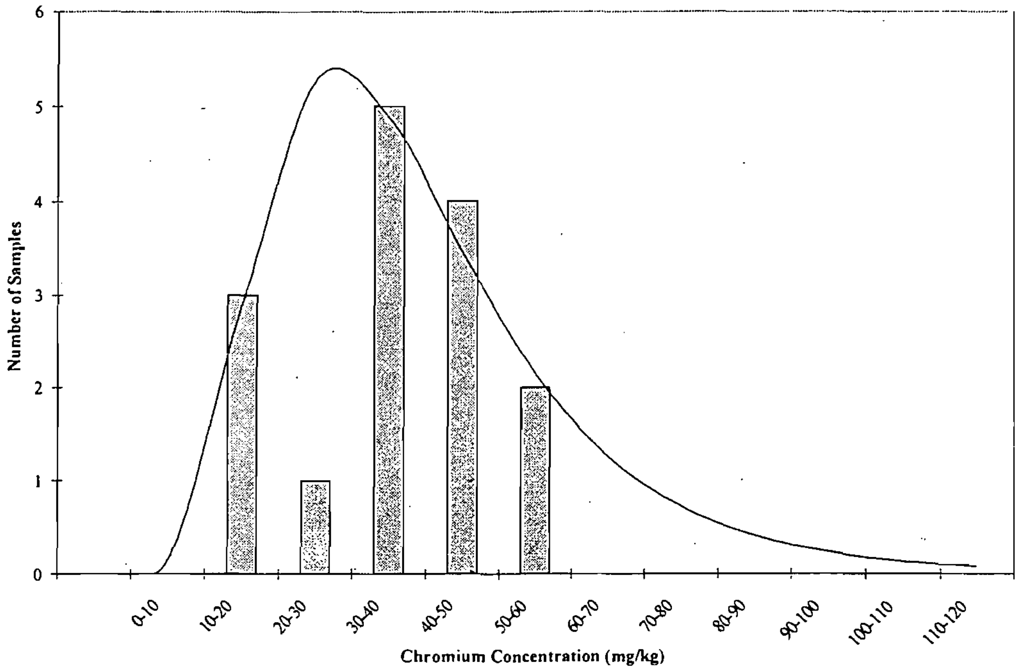

Figure 4-10. Chromium Histogram and Lognormal Distribution.

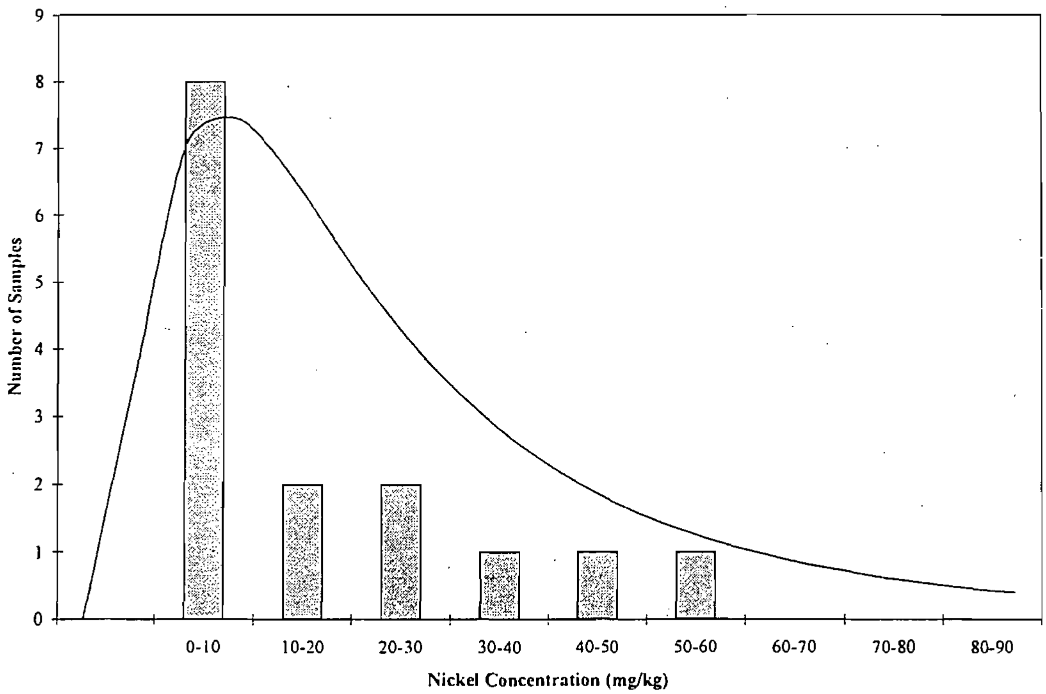

Figure 4-11. Nickel Histogram and Lognormal Distribution.

Table A-2. Data for Total Metal-Flame

TOTAL	METALS	Sample wt.	Lead	Copper	Chromium	Zinc	Cadmium	Nickel	Iron
SAMPLE ID		g	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
MSBLANK	Blank Spike (mg/L)	-	4.5	4.7	5.2	4.6	2.3	5.0	2.7
SBA1		2.20	78.6	3579.5	50.9	2738.6	<2.5	72.3	50454.5
SBA1MS	Matrix Spike	2.11	273.0	-	226.5	-	105.7	294.8	
SBA1MSD	Matrix Spike - Dup	2.27	259.0	-	196.5	-	101.3	261.2	
SBA2		2.40	39.6	183.3	52.1	2102.1	<2.5	62.1	46166.7
SBA2D	Field Dup	2.04	40.7	211.8	48.5	1781.9	<2.5	54.4	49166.7
SBA3		2.12	44.8	448.6	125.0	3344.3	<2.5	71.7	51509.4
SBA4		2.23	25.6	326.9	73.1	373.9	<2.5	41.7	44529.1
SBA4D	Field Dup	2.01	26.4	62.2	93.0	119.7	<2.5	46.8	51865.7
SBA5		2.08	40.9	1086.5	99.5	1870.2	<2.5	55.3	49326.9
SBA6		2.40	183.8	1500.0	104.2	2297.9	<2.5	100.8	109479.2
SBB1		2.02	67.3	2607.4	93.6	3071.8	<2.5	53.0	44594.1
SBB2		2.37	216.5	192.0	126.2	215.7	<2.5	55.7	42995.8
SBB2D	Method Dup	2.04	194.1	307.8	135.3	306.9	<2.5	63.7	49313.7
SBB3		2.38	102.5	697.5	111.3	558.8	<2.5	57.6	46512.6
SBB4		2.10	140.0	709.5	103.8	390.0	<2.5	56.2	49428.6
SBB5		2.36	55.1	4131.4	114.0	4447.0	<2.5	58.5	42881.4
SBB6		2.20	105.9	954.5	92.3	4231.8	<2.5	64.5	45313.6
SBC1		2.06	78.2	728.2	45.6	997.6	<2.5	51.9	48291.3
SBC2		2.02	60.9	1361.4	47.0	2787.1	<2.5	61.9	56980.2
SBC3		1.94	446.4	184.0	95.9	2054.1	<2.5	50.5	54948.5
SBC4		2.09	77.5	1411.5	54.5	1105.3	<2.5	48.3	52392.3
SBC5		2.01	93.5	626.9	69.2	916.7	<2.5	68.2	88432.8
SBC6		2.19	87.7	474.0	39.7	588.1	<2.5	42.9	45547.9
SBC7		2.05	38.0	365.9	42.4	8885.4	<2.5	67.8	53073.2
SBC8		2.00	40.5	516.5	47.0	2085.0	<2.5	59.0	89712.5
GCA1		2.05	<25	<25	44.9	4328.0	<2.5	9.3	2801.0
GCA2		2.13	<25	<25	31.0	484.7	<2.5	12.7	1379.3
GCA3		2.07	81.2	<25	33.3	1678.7	<2.5	7.7	1527.5
GCA4		2.46	<25	<25	12.6	329.1	<2.5	7.3	882.1
GCA5		2.07	<25	<25	26.1	1386.5	<2.5	12.6	903.9
GCA6		2.28	<25	<25	17.1	1290.6	<2.5	5.7	826.8
GCB1		2.09	99.5	<25	45.5	102.8	<2.5	4.8	875.1
GCB2		2.34	71.8	<25	37.2	99.6	<2.5	9.4	939.3
GCB3		2.01	44.3	<25	17.4	100.1	<2.5	7.0	1595.0
GCB4		2.51	54.6	<25	41.0	92.1	<2.5	7.6	1072.9
BLANK		-	BDL	BDL	BDL	BDL	BDL	BDL	BDL
GCC1		2.13	58.7	<25	32.9	24.3	<2.5	22.1	1626.8
GCC2		1.60	43.8	<25	53.8	26.1	<2.5	53.1	1813.8
GCC3		1.98	82.3	<25	59.1	30.9	<2.5	49.5	1744.9
GCC4		1.75	57.7	<25	38.9	29.6	<2.5	27.4	1474.9
GCC5		1.56	53.2	<25	43.6	65.4	<2.5	35.9	1233.3

Table A-1 is a summary of the recoveries from the spikes used as quality assurance and control for the analyses completed. The blank spikes were spiked deionized water samples treated the same way as samples during laboratory procedures. Blanks samples of deionized water were also incorporated to make sure no contamination occurred in the lab. Matrix spikes were samples spiked with a known concentration. Duplicates in the field and in the lab were analyzed to check for consistency of the samples. The raw data including spikes and duplicates follows in table A-1 through A-6.

Table A-1. QA/QC Data

	TOTALS			LEACH				
	Blk.Spike	MS1	MS2	Blk. Spike	MS1	MS2	MS3	MS4
Zinc	92%	112%	111%	101%	79%	65%	101%	72%
Copper	94%	112%	112%	136%	105%	108%	141%	147%
Lead	90%	82%	82%	110%	119%	132%	115%	110%
Chromium	105%	74%	66%	103%	105%	104%	107%	108%
Cadmium	92%	89%	92%	80%	85%	75%	80%	85%
Nickel	100%	94%	86%	85%	90%	88%	84%	79%
Iron	106%	60%	79%	121%	112%	133%	88%	115%
Arsenic	128%	60%	54%	98%	-	-	-	-
Selenium	75%	84%	78%	85%	-	-	-	-
Barium	-	-	-	90%	80%	120%	-	-
Silver	-	-	-	-	41%	71%	-	-
Mercury	-	87%	109%	-	83%	66%	-	-

Note: ms=Matrix spike

APPENDIX A

QA/QC Data

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limits may also occasionally be exceeded, storage on an impervious surface, like concrete is recommended. Waste ABM may be disposed of in a lined landfill or recycled in a manner which will not produce leachate when the waste exceeds groundwater guidance concentrations. An excellent recycling option for the coals slag used media is at a cement kiln. The media contains minerals needed as feedstock in the cement-making process. Other recycling options include as aggregate in concrete or asphalt.

6. CONCLUSIONS

The process of abrasive blasting creates a solid waste stream composed of the media utilized for blasting and the materials removed by the process. These materials are typically paints and coatings that serve as protection for the surfaces blasted. Coatings and paint contain pigments and other additives like anti-corrosion agents and biocides that may contain heavy metal compounds. These metallic compounds end up in the abrasive blasting waste stream potentially causing harm to human health and the environment.

Typical generators of abrasive blasting media waste are the military, departments of transportation, ship maintenance facilities and sandblasting contractors. The military and transportation departments have organized management practices that are followed for the solid waste created by abrasive blasting. Ship maintenance facilities and sandblasting contractors may be smaller operations, and are often uncertain of the best way to manage ABM waste. An overall, consistent management practice would benefit the smaller industries and the agencies that regulate them.

This research developed a management strategy outlining the steps that can be taken by a generator to properly manage waste ABM. Th research studied several types of waste ABM, but concentrated on ship maintenance facility and sandblasting contractor waste. The abrasive blasting media encountered during this research was typically non-hazardous. The FDEP file reviews also confirm this, although when paints with known heavy metal contents are blasted (such as lead-based paint), the waste can easily take on the hazardous characteristic for toxicity.

When waste ABM is non-hazardous, other considerations must be made to assess the safety of human health and the environment for various management options. Direct exposure risk through ingestion, inhalation and dermal contact must be considered. Direct exposure limits are typically risk-based concentrations utilized by regulators in assessing the contamination of soil at a site or to regulate the placing of materials on the land. If waste ABM may possibly be placed on the land or allowed to accumulate on site, the direct exposure risk must be assessed. For the coal slag media typically used to blast ships, the concentration of arsenic typically exceeds direct exposure limits for residential areas, and occasionally industrial areas. The sandblasting contractor waste examined for this study was not found to exceed any direct exposure limits.

The leachability of waste ABM must be considered in terms of potential groundwater contamination. The SPLP test is an assay used to simulate rainfall conditions and examine the leachability of a waste. Lysimeter studies were also completed to further examine these leaching characteristics. For the ship maintenance facilities, iron, copper, and zinc exceeded their respective groundwater guidance concentrations at times. One sample exceeded the standard for lead. Iron also leached above the limits for the sandblasting contractor media. One sample of the contractor media leached above the standard for cadmium.

Because this waste stream does exceed some groundwater guidance concentrations, the production of leachate must be minimized. The best way to minimize leachate production is to not produce it at all in the first place. Leachate production may be prevented by covering the waste with a plastic cover or by keeping it under a roof or overhang. Because direct exposure

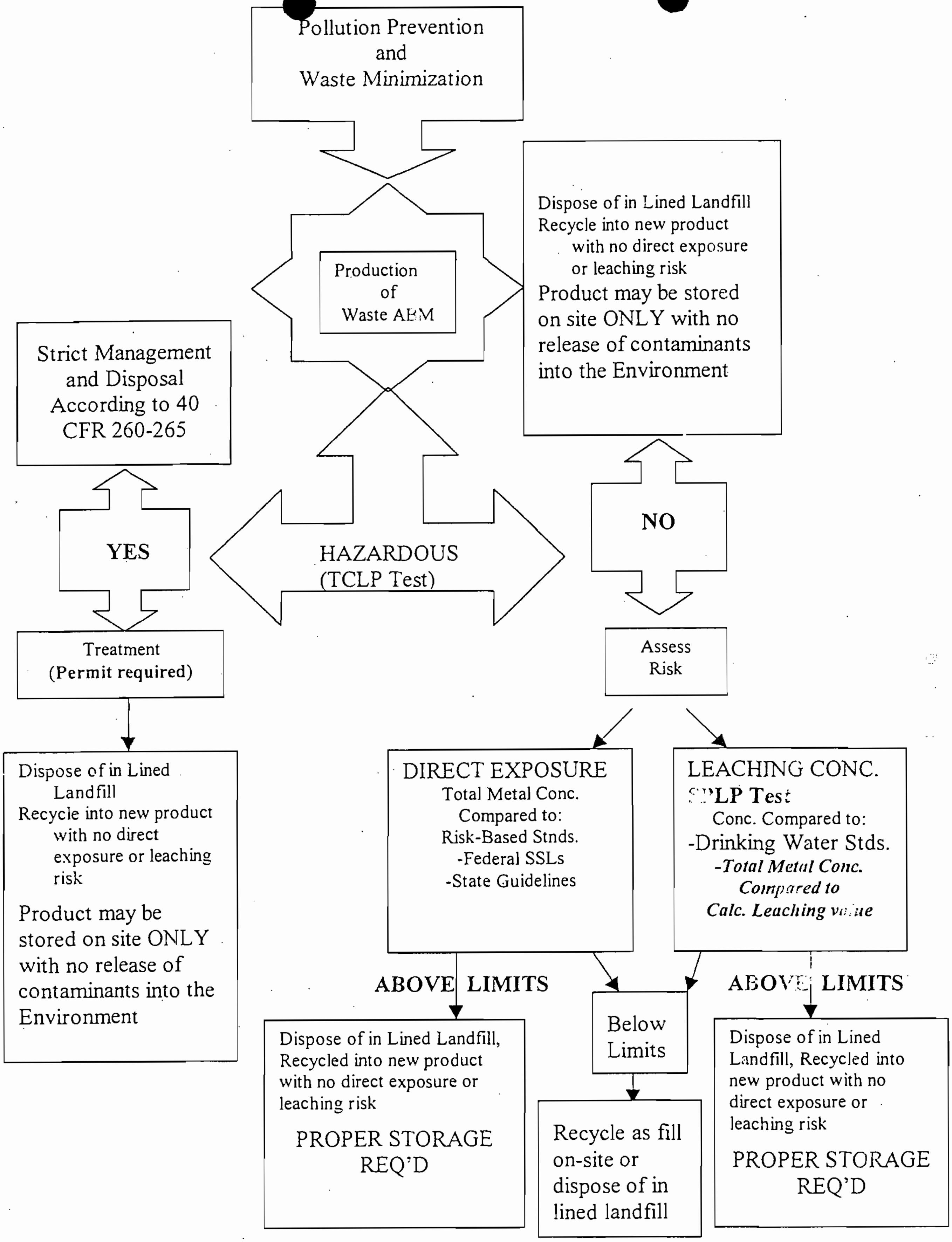

Figure 5-1. Overview of Management Options

5. BEST MANAGEMENT PRACTICES

In addition to the analytical work presented as part of this research, a document with best management practices for the management of ABM waste was produced. As mentioned in Chapter 2, this document was designed to provide generators, regulators, and suppliers in the industry with the needed information to manage waste ABM appropriately. The management practices presented covers management from generation, waste reduction, reuse, recycling, and disposal. An overview of management options is presented in Figure 5-1.

A draft of the best management practices was presented to the Technical Advisory Group consisting of industry professionals, regulators, and engineers, on January 30, 1998. Comments were accepted on the document through March, and changes were made.

The BMP document is simply organized and addresses such situations as when waste ABM is hazardous and how it should be handled, where non-hazardous waste ABM can be disposed, whether or not the waste may be land applied, and how to reduce overall amounts of waste ABM. The document also includes all of the pertinent state standards, goals and regulations that may apply to waste ABM. The analytical tests appropriate for waste ABM are outlined and explained in the BMP document. Table 5-1 summarizes the content of the BMP document. The document is presented in Appendix C.

5.1 IMPLEMENTATION OF BMP'S

Table 5-1. Topics in BMP Document

Topic
Is my waste ABM hazardous?
What kind of hazardous waste generator am I?
What are my requirements as a hazardous waste generator?
What if my waste ABM is not hazardous?
Where can I dispose of my nonhazardous ABM?
What tests do I need to run on my waste ABM?
How can I reduce the amount of ABM waste I produce?
How can I recycle my waste ABM?
Who should I contact if I have questions about my waste ABM?

Table 4-24. Percent Leaching for Copper.

Copper	L1	L2	L4
TCLP	18.3%	35.6%	16.7%
SPLP	<0.52%	<0.89%	<0.30%
Lysimeter	0.2%	0.5%	0.2%

Table 4-25. Percent Leaching for Lead.

Lead	L1	L2	L3	L4	L5
TCLP	7.7%	6.9%	3.3%	5.1%	8.4%
SPLP	<0.75%	<0.87%	<0.5%	<0.3%	<1.0%
Lysimeter	0.04%	0.02%	0.04%	0.03%	0.49%

Table 4-26. Percent Leaching for Zinc.

Zinc	L1	L2	L3	L4	L5
TCLP	85.5%	76.0%	50.5%	72.5%	56.5%
SPLP	2.3%	3.5%	4.8%	1.3%	3.2%
Lysimeter	2.5%	2.9%	1.7%	2.0%	15.4%

4.4.2.3 Implications for Characterization

The leaching percentages of the TCLP test are higher than the SPLP or lysimeter leaching. The TCLP test is more aggressive in simulating the anaerobic leaching conditions occurring inside a landfill with acetic acid. The TCLP would not be a good representation of the leaching of a waste in non-landfilled or open environmental conditions. The SPLP test is much better suited for predicting the leachate produced in the environment and is recommended by some regulators (WDNR 1997). Tables 4-6 through 4-8 show that the lysimeter column was very similar to the SPLP test for percentage of total metal leached.

The batch leaching tests predict the concentration of metals in leachate produced, while providing some degree of dilution of the leachate as might occur in the environment (liquid to solid ratio at 20:1). The lysimeters, although they may simulate field and environmental conditions more accurately by allowing the liquid to percolate though the waste, do not account for dilution in the environment. This can be seen by the high maximums on the lysimeter metal leaching curves. A dilution factor may need to be incorporated into the lysimeter leaching numbers to properly assess the impact of this waste stream on the natural environment.

The concentrations of some of the heavy metals exceeded groundwater guidance concentrations in lysimeters. This included some cases where the GWGCs were not exceeded in the SPLP tests. A complete examination of the lysimeter data and their relationship with the batch SPLP data was beyond the scope of this report. For additional information and discussion, see the Master of Engineering thesis by Carlson (1998). Additional analyses and examination will be performed as part of technical journal articles that will be drafted and submitted in the future.

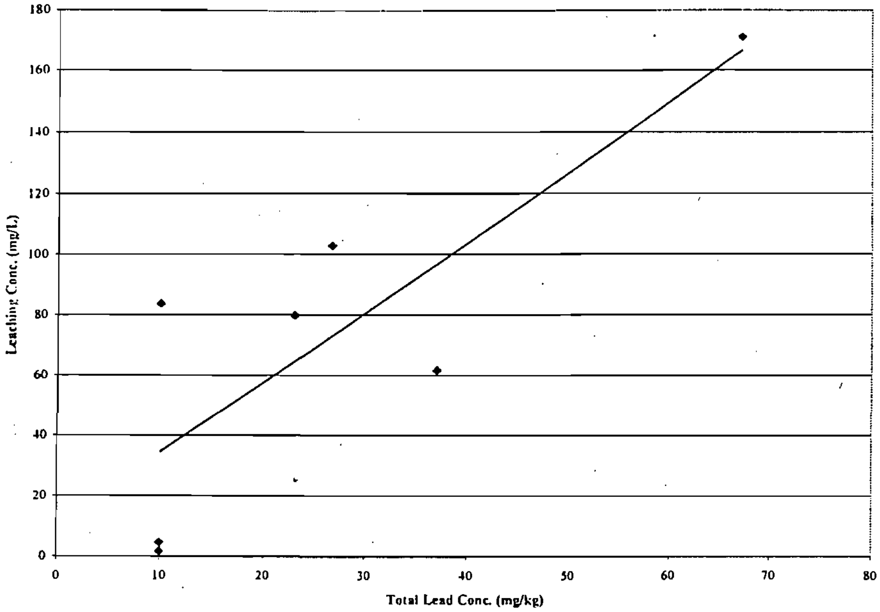

Figure 4-22. Lead TCLP and Total Metal Correlation.

A percentage of the total metals leached during the TCLP, SPLP, and lysimeter tests. Tables 4-24 through 4-26 show the percent leaching for all tests. The leaching mechanisms of the TCLP and SPLP test also differ. However, there was some correlation for all samples leaching above detection limit for SPLP and TCLP. Figure 4-23 illustrates this relationship with a 0.80 correlation coefficient.

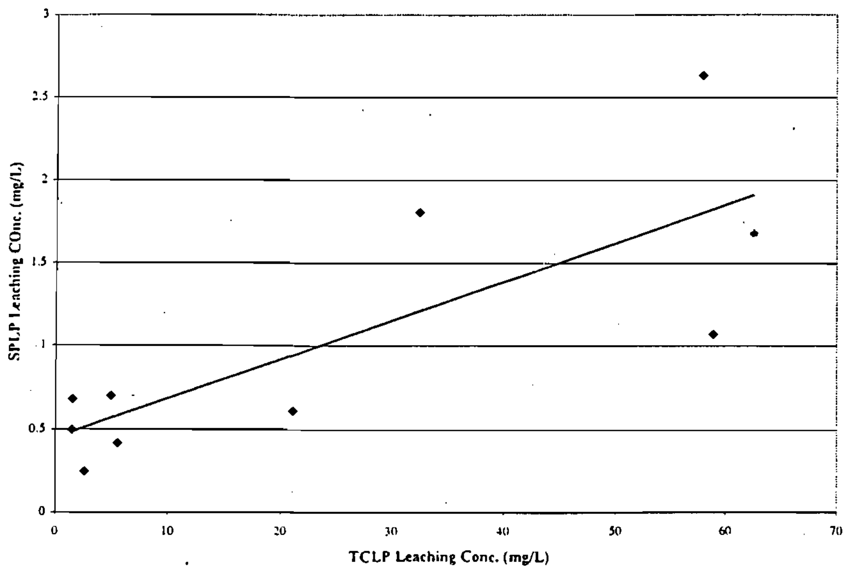

Figure 4-23. TCLP and SPLP Correlation

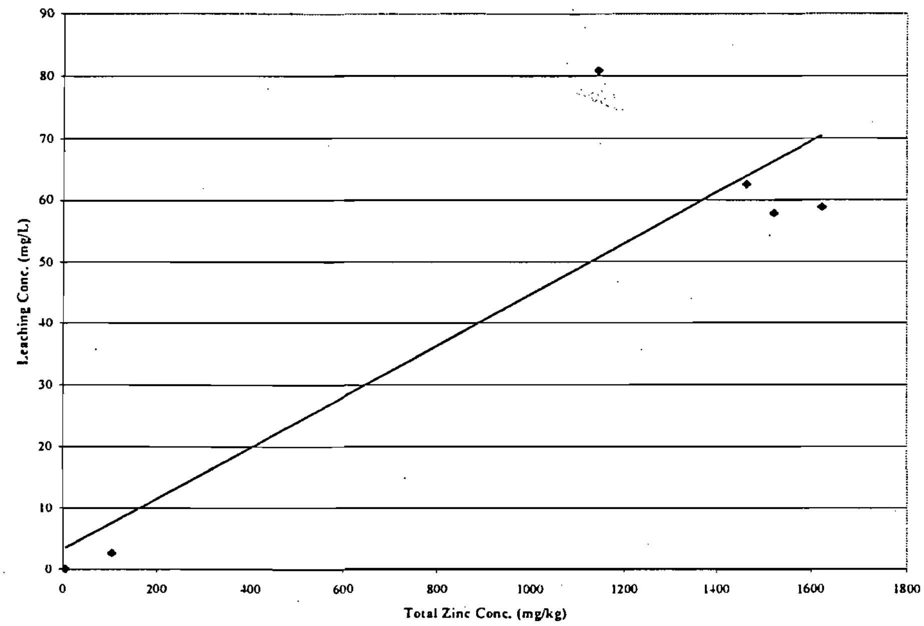

Figure 4-20. Zinc TCLP and Total Metal Correlation.

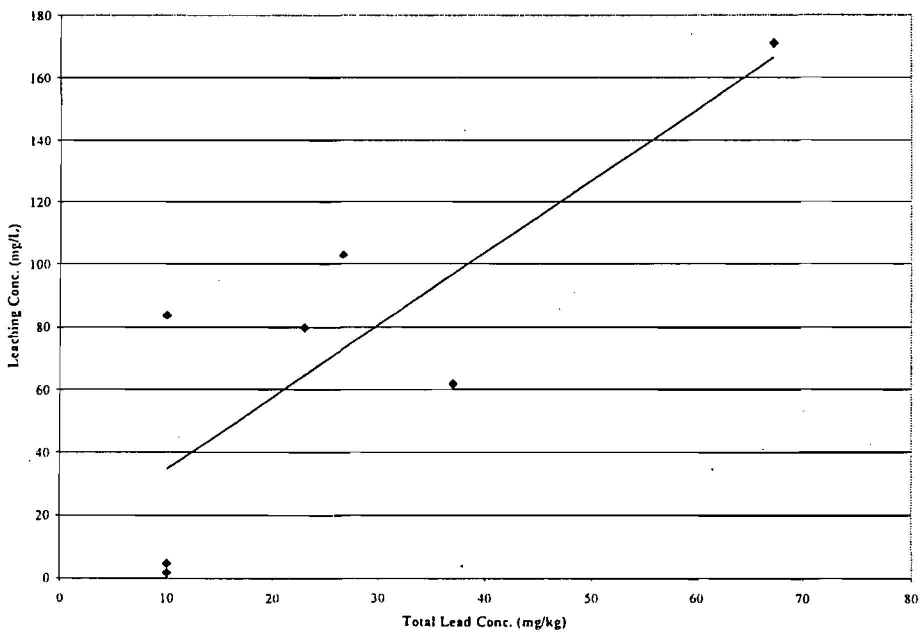

Figure 4-21. Copper TCLP and Total Metal Correlation.

4.4.2 Discussion

4.4.2.1 Leaching Relationships

Many of the general water quality parameters and all of the ions demonstrated similar leaching relationships over time, starting at a maximum value then decreasing to steady state. One reason for this phenomenon is that the readily leachable concentrations in the waste stream are high to begin with and then as constituents get washed away, the amount that can be leachable falls to a steady state. Leaching mechanisms may be very complex and are affected by physical waste characteristics (e.g. particle size, porosity) and chemical characteristics of the leaching fluid (e.g. pH and oxidation reduction potential). A brief discussion of some of these parameters follows.

The relationship of pH on the leaching of wastes has been examined to some extent and the leaching behavior of contaminants as a function of pH is very systematic (van der Sloot, 1991). There is typically a pH range where maximum and minimum leaching will occur for separate metals.

Physical parameters can also affect the leachability of contaminants from waste. A smaller particle size allows a larger surface area for a contaminant to leach from. A paint chip in waste ABM would leach differently than a particle of the media itself. As presented earlier, in coal slag media, zinc, copper, and lead for the most part came from the use of the media (paint or coating) and other metals are inherent to the media (As, Ni, Cr).

In general, highly soluble constituents will wash out of a system quickly and less soluble constituents will leach at a consistent rate leading to a continuous increase (van der Sloot, 1991) and then decrease again as the contaminant is washed away. This leaching characteristic may explain why some of the leaching graphs increase and then decrease while others simply decrease. The solubility of the same metal in a different lysimeter would be affected by the individual conditions of that lysimeter.

Another leaching mechanism that may produce different leaching curves is channeling. Fluid may travel through certain paths and then find its way into other areas causing the "bump" produced in the leaching curves of lead and iron. A chemical parameter may also have caused those two metals to react in that manner.

4.4.2.2 Leaching Comparisons

The concentrations of metals leached from the TCLP correlated with the total metal concentrations for zinc, copper, and lead. The correlation coefficient for this relationship for zinc, copper, and lead were 0.89, 0.93, and 0.82 respectively (Figures 4-20 through 4-22). Samples which leached, but were below the total metal detection limit, were assumed half of the limit (for copper and lead only).

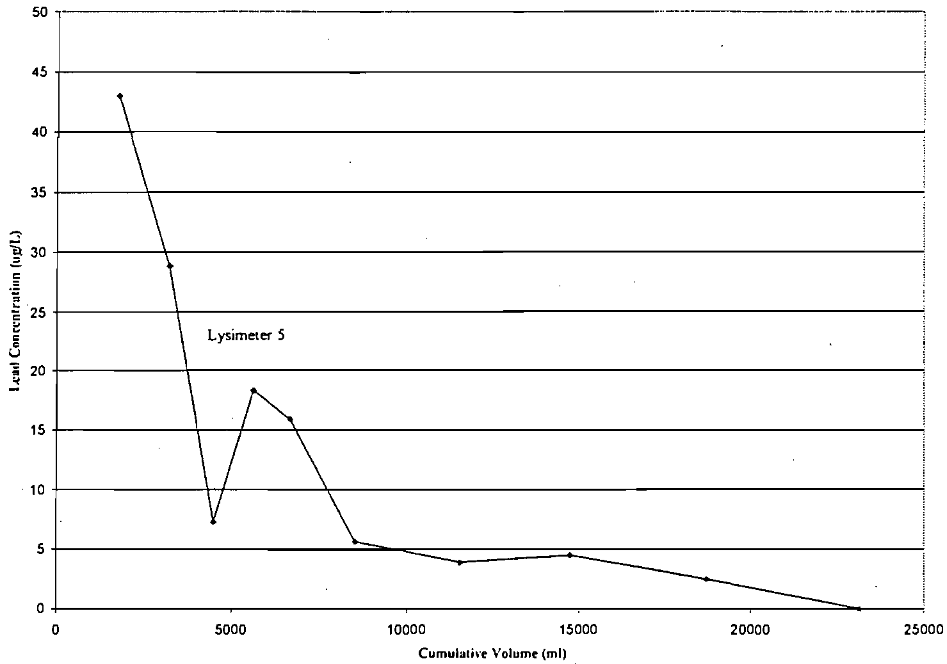

Figure 4-18. Lead Leaching from Lysimeter 5.

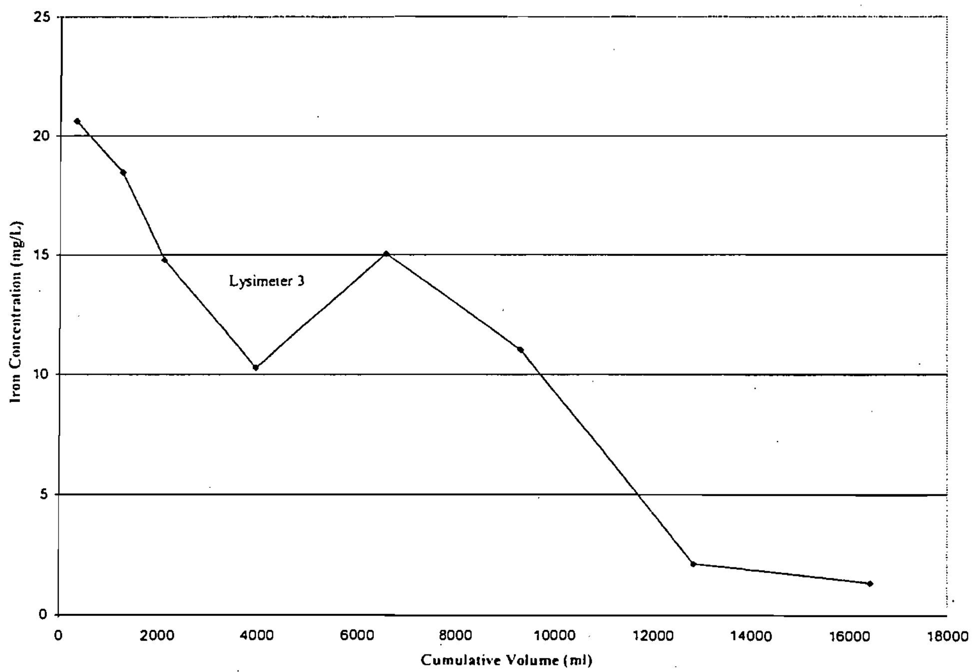

Figure 4-19. Iron Leaching from Lysimeter 3.

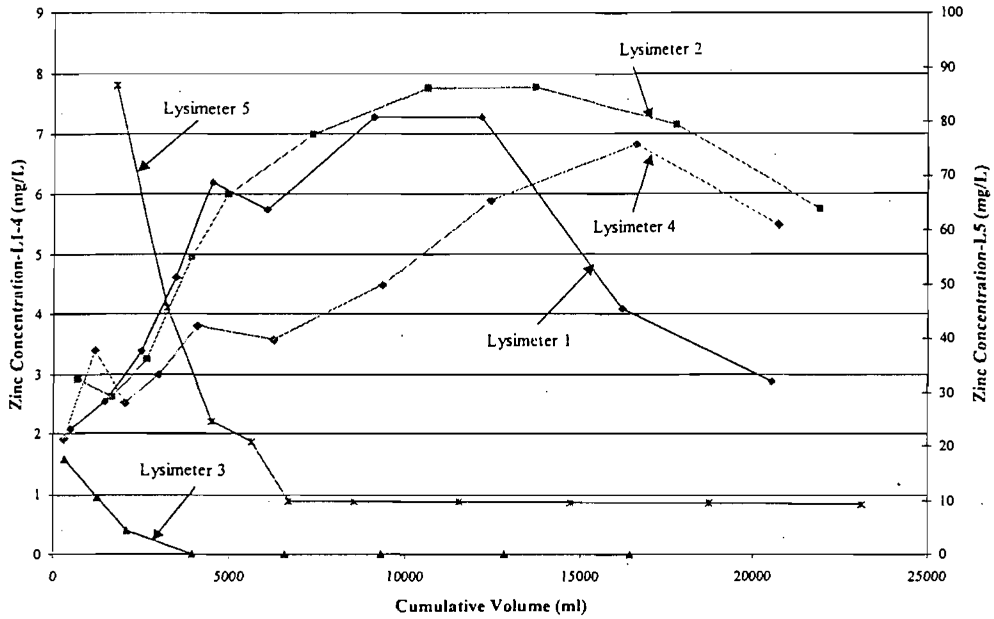

Figure 4-16. Zinc Leaching from Lysimeters.

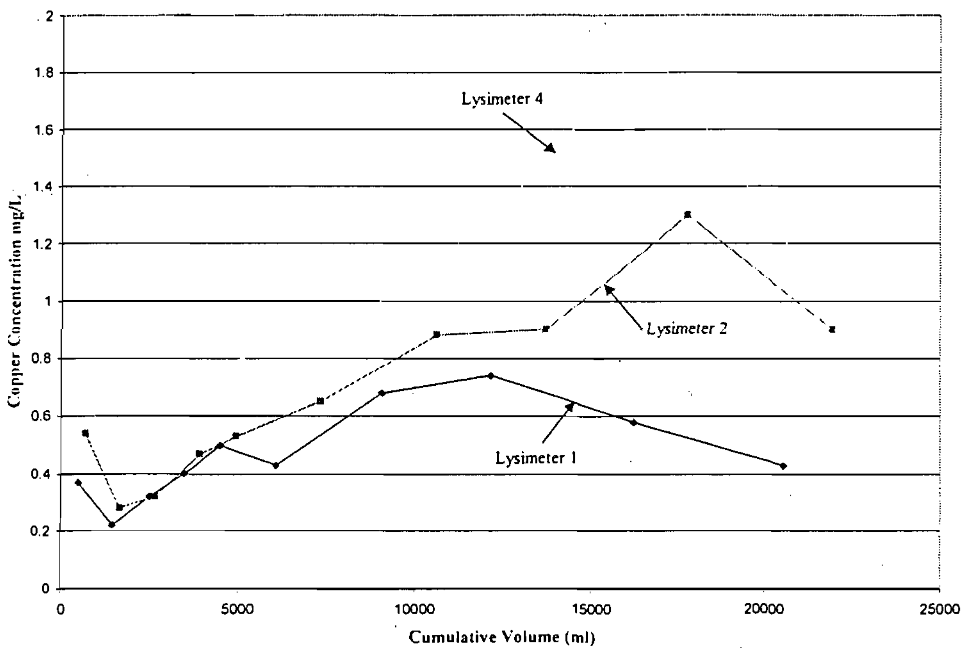

Figure 4-17. Copper Leaching from Lysimeters.

Table 4-23. Heavy Metals found in Lysimeter Leachate (mg/L).

	L1	L2	L3	L4	L5	L6	L7	L8
No. Detected	0	0	2	0	7	0	0	0
Max Cadmium	N/A	N/A	.011	N/A	.004	N/A	N/A	N/A
Min Cadmium	N/A	N/A	<.001	N/A	<.001	N/A	N/A	N/A
No. Detected	1	1	2	3	2	2	2	1
Max Chromium	.034	.027	.082	.107	.005	.035	.042	.013
Min Chromium	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
No. Detected	10	10	0	10	0	0	0	0
Max Copper	0.74	1.3	N/A	1.9	N/A	N/A	N/A	N/A
Min Copper	0.22	0.28	N/A	0.44	N/A	N/A	N/A	N/A
No. Detected	6	6	8	4	7	8	6	6
Max Iron	0.59	0.69	20.61	1.27	0.95	1.35	1.23	0.27
Min Iron	<0.01	<0.01	1.34	<0.01	<0.01	<0.01	<0.01	<0.01
No. Detected	3	1	1	2	9	1	1	0
Max Lead	.011	.005	.028	.023	.043	.002	.001	N/A
Min Lead	0.001	0.001	0.001	0.001	0.000	0.001	0.001	N/A
No. Detected	0	0	0	1	1	1	0	0
Max Nickel	N/A	N/A	N/A	0.16	0.12	0.18	N/A	N/A
Min Nickel	N/A	N/A	N/A	0.01	0.01	0.01	N/A	N/A
No. Detected	10	10	3	10	10	0	0	0
Max Zinc	7.29	7.77	1.59	6.82	86.79	N/A	N/A	N/A
Min Zinc	2.09	2.62	0.01	1.93	9.35	N/A	N/A	N/A

The metals that expressed leaching curves in various lysimeters were zinc, copper, lead, and iron. Figures 4-16 through 4-19 present the leaching curves for these metals from their respective lysimeters.

Table 4-22. Solids Balance for Ions and TDS (g).

	LYS 1	LYS 2	LYS 3	LYS 4	LYS 5	LYS 6	LYS 7	LYS 8
Sulfate	0.64	0.57	0.81	1.33	0.18	0.50	0.49	0.08
Nitrate	0.23	0.18	0.14	0.39	0.09	0.16	0.15	0.14
Chloride	0.48	0.44	0.10	0.68	0.10	0.12	0.06	0.05
Fluoride	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.00
Carbonate	3.73	3.74	2.63	3.46	1.52	0.01	0	0
Calcium	1.53	1.56	1.42	1.47	0.93	0.27	0.21	0.05
Potassium	0.09	0.08	0.08	0.18	0.02	0.02	0.01	0.00
Magnesium	0.76	0.73	0.25	0.95	0.07	0.07	0.02	0.00
Sodium	0.25	0.21	0.11	0.69	0.04	0.09	0.01	0.00
Ion Sum	7.73	7.52	5.55	9.16	2.97	1.24	0.95	0.33
TDS	9.45	8.77	8.26	10.38	5.65	1.71	1.16	0.99

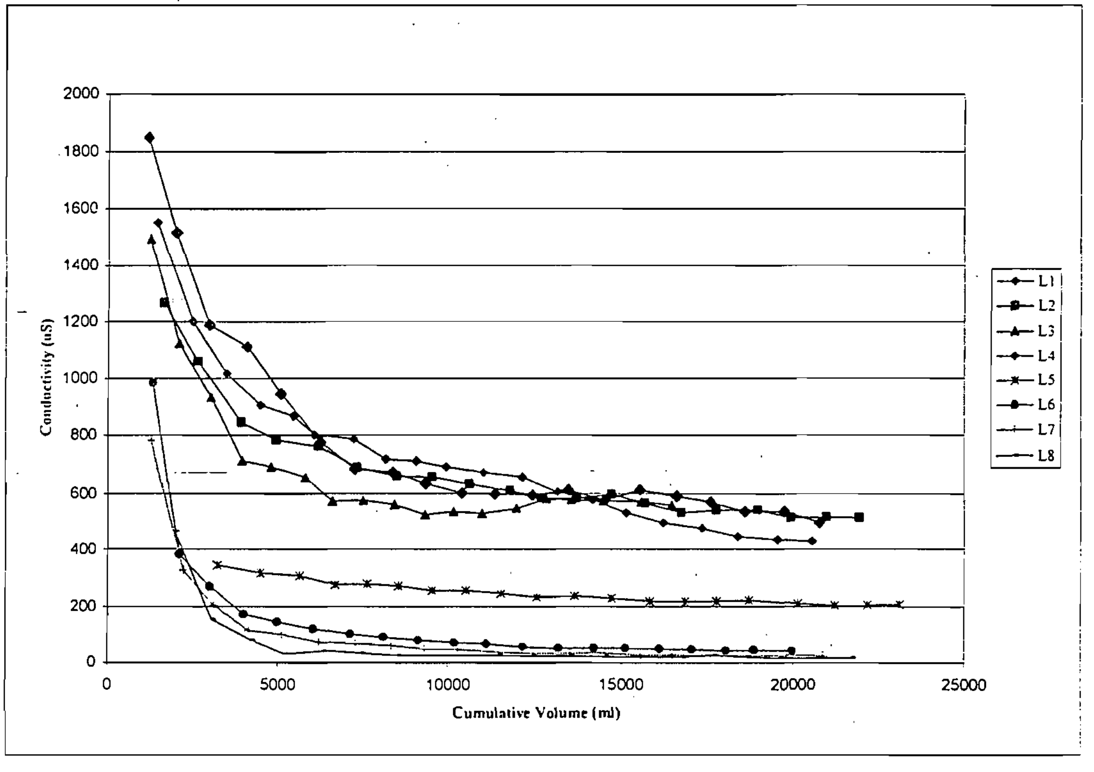

Figure 4-15. Conductivity

4.4.1.2.2 Heavy Metals

Many of the general water quality parameters and ions followed a similar leaching curve. Leachate samples were analyzed for typical metals found in waste ABM (Chapter 2 and 3) to see if similar leaching curves were formed by the leaching of heavy metals from this waste stream. Metal samples were collected 10 times (except lysimeter 3, 8 times) during the 6 week study. Table 4-23 presents the number of detected samples out of 10 (8 for L3) for each metal.

Conductivity and TDS are related. The more total dissolved solids, the more ions available to produce conductance. Table 4-20 shows some relationship between them, and this was further investigated. The ions contribute to the TDS and conductivity and Table 4-21 contains all of the ions analyzed for as well as their ranges and averages. As mentioned earlier, a relationship exists between conductivity, ions, and TDS. Table 4-22 is a "solids balance" for the total amount of ions leached and the total TDS leached for each lysimeter. The sums matched up relatively well in most cases, with all ion sums slightly lower. Differences may be explained by organic matter (Lys 3) and other non-detected ions. Figure 4-15 presents the leaching curve for conductivity. TDS and the inorganic ions followed this same trend.

Table 4-21. Ions Found in Lysimeter Leachate (mg/L).

	L1	L2	L3	L4	L5	L6	L7	L8
No. Collected	20	20	20	20	20	20	20	20
Avg. Sulfate	32.3	26.9	49.8	67.0	8.2	26.6	25.4	4.0
Max	129.2	115.7	275.4	195.2	14.5	107.2	108.1	10.6
Min	15.9	5.9	9.3	31.1	5.4	3.9	8.8	2.9
Avg. Nitrate	11.9	8.7	8.5	21.4	3.9	9.6	8.3	6.8
Max	109.6	84.9	107.3	285.5	30.1	111.6	90.8	43.1
Min	3.6	2.5	2.0	2.0	2.1	2.2	2.7	3.0
Avg. Chloride	24.3	21.1	6.5	35.7	4.4	6.2	3.0	2.5
Max	129.8	113.7	28.4	159.9	10.6	26.7	5.0	3.2
Min	9.0	4.9	2.8	7.8	2.9	2.7	2.5	0.0
Avg. Fluoride	1.2	1.1	1.0	0.9	1.0	0.7	0.4	0.0
Max	1.6	1.4	1.3	1.0	1.1	1.0	0.8	0.0
Min	1.0	0.9	0.8	0.7	0.8	0.5	0.0	0.0
Avg. Calcium	76.4	73.7	84.5	71.8	43.5	14.0	10.8	2.5
Max	104.8	96.1	122.0	97.1	55.1	44.7	48.3	11.3
Min	58.2	48.6	53.4	50.0	34.9	4.2	0.0	0.0
Avg. Potassium	4.6	3.6	4.9	9.1	1.1	1.1	0.3	0.0
Max	14.9	11.3	12.8	20.3	2.7	3.1	1.2	0.1
Min	1.7	1.7	2.6	3.7	0.5	0.6	0.0	0.0
Avg. Magnesium	39.1	34.0	14.3	46.9	3.1	3.8	1.0	0.0
Max	87.2	77.8	48.3	92.5	6.8	21.9	8.5	0.2
Min	14.7	16.0	4.5	22.7	0.0	0.4	0.0	0.0
Avg. Sodium	12.6	10.0	5.7	35.8	1.8	4.7	0.3	0.2
Max	105.1	75.1	31.0	172.4	7.9	21.2	1.7	0.5
Min	1.9	2.1	0.2	3.1	0.1	0.7	0.0	0.0

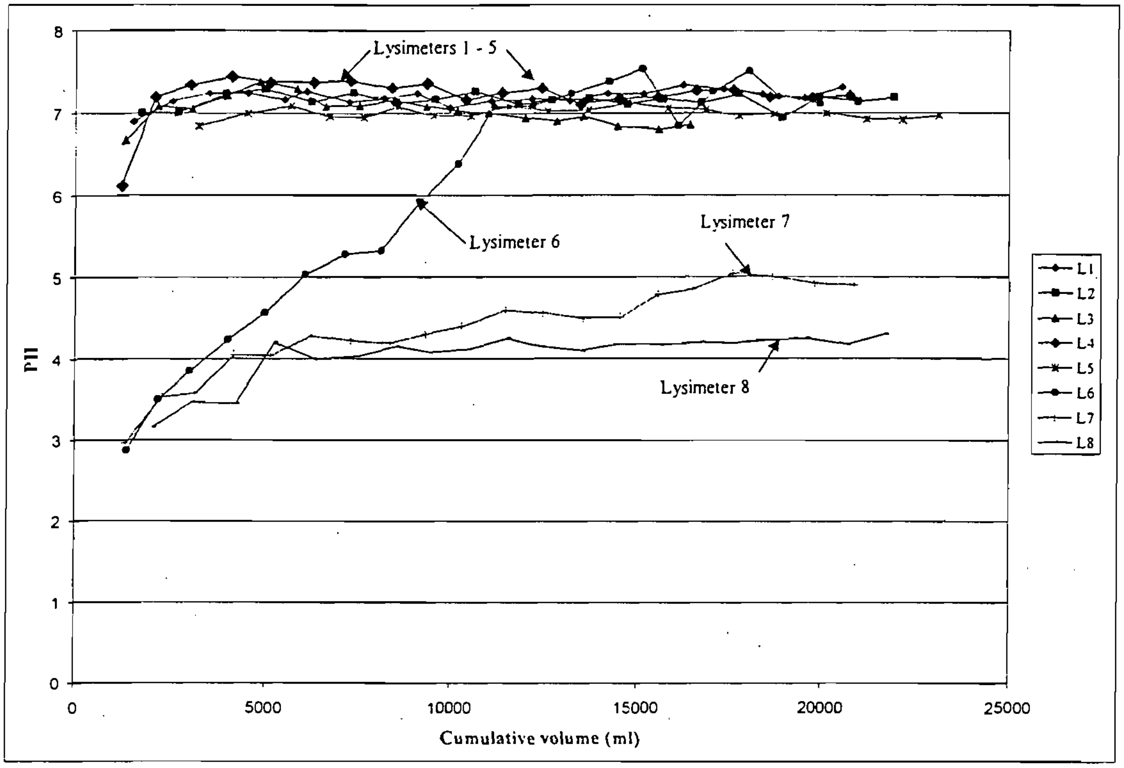

Figure 4-13. Lysimeter pH graph.

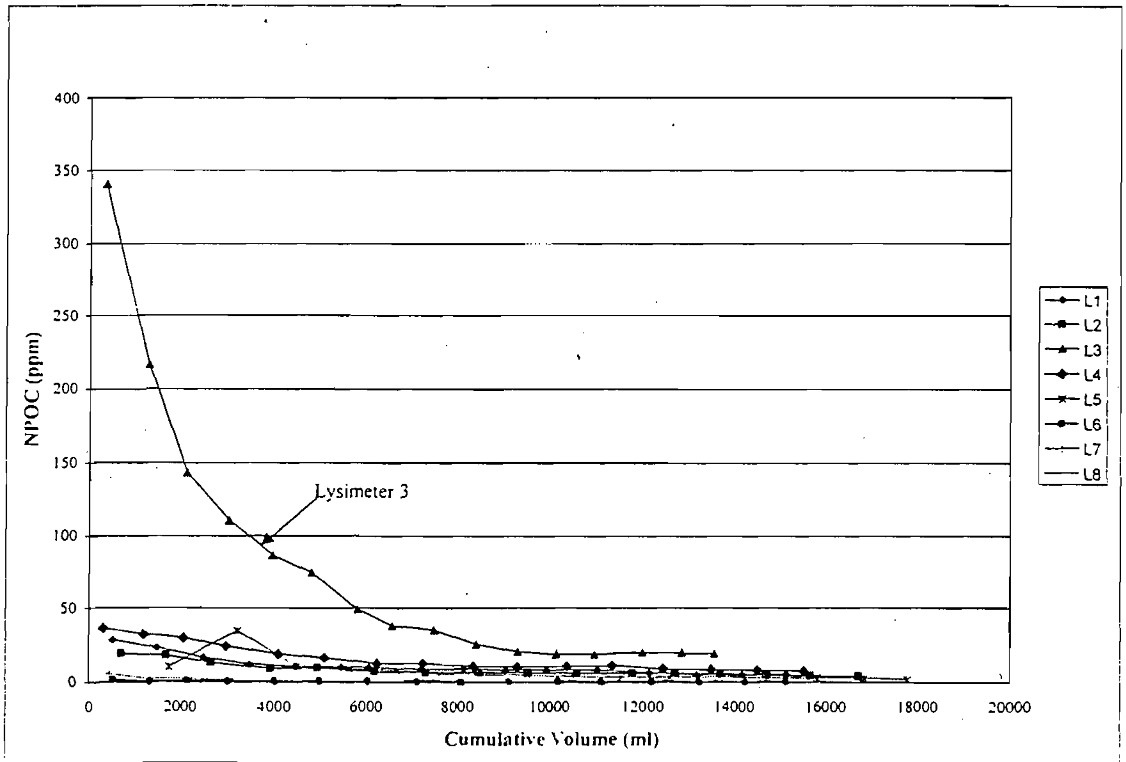

Figure 4-14. Nonpurgeable Organic Carbon

Table 4-20. General Water Quality Parameters for Lysimeters

	L1	L2	L3	L4	L5	L6	L7	L8
No. Collected	20	20	20	20	20	20	20	20
Avg. DO[1]	6.61	6.11	2.67	6.39	4.65	6.88	8.56	8.50
Max	8.03	7.07	6.05	7.5	5.63	8.54	9.08	8.8
Min	4.67	4.86	1.5	5.31	3.27	4.54	8.00	7.9
Avg. ORP	481.3	480.6	181.4	464.5	539.6	563.5	599.0	614.8
Max	548	54[illegible]	568	577	588	615	649	658
Min	227	226	-133	194	400	430	507	558
Avg. pH	7.20	7.15	7.03	7.22	7.00	5.96	4.36	4.04
Max	7.35	7.29	7.38	7.44	7.12	7.54	5.04	4.30
Min	6.90	6.94	6.67	6.12	6.84	2.88	2.97	3.16
Avg.TDS[1]	476	404	513	518	238	91	61	48
Max	980	980	1830	1340	1320	400	360	180
Min	160	120	280	280	60	0	0	0
Avg. Conduct.[2]	729	672	685	785	248	146	106	55
Max	1551	1265	1494	1850	344	985	782	464
Min	428	512	525	494	205	41	23	16
Avg. NPOC[1]	9.81	6.0	50	11	5.0	0	1	0
Max	23.1	18.0	341	32.5	34.7	0.999	2.44	1.26
Min	5.19	4.05	18.9	7.75	2.13	0.06	0.124	0
Avg. Alk.[3]	321	291	273	280	118	1	0	0
Max	449	375	320	370	131	3	0	0
Min	210	250	2[illegible]6	230	106	1	0	0

[1]Units in mg/L

[2]Units in uS

[3]Units in mg/L as $CaCO_3$

Table 4-19. SPLP Metal Concentration for each Comp. Sample (mg/L).

Metal	L1	L2	L3	L4	L5	L6	L7
As	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cd	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cr	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
Cu	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Fe	0.42	0.68	0.70	0.50	0.41	0.61	0.44
Pb	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Ni	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
Hg	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
Se	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Zn	1.68	2.63	0.25	1.07	1.81	<0.100	<0.100

4.4.1.2 Lysimeter Leachate Analyses

The first characteristics of interest for the lysimeters were the general parameters. These parameters can provide some idea of what kind of processes are occurring inside the lysimeters and the types of conditions the waste was exposed to.

4.4.1.2.1 General Water Quality Parameters

Table 4-20 contains the number of readings, the ranges observed, and the averages for many general water quality parameters. Some of the parameters (pH, Conductivity, and NPOC) expressed trends that will be examined further. pH is an important parameter that can affect the leachability of many substances as well as metal speciation. Figure 4-13 is the plot of pH for the lysimeters. The pH curves reflected the degree of buffering capacity of the waste. Buffer capacity is the ability of a substance to resist pH change with the addition of a strong acid or base. Carbonate species were believed to be responsible for the majority of the buffering capacity.

The primary buffer encountered in waste materials and soil is carbonate alkalinity. pH buffers include metal ions, oxidation reduction potential buffers (Snoeyink and Jenkins). Lysimeters 1 through 5 had some buffering capacity as they brought the pH of the fluid up to approximately 7. Lysimeter 6 (raw coal slag) also had buffering capacity, but expressed it at a slower rate. Lysimeter 7 (raw silica sand) had a small amount of buffering capacity and was expressed late in the test. As expected, the SPLP fluid did not change pH in the control lysimeter.

The dissolved oxygen (DO) level may indicate whether biological reactions occur in the lysimeters. From the Table 4-20 DO data, Lysimeter 3 was the only lysimeter with some potential biological activity. This data is confirmed by the nonpurgeable organic carbon data. There was little organic carbon in these lysimeters except for lysimeter 3. The graph of the nonpurgeable organic carbon follows a typical leaching curve for lysimeter 3 (Figure 4-14).

media (Lysimeter 6) compared to the used media, indicated that some of the metals (As, Cr, Ni) were inherent to the media and other metals (Cu, Zn, Pb) came from the blasting residuals. The sandblasting contractor samples (Lysimeters 3 and 5) were similar, except lysimeter 3 had more iron and lysimeter 5 had more zinc. The unused silica sand media contained no metals above detection limits except for a small amount of mercury and some iron.

Table 4-17. Total Metal Concentration for each Comp. Sample (mg/Kg).

Metal	L1	L2	L3	L4	L5	L6	L7
As	1.99	2.38	0.1	1.92	<0.5	2.36	<0.5
Cd	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Cr	98.57	114.5	49.0	133.6	48.10	265.2	<5
Cu	1,910	1,125	<25	3,336	<25	28.10	<25
Fe	80,810	72,500	3,164	62,682	2,080	74,571	168.95
Pb	26.67	23.0	37.0	67.27	<20	<20	<20
Ni	59.05	68.5	12.0	56.36	12.38	129.52	<5
Hg	.004	.004	.002	.001	.002	.003	.001
Se	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Zn	1,464	1,523	104.5	1,623	1,145	98.62	<5

The leaching concentrations of the samples varied, indicating that complex leaching mechanisms are involved in the batch processes. Lysimeters 1 and 2 duplicated well for some metals (Zn, Cu), but not as well for others (Fe). For TCLP tests, Lysimeter 4 leached the most copper and lead, lysimeter 6 leached the most iron and nickel, and lysimeter 5 leached the most zinc. For the SPLP results, lysimeter 3 leached the most iron and lysimeter 5 leached the most zinc.

Table 4-18. TCLP Metal Concentration for each Comp. Sample (mg/L).

Metal	L1	L2	L3	L4	L5	L6	L7
As	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cd	0.004	0.004	0.015	0.004	0.001	<0.001	<0.001
Cr	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
Cu	17.5	20.0	<0.5	27.9	<0.5	<0.5	<0.5
Fe	5.58	1.54	4.97	1.47	<0.1	21.13	<0.1
Pb	0.103	0.080	0.062	0.171	0.084	<0.010	<0.010
Ni	<0.100	<0.100	<0.100	<0.100	<0.100	0.280	<0.100
Hg	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
Se	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Zn	62.6	57.9	26.4	58.8	81.0	0.100	<0.100

Table 4-16. Potential Concerns with Sandblasting Contractor Waste ABM

Metal	Direct Exposure Residential	Direct Exposure Industrial	Groundwater-Leaching
Arsenic	No	No	No
Cadmium	No	No	Possibly
Chromium	No	No	No
Copper	No	No	No
Iron	No	No	Yes
Lead	No	No	No
Nickel	No	No	No
Selenium	No	No	No
Zinc	No	No	Yes

SPLP results that exceed a GWGC standard would require generators to dispose of this waste in lined landfills. For the case of general contractor waste ABM, with the exception of one sample for cadmium, only secondary standards were violated (iron and zinc). The applicability of secondary standards to the leaching of wastes has not been fully explored. Local regulatory officials should be consulted when considering management options for waste that may leach secondary standard compounds. As a conservative management practice, waste ABM should be stored in a manner to minimize leachate production.. Disposing of spent silica sand ABM on-site, a relatively common practice does not likely present a direct exposure risk, but may present a risk to groundwater from leaching of secondary standards. Recycling, or disposal in unlined landfills, should be considered as more acceptable management options.0

4.4 RESULTS AND DISCUSSION OF LYSIMETER EXPERIMENT

4.4.1 Results

A number of analyses were conducted for each composite sample. The results included a total metal analysis, batch-leaching study, and the six-week simulated leaching process. The total metal analysis and batch leaching study were performed on the composite sub-samples taken when the lysimeters were filled.

4.4.1.1 Composite Sample Analyses

The batch tests included both the SPLP and TCLP test. The sample taken from each site was non-hazardous for the 8 metals in 40 CFR 261 (arsenic, barium, cadmium, chromium, lead, mercury, silver, and selenium). The TCLP extract was also tested for copper, iron, nickel, and zinc. The SPLP extract analyses included the same metals, except for silver. Tables 4-17 through 4-19 are a summary of each lysimeter batch characteristics including total metal concentration, TCLP and SPLP leaching.

The total metals discovered in the lysimeters samples were common metals that are found in paint and coal slag media. Lysimeters 1, 2, and 4 have similar characteristics because they are all ship maintenance used coal slag media. The similar characteristics of the unused coal slag

Table 4-14. Summary Total Metal Limits and Comparative Results.

	As	Cd	Cr	Cu	Fe	Pb	Ni	Se	Zn
Res. SCG (mg/kg)	0.8	75	290	105	23,000	500	105	390	23,000
Ind. SCG (mg/kg)	3.7	1300	430	12,000	490,000	920	28,000	9,100	560,000
No. Res.	0	0	0	0	0	0	0	0	0
No. Ind.	0	0	0	0	0	0	0	0	0

4.3.2.3 Risk to Groundwater

The drinking water standards adopted as groundwater guidance concentrations are regulations that can be enforced by federal and state agencies. In this study, one sample out of 15 exceeded a primary drinking water standard. The sample exceeded the 0.005 mg/L limit for cadmium at 0.009 mg/L. Both the arithmetic and geometric mean of the cadmium data were under the primary standard. One metal exceeded secondary drinking water limits in other samples. Seven samples exceeded the 0.3 mg/L limit for iron. The arithmetic mean for iron exceeded the secondary standards by .01 mg/L, however the geometric mean did not exceed the standard. The distribution of iron appeared normally distributed and therefore the arithmetic mean would likely be used.

Table 4-15. Summary of Leaching Limits and Comparative Results.

	As	Cd	Cr	Cu	Fe	Pb	Ni	Se	Zn
GWGC (mg/L)	.05	.005	0.1	1.0	0.3	0.015	0.1	.05	5.0
No. above GWGC (out of 15)	0*	1	0	0	7	0	0	0*	0

*Out of 3

4.3.2.4 Correlation of Data

A correlation of total metal amounts and leachability was performed on the individual samples above the detection limits. There was little correlation observed between the leachable and total metals concentrations (correlation coefficient <0.1). The range of percent leaching (of total metal concentration) was 0.7-13.4% for zinc. The range for percent leaching of iron was <6.3%-53.5%.

4.3.2.5 Implication for Management

Sandblasting contractor waste was non-hazardous for the sites characterized in this study. The sites sampled for this research blasted various equipments from scaffolding to heavy machinery. The concentration of heavy metals in the sandblast grit did not pose direct threat to human health when compared to state and risk-based standards. This waste could be land applied if it would not potentially contaminate the ground water at the site. Table 4-16 summarizes the main concerns with sandblasting contractor waste ABM.

4.3.1.3 Leachable Metal Content

The SPLP test was performed on all samples collected to assess the potential impact of the waste on groundwater. Table 4-13 lists the leachable metal content of the ABM samples for the SPLP test.

Table 4-13. Leachable Metal Content in Waste ABM (mg/L).

	As[2]	Cd	Cr	Cu	Fe	Pb	Ni	Se[2]	Zn
No. of Samples	3	15	15	15	15	15	15	3	15
Detection Limit	0.010	0.001	0.100	0.200	0.100	0.010	0.100	0.010	0.100
% Detects	0%	12.5%	0%	0%	94%	0%	0%	0%	40%
Minimum	N/A	<.001	N/A	N/A	<0.1	N/A	N/A	N/A	<0.10
Maximum	N/A	.009	N/A	N/A	1.14	N/A	N/A	N/A	2.56
Geo. Mean[1]	N/A	.001	N/A	N/A	0.25	N/A	N/A	N/A	0.18
Geo. Std. Dev.	N/A	.002	N/A	N/A	0.14	N/A	N/A	N/A	0.63
Arith. Mean[1]	N/A	.002	N/A	N/A	0.31	N/A	N/A	N/A	0.67
Arith. Stnd. Dev.	N/A	.002	N/A	N/A	0.18	N/A	N/A	N/A	0.93

[1]Calculated by using ½ the detection limit for undetected samples
[2]Analysis on composite sample from each site

4.3.2 Discussion

4.3.2.1 Hazardous Characteristic

Waste ABM is not a listed hazardous waste and does not normally exhibit the characteristics of corrosivity, reactivity, and ignitability. The hazardous waste characteristic that ABM may possess is toxicity. The TCLP test was used to test for this characteristic. The composite sample from each site resulted in calculations below the TCLP limits for the eight heavy metals listed in 40 CFR 261. These results show that the samples collected were not hazardous for the toxicity characteristic.

4.3.2.2 Direct Human Exposure

The total metal concentrations of the general contractor waste ABM samples were compared to the Florida Soil Cleanup Target Levels. As discussed previously, these goals are tools for assessing the risk of a soil or soil-like material in the enviroment. None of the samples exceeded the residential or industrial limits of the Florida Soil Cleanup Goals.

None of the samples exceeded the residential or industrial limits of the Florida SCTLs. Theses sites are in industrial areas and typically the industrial goals would apply. Many states may have similar or stricter guidelines, and all local regulations apply to the management of this waste. Table 4-14 summarizes the total metal results data.

Table A-2 continued.

TOTAL	METALS	Sample wt.	Lead	Copper	Chromium	Zinc	Cadmium	Nickel	Iron
LYS1		2.10	26.7	1909.5	98.6	1463.8	<2.5	59.0	80809.5
LYS2		2.00	23.0	1125.0	114.5	1522.5	<2.5	68.5	72500.0
LYS3		2.00	37.0	<25	49.0	104.5	<2.5	12.0	3163.5
LYS4		2.20	67.3	3336.4	133.6	1622.7	<2.5	56.4	62681.8
LYS5		2.10	<25	<25	48.1	1145.2	<2.5	12.4	2080.5
BB Comp		2.10	<25	28.1	265.2	98.6	<2.5	129.5	74571.4
SS Comp		1.90	<25	<25	<5	<5	<2.5	<5	168.9
SBB2MS		1.884		812.1		810.0			3220.0
SBB2MSD		1.9061		802.7		797.4			3339.7

Table A-3. Data for Total Metal-Furnace

SAMPLE ID	Sample Wt. (g)	Arsenic (mg/kg)	Selenium (mg/kg)	SAMPLE ID	Sample Wt. (g)	Arsenic (mg/kg)	Selenium (mg/kg)
MSBLANK	mg/L	0.128	0.075	GCA1	2.02	<.05	<0.5
SBA1	2.00	0.25	<0.5	GCA2	2.03	<.05	<0.5
SBA2	2.02	0.30	<0.5	GCA3	2.01	<.05	<0.5
SBA2D	2.00	0.35	<0.5	GCA4	1.99	<.05	<0.5
SBA3	2.04	4.64	<0.5	GCA5	2.00	<.05	<0.5
SBA4	2.04	0.95	<0.5	GCA6	2.01	0.07	<0.5
A4D	2.04	2.24	<0.5	GCB1	2.00	<.05	<0.5
SBA5	2.04	3.23	<0.5	GCB2	2.04	0.08	<0.5
SBA6	2.05	1.97	<0.5	GCB3	2.01	0.08	<0.5
SBB1	2.03	0.09	<0.5	GCB4	2.00	0.06	<0.5
SBB2	2.01	3.27	<0.5	BLANK		<.05	<0.5
SBB2D	2.00	2.03	<0.5	GCC1	2.00	0.17	<0.5
SBB3	2.00	2.18	<0.5	GCC2	2.01	<.05	<0.5
SBB4	2.00	1.96	<0.5	GCC3	2.01	0.14	<0.5
SBB5	2.03	3.88	<0.5	GCC4	2.00	0.07	<0.5
SBB6	2.00	2.36	<0.5	GCC5	2.00	0.10	<0.5
SBC1	2.03	2.15	<0.5	LYS1	2.02	1.99	<0.5
SBC2	2.03	3.27	<0.5	LYS2	2.01	2.38	<0.5
SBC3	2.01	2.97	<0.5	LYS3	2.01	0.10	<0.5
SBC4	2.01	0.25	<0.5	LYS4	2.04	1.92	<0.5
SBC5	2.03	2.41	<0.5	LYS5	2.04	<.05	<0.5
SBC6	2.01	0.31	<0.5	LYS6	2.00	2.36	<0.5
SBC7	2.02	0.46	<0.5	LYS7	2.00	<.05	<0.5
SBC8	2.00	0.27	<0.5	LYS6MS	2.00	5.25	4.23
				LYS6MSD	2.00	4.93	3.92

Table A-4. Mercury Total Metal and Leaching Data

Sample ID	Sample Wt (g)	Tot Met mg/kg	TCLP (mg/L)	SPLP (mg/L)
LYS1	2.1	0.0041	<.0001	<.0001
LYS2	2.0	0.0043	<.0001	<.0001
LYS3	2.2	0.0019	<.0001	<.0001
LYS4	2.0	0.0011	<.0001	<.0001
LYS5	2.0	0.0020	<.0001	<.0001
LYS6	2.0	0.0027	<.0001	<.0001
LYS7	2.0	0.0012	<.0001	<.0001
MS1	2.09	0.433	<.0001	<.0001
MS2	2.05	0.417	<.0083	<.0066

Table A-5. SPLP Data

SAMPLE ID		Lead	Copper	Chromium	Zinc	Nickel	Cadmium	Iron	Arsenic	Selenium
		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
MSBLANK	Matrix Spike	1.1	1.36	1.03	1.014	0.85	0.8	1.21	-	-
SBB3		0.01	1.48	<0.1	3.319	<0.1	<.001	<0.1	-	-
SBB3MS	Matrix Spike	1.2	2.73	1.05	4.105	0.9	0.85	1.12	-	-
SBB3D		<0.01	1.56	<0.1	3.318	<0.1	0.001	<0.1	-	-
SBB3DMS	Matrix Spike - Dup	1.325	2.7	1.04	3.969	0.88	0.75	1.33	-	-
GCA5		<0.01	<0.2	<0.1	2.001	<0.1	<.001	1.14	-	-
GCA5MS	Matrix Spike	1.15	1.06	1.07	3.008	0.84	0.8	2.02	-	-
GCA5D		<0.01	<0.2	<0.1	2.566	<0.1	<.001	0.36	-	-
GCA5DMS	Matrix Spike - Dup	1.1	1.05	1.08	3.282	0.79	0.85	1.51	-	-
SBA1		<.010	2.66	<0.1	8.19	<0.1	0.001	<0.1	-	-
SBA2		0.01	0.65	<0.1	11.4	<0.1	0.001	0.66	-	-
SBA2D	Field Dup	<.010	0.28	<0.1	19.2	<0.1	0.001	0.2	-	-
SBA3		0.014	0.3	<0.1	19.38	<0.1	0.002	0.71	-	-
SBA4		<.010	0.5	<0.1	3.476	<0.1	0.001	0.18	-	-
SBA4D	Field Dup	<.010	0.29	<0.1	0.939	<0.1	<.001	0.35	-	-
SBA5		<.010	0.48	<0.1	10.78	<0.1	0.001	0.23	-	-
SBA6		<.010	2.05	<0.1	10.54	<0.1	0.001	<0.1	-	-
SBB1		<.010	0.47	<0.1	2.399	<0.1	0.001	<0.1	-	-
SBB4		<.010	0.53	<0.1	3.071	<0.1	<.001	0.47	-	-
SBB5		<.010	2.91	<0.1	22.54	<0.1	0.002	<0.1	-	-
SBB6		<.010	0.44	<0.1	16.02	<0.1	0.001	<0.1	-	-
SBC1		<.010	0.91	<0.1	3.634	<0.1	0.001	0.43	-	-
SBC2		<.010	2.28	<0.1	11.64	<0.1	<.001	0.1	-	-
SBC3		0.041	0.21	<0.1	3.296	<0.1	0.001	<0.1	-	-

Table A-5 continued

SAMPLE ID		Lead	Copper	Chromium	Zinc	Nickel	Cadmium	Iron	Arsenic	Selenium
SBC4		<.010	1.25	<0.1	3.034	<0.1	0.002	0.47	-	-
SBC5		0.011	0.88	<0.1	2.111	<0.1	0.001	0.27	-	-
SBC6		0.011	<0.2	<0.1	0.807	<0.1	<.001	0.32	-	-
SBC7		<.010	0.32	<0.1	26.975	<0.1	0.002	0.24	-	-
SBC8		<.010	1.37	<0.1	10.2	<0.1	0.001	<0.1	-	-
GCA1		<.010	<0.2	<0.1	1.475	<0.1	<.001	0.3	-	-
GCA2		<.010	<0.2	<0.1	2.297	<0.1	<.001	0.45	-	-
GCA3		<.010	<0.2	<0.1	2.191	<0.1	<.001	<0.1	-	-
GCA4		<.010	<0.2	<0.1	2.22	<0.1	<.001	0.23	-	-
GCA6		<.010	<0.2	<0.1	1.709	<0.1	<.001	0.18	-	-
GCB1		<.010	<0.2	<0.1	<0.1	<0.1	0.001	0.3	-	-
GCB2		<.010	<0.2	<0.1	<0.1	<0.1	<.001	0.59	-	-
GCB3		<.010	<0.2	<0.1	<0.1	<0.1	<.001	0.35	-	-
GCB4		<.010	<0.2	<0.1	0.385	<0.1	0.009	0.58	-	-
BLANK		<.010	<0.5	<0.1	<0.1	<0.1	<.001	0.13	-	-
BLANK		<.010	<0.5	<0.1	<0.1	<0.1	<.001	<0.1	-	-
GCC1		<0.010	<0.5	<0.1	<0.10	<0.1	<.001	0.51	-	-
GCC2		<0.010	<0.5	<0.1	<0.10	<0.1	<.001	0.14	-	-
GCC3		<0.010	<0.5	<0.1	<0.10	<0.1	<.001	0.34	-	-
GCC4		<0.010	<0.5	<0.1	<0.10	<0.1	<.001	0.5	-	-
GCC5		<0.010	<0.5	<0.1	<0.10	<0.1	<.001	0.24	-	-
LYS1		<0.010	<0.5	<0.1	1.68	<0.1	<.001	0.42	<.010	<.010
LYS2		<0.010	<0.5	<0.1	2.63	<0.1	<.001	0.68	<.010	<.010
LYS3		<0.010	<0.5	<0.1	0.25	<0.1	<.001	0.7	<.010	<.010
LYS4		<0.010	<0.5	<0.1	1.07	<0.1	<.001	0.5	<.010	<.010
LYS5		<0.010	<0.5	<0.1	1.81	<0.1	<.001	0.41	<.010	<.010
BB Comp		<0.010	<0.5	<0.1	<0.10	<0.1	<.001	0.61	<.010	<.010
SS Comp		<0.010	<0.5	<0.1	<0.10	<0.1	<.001	0.44	<.010	<.010
GCC		<0.010	<0.5	<0.1	<0.10	<0.1	<.001	0.85	<.010	<.010
SBC		<0.010	<0.5	0.11	1.35	<0.1	<.001	0.97	<.010	<.010

Table A-6. TCLP Data

	Copper	Zinc	Chromium	Barium	Nickel	Lead	Cadmium	Silver	Iron	Arsenic	Selenium
Sample ID	mg/L	mg/L	mg/L	Mg/L	mg/L	ug/L	ug/L	mg/L	mg/L	mg/L	mg/L
lys 1	17.5	62.55	<0.1	<10	<0.1	103	3.716	<0.1	5.58	<.010	<.010
lys 2	20	57.89	<0.1	<10	<0.1	79.85	3.712	<0.1	1.54	<.010	<.010
lys 3	<0.50	2.64	<0.1	<10	<0.1	61.88	15.28	<0.1	4.97	<.010	<.010
lys 4	27.9	58.84	<0.1	<10	<0.1	171.1	3.668	<0.1	1.47	<.010	<.010
lys 5	<0.50	32.38	<0.1	<10	<0.1	83.72	1.467	<0.1	<0.1	<.010	<.010
lys 6	<0.50	0.1	<0.1	<10	0.28	<.010	<.001	<0.1	21.1	<.010	<.010
lys 7	<0.50	<0.1	<0.1	<10	<0.1	<.010	<.001	<0.1	<0.1	<.010	<.010
GCC	<0.50	0.548	0.13	<10	<0.1	20.37	9.5	<0.1	0.24	<.010	<.010
SBC	11.7	76.91	<0.1	<10	<0.1	154.9	4.63	<0.1	2.85	<.010	<.010

APPENDIX B

Lysimeter Data

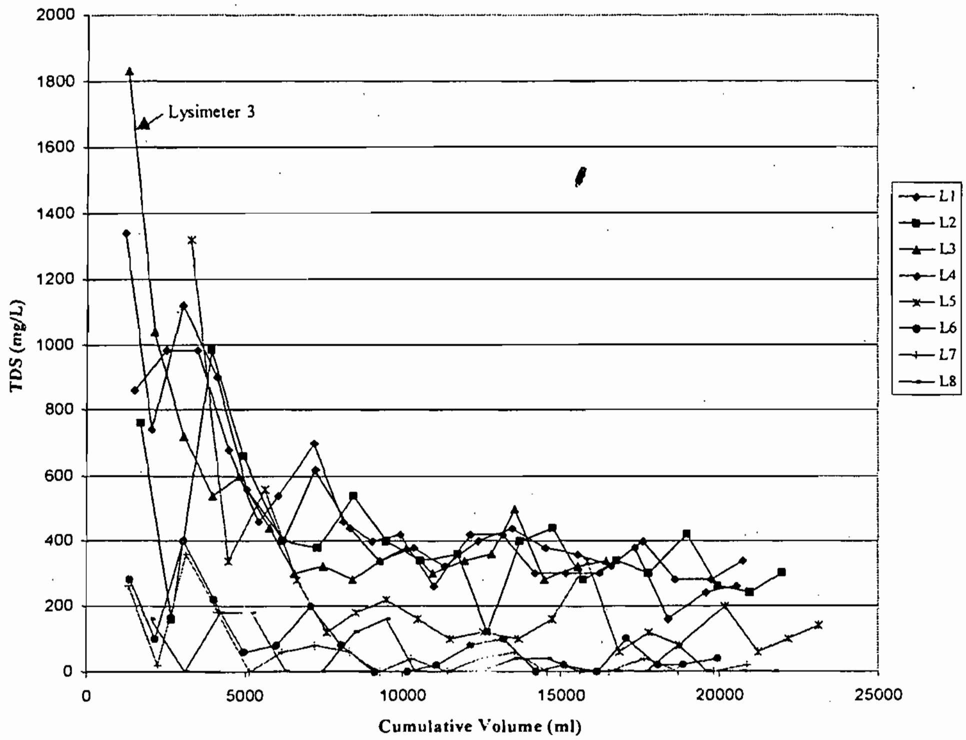

Figure B-1. TDS Leaching Curves .

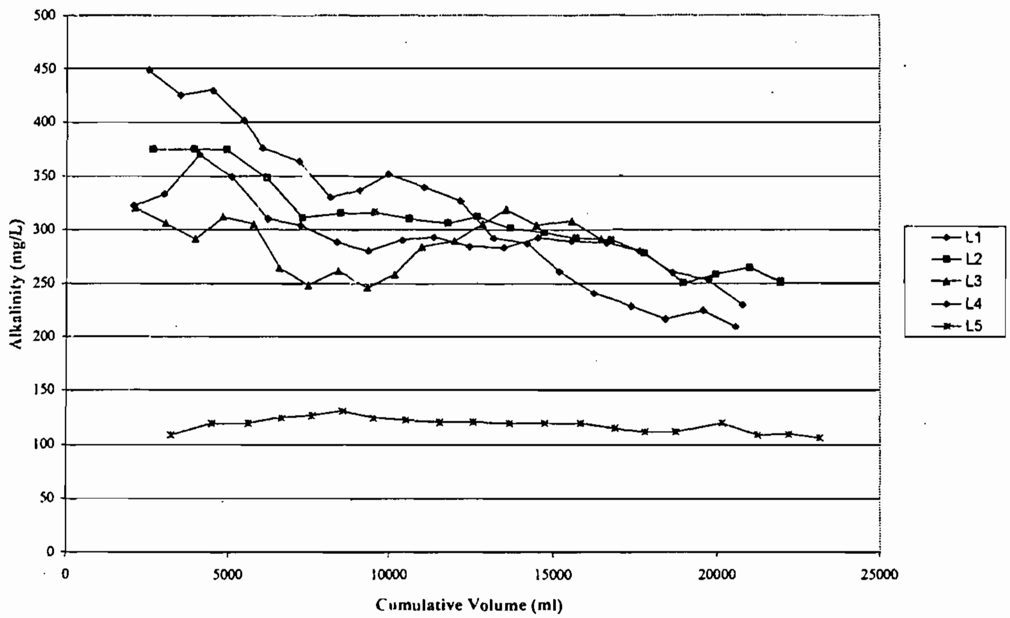

Figure B-2. Alkalinity Leaching Curves.

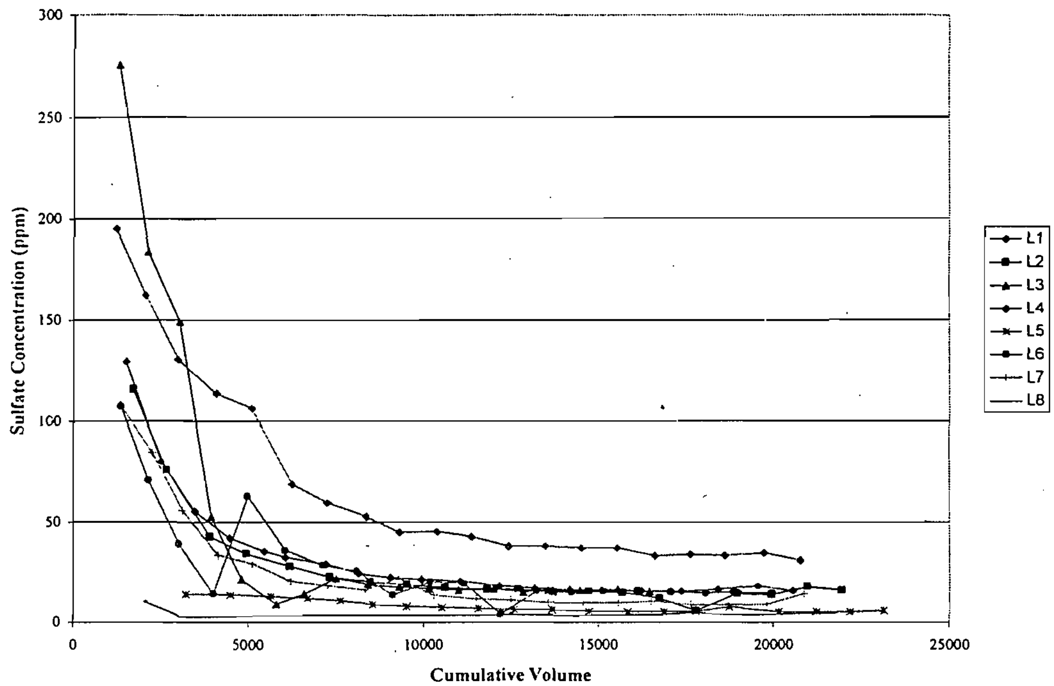

Figure B-3. Sulfate Leaching Curves

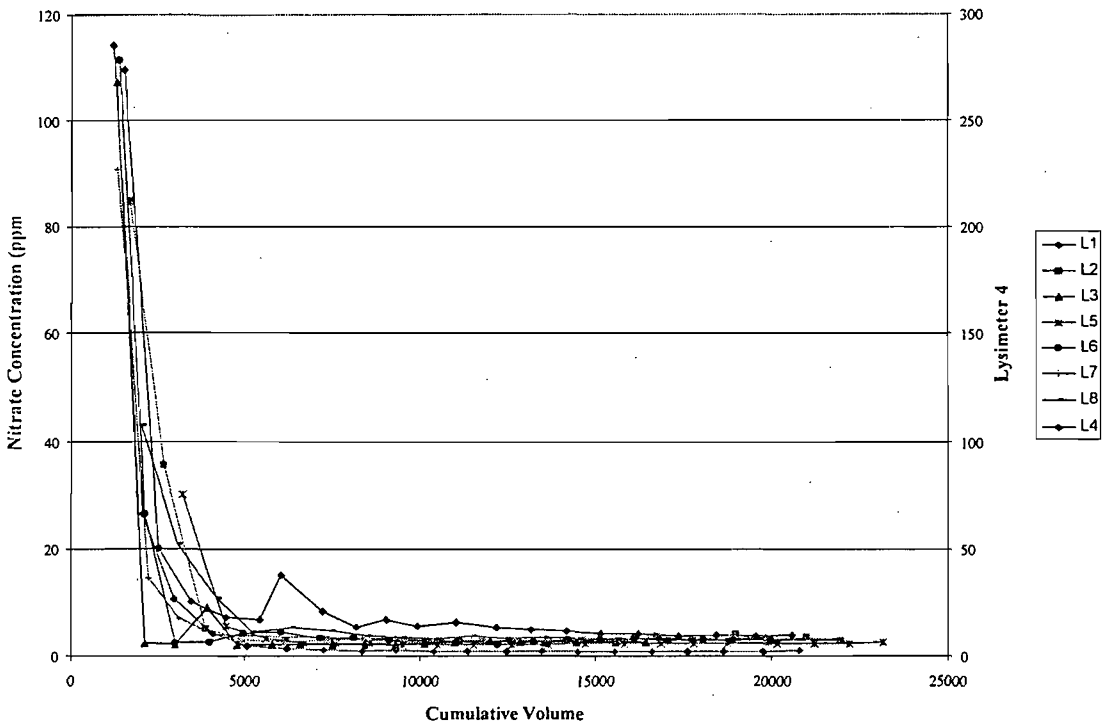

Figure B-4. Nitrate Leaching Curves

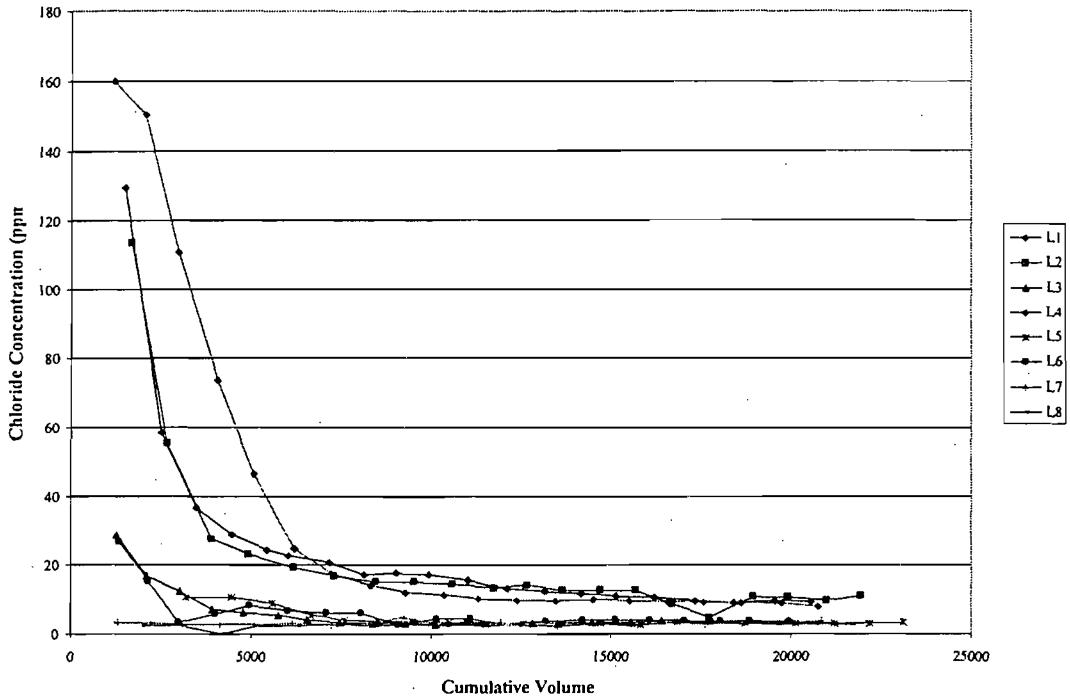

Figure B-5. Chloride Leaching Curves.

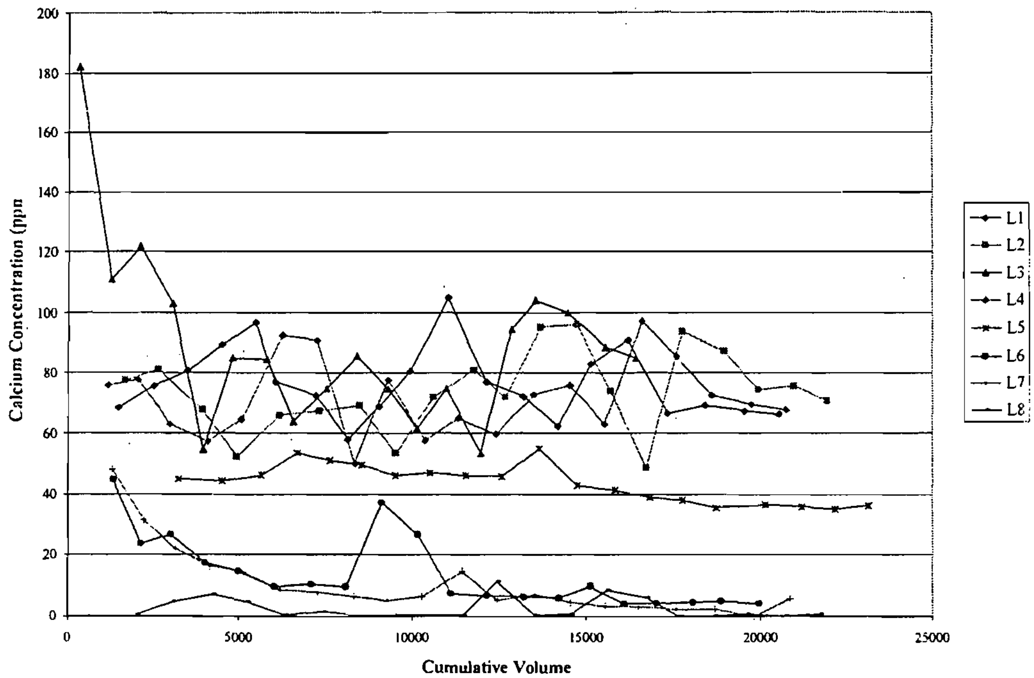

Figure B-6. Calcium Leaching Curves.

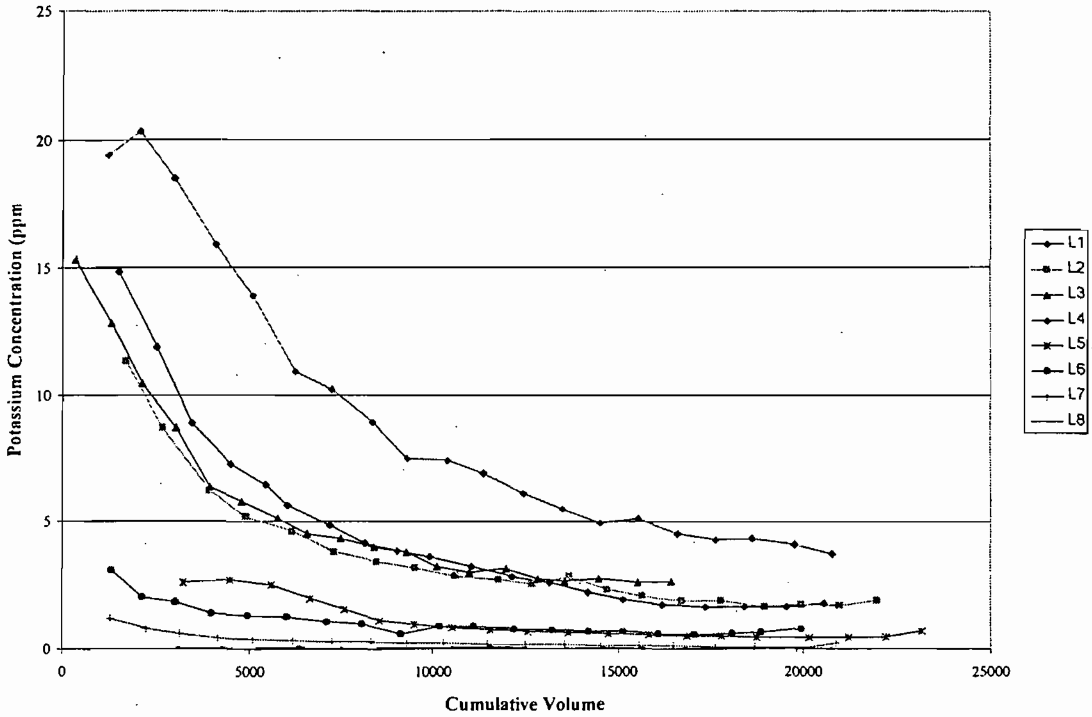

Figure B-7. Potassium Leaching Curves.

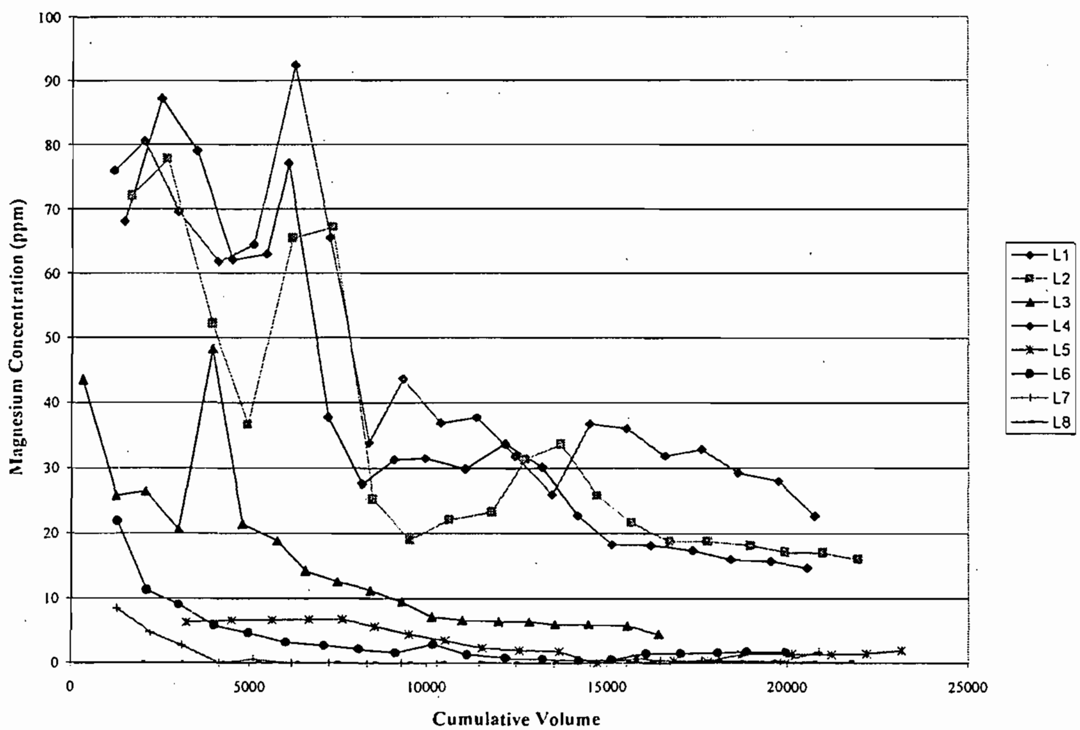

Figure B-8. Magnesium Leaching Curves.

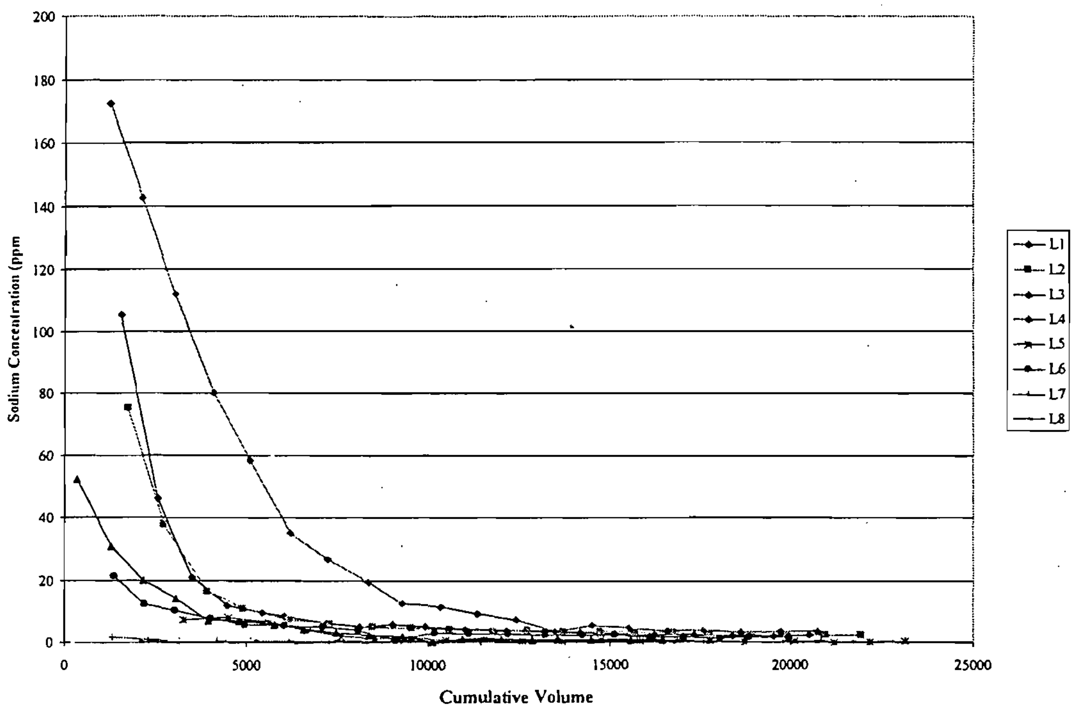

Figure B-9. Sodium Leaching Curves.

Table B-1. TDS Data

DAY	VOL ml	L1 mg/L	VOL ml	L2 mg/L	VOL ml	L3 Mg/L	VOL ml	L4 mg/L	VOL ml	L5 mg/L	VOL ml	L6 mg/L	VOL ml	L7 mg/L	VOL ml	L8 mg/L
2	500	1840	700	1500	0		300	1640	1760	420	530	440	450	460	1030	40
4	1480	860	1680	760	0		1180	1340	3220	1320	1330	280	1300	260	2010	160
6	2500	980	2660	160	330	1920	2040	740	4480	340	2140	100	2250	20	3070	0
8	3470	980	3910	980	1270	1830	2980	1120	5620	560	3020	400	3130	360	4210	180
10	4470	680	4930	660	2110	1040	4070	900	6660	280	4000	220	4145	180	5210	180
12	5440	460	6170	400	3030	720	5070	560	7600	120	4970	60	5115	0	6310	0
14	6040	540	7310	380	3940	540	6220	400	8530	180	6030	80	6185	60	7440	0
16	7190	700	8480	540	4790	600	7230	620	9510	220	7110	200	7255	80	8500	120
18	8140	460	9530	400	5780	440	8350	440	10510	160	8090	80	8325	60	9510	160
20	9050	400	10610	340	6560	300	9310	340	11540	100	9120	0	9295	0	10450	0
22	9940	420	11790	360	7480	320	10380	380	12580	120	10190	0	10295	40	11490	0
24	11040	260	12700	120	8400	280	11350	320	13670	100	11130	20	11465	0	12450	0
26	12150	420	13700	400	9300	340	12430	400	14730	160	12190	80	12485	40	13540	40
28	13170	420	14720	440	10140	380	13480	440	15820	340	13220	100	13555	60	14550	40
30	14180	300	15680	280	10980	300	14510	380	16850	60	14230	0	14555	0	15600	0
32	15140	300	16730	340	11980	340	15530	360	17780	120	15130	20	15555	0	16750	0
34	16210	300	17770	300	12840	360	16590	320	18730	80	16100	0	16485	0	17690	0
36	17350	380	18970	420	13550	500	17605	400	20140	200	17050	100	17615	40	18680	80
38	18410	160	19940	260	14470	280	18615	280	21220	60	18060	20	18695	0	19610	0
40	19550	240	20980	240	15550	320	19745	280	22185	100	18870	20	19825	0	20700	0
42	20550	260	21950	300	16430	340	20765	340	23145	140	19970	40	20875	20	21710	0

Table B-2. Alkalinity Data

DAY	VOL ml	L1 Mg/L	VOL ml	L2 Mg/L	VOL ml	L3 Mg/L	VOL ml	L4 Mg/L	VOL ml	L5 Mg/L	VOL ml	L6 Mg/L
2	500	0	700	0	0		300	0	1760	31	530	0
4	1480	380	1680	331.5	0		1180	77.5	3220	109	1330	0
6	2500	449	2660	375	330	0	2040	322	4480	120	2140	0
8	3470	425	3910	375	1270	304	2980	333	5620	120	3020	0
10	4470	430	4930	375	2110	320	4070	370	6660	125	4000	0
12	5440	402	6170	348	3030	306	5070	350	7600	127	4970	0
14	6040	376	7310	311	3940	291	6220	310	8530	131	6030	0
16	7190	364	8480	315	4790	312	7230	304	9510	125	7110	0
18	8140	330	9530	316	5780	305	8350	288	10510	123	8090	0
20	9050	337	10610	310	6560	264	9310	280	11540	121	9120	0
22	9940	352	11790	306	7480	248	10380	290	12580	121	10190	0
24	11040	340	12700	312	8400	261	11350	293	13670	120	11130	0
26	12150	327	13700	301	9300	246	12430	284	14730	120	12190	0
28	13170	292	14720	297	10140	258	13480	283	15820	120	13220	1
30	14180	287	15680	292	10980	284	14510	292	16850	115	14230	2
32	15140	261	16730	29[illegible]	11980	289	15530	289	17780	112	15130	2
34	16210	241	17770	278	12840	305	16590	287	18730	112	16100	3

Table B-2 continued.

DAY	VOL ml	L1 Mg/L	VOL ml	L2 Mg/L	VOL ml	L3 Mg/L	VOL ml	L4 Mg/L	VOL ml	L5 Mg/L	VOL ml	L6 Mg/L
36	17350	229	18970	250	13550	319	17605	280	20140	120	17050	3
38	18410	217	19940	258	14470	304	18615	260	21220	109	18060	3
40	19550	225	20980	264	15550	308	19745	253	22185	110	18870	2.5
42	20550	210	21950	251	16430	291	20765	230	23145	106	19970	3

Table B-3. NPOC Data

DAY	VOL ml	L1 Mg/L	VOL ml	L2 Mg/L	VOL ml	L3 Mg/L	VOL ml	L4 Mg/L	VOL ml	L5 Mg/L	VOL ml	L6 Mg/L	VOL ml	L7 Mg/L	VOL ml	L8 Mg/L
2	500	28.55	700	19.38	0		300	36.46	1760	10.26	530	1.501	450	5.577	1030	0
4	1480	23.08	1680	18.02	0		1180	32.5	3220	34.71	1330	0.568	1300	2.437	2010	0
6	2500	16.62	2660	13.09	330	340.7	2040	29.78	4480	10.6	2140	0.999	2250	2.354	3070	1.263
8	3470	12.37	3910	9.243	1270	216.6	2980	24.0	5620	9.136	3020	0.676	3130	1.439	4210	0.303
10	4470	10.56	4930	9.405	2110	143.5	4070	18.71	6660	7.873	4000	0.612	4145	0.874	5210	0.513
12	5440	10.23	6170	6.861	3030	110.5	5070	16.02	7600	5.715	4970	0.583	5115	0.737	6310	0.343
14	6040	9.707	7310	6.338	3940	86.2	6220	12.45	8530	5.118	6030	0.586	6185	0.846	7440	0.994
16	7190	8.842	8480	6.576	4790	74.4	7230	12.52	9510	4.727	7110	0.06	7255	0.426	8500	0
18	8140	9.028	9530	6.222	5780	49.3	8350	10.79	10510	3.805	8090	0.06	8325	0.392	9510	0
20	9050	8.089	10610	5.969	6560	38.48	9310	10.62	11540	3.232	9120	0.263	9295	0.154	10450	0
22	9940	8.045	11790	6.108	7480	35.43	10380	10.95	12580	3.418	10190	0.567	10295	0.296	11490	0
24	11040	8.349	12700	6.003	8400	25.38	11350	11.06	13670	3.762	11130	0.199	11465	0.574	12450	0
26	12150	6.256	13700	5.586	9300	20.73	12430	9.107	14730	2.883	12190	0.633	12485	0.33	13540	0.066
28	13170	5.258	14720	4.786	10140	19.17	13480	8.651	15820	2.713	13220	0.144	13555	0.138	14550	0
30	14180	5.194	15680	4.234	10980	18.89	14510	8.219	16850	2.648	14230	0.179	14555	0.175	15600	0.344
32	15140	5.525	16730	4.051	11980	20.22	15530	7.748	17780	2.135	15130	0.447	15555	0.124	16750	0
34	16210		17770		12840	19.78	16590		18730		16100		16485		17690	
36	17350		18970		13550	19.2	17605		20140		17050		17615		18680	

Table B-4. pH Data

DAY	VOL	L1	VOL	L2	VOL	L3	VOL	L4	VOL	L5	VOL	L6	VOL	L7	VOL	L8
2	500		700		0		300		1760		530		450		1030	
4	1480	6.9	1680	7	0		1180	6.12	3220	6.84	1330	2.88	1300	2.97	2010	3.16
6	2500	7.15	2660	7.01	330		2040	7.2	4480	7	2140	3.5	2250	3.53	3070	3.47
8	3470	7.25	3910	7.24	1270	6.67	2980	7.34	5620	7.09	3020	3.85	3130	3.57	4210	3.45
10	4470	7.25	4930	7.29	2110	7.09	4070	7.44	6660	6.96	4000	4.24	4145	4.05	5210	4.2
12	5440	7.17	6170	7.14	3030	7.06	5070	7.38	7600	6.95	4970	4.57	5115	4.04	6310	4.00
14	6040	7.27	7310	7.26	3940	7.22	6220	7.38	8530	7.08	6030	5.03	6185	4.28	7440	4.03
16	7190	7.14	8480	7.13	4790	7.38	7230	7.4	9510	6.97	7110	5.28	7255	4.22	8500	4.15
18	8140	7.18	9530	7.17	5780	7.3	8350	7.31	10510	6.97	8090	5.32	8325	4.19	9510	4.08
20	9050	7.25	10610	7.27	6560	7.09	9310	7.37	11540	7.09	9120	5.93	9295	4.3	10450	4.12
22	9940	7.07	11790	7.11	7480	7.1	10380	7.17	12580	7.03	10190	6.38	10295	4.4	11490	4.25
24	11040	7.15	12700	7.17	8400	7.16	11350	7.26	13670	7.04	11130	7.08	11465	4.6	12450	4.15

Table B-4. Continued

DAY	VOL	L1	VOL	L2	VOL	L3	VOL	L4	VOL	L5	VOL	L6	VOL	L7	VOL	L8
26	12150	7.18	13700	7.18	9300	7.09	12430	7.31	14730	7.12	12190	7.1	12485	4.56	13540	4.1
28	13170	7.16	14720	7.11	10140	7.03	13480	7.11	15820	7.07	13220	7.25	13555	4.5	14550	4.18
30	14180	7.25	15680	7.18	10980	7	14510	7.18	16850	7.05	14230	7.39	14555	4.51	15600	4.17
32	15140	7.24	16730	7.13	11980	6.94	15530	7.2	17780	6.97	15130	7.54	15555	4.79	16750	4.2
34	16210	7.35	17770	7.24	12840	6.91	16590	7.28	18730	6.99	16100	6.85	16485	4.85	17690	4.19
36	17350	7.3	18970	6.94	13550	6.96	17605	7.29	20140	7	17050	7.27	17615	5.04	18680	4.23
38	18410	7.24	19940	7.2	14470	6.84	18615	7.2	21220	6.93	18060	7.52	18695	5	19610	4.25
40	19550	7.19	20980	7.14	15550	6.8	19745	7.19	22185	6.92	18870	7.21	19825	4.92	20700	4.17
42	20550	7.32	21950	7.19	16430	6.86	20765	7.22	23145	6.97	19970	7.12	20875	4.9	21710	4.3

Table B-5. Conductivity

DAY	VOL	L1	VOL	L2	VOL	L3	VOL	L4	VOL	L5	VOL	L6	VOL	L7	VOL	L8
2	500	4270	700	2580	0		300	9950	1760	645	530	4380	450	6200	1030	2930
4	1480	1551	1680	1265	0		1180	1850	3220	344	1330	985	1300	782	2010	464
6	2500	1202	2660	1062	330	5380	2040	1517	4480	316	2140	381	2250	326	3070	154
8	3470	1019	3910	845	1270	1494	2980	1191	5620	308	3020	270	3130	205	4210	80
10	4470	904	4930	783	2110	1126	4070	1114	6660	276	4000	173	4145	115	5210	31
12	5440	867	6170	762	3030	934	5070	945	7600	278	4970	146	5115	99	6310	41
14	6040	802	7310	688	3940	714	6220	777	8530	273	6030	121	6185	73	7440	32
16	7190	786	8480	660	4790	693	7230	684	9510	257	7110	101	7255	68	8500	25
18	8140	718	9530	657	5780	656	8350	673	10510	257	8090	91	8325	59	9510	26
20	9050	711	10610	632	6560	573	9310	635	11540	247	9120	80	9295	49	10450	23
22	9940	692	11790	611	7480	575	10380	602	12580	232	10190	70	10295	46	11490	24
24	11040	674	12700	584	8400	560	11350	599	13670	237	11130	67	11465	39	12450	23
26	12150	658	13700	583	9300	525	12430	593	14730	230	12190	57	12485	33	13540	23
28	13170	606	14720	597	10140	535	13480	612	15820	221	13220	52	13555	34	14550	20
30	14180	577	15680	564	10980	530	14510	576	16850	217	14230	51	14555	32	15600	20
32	15140	531	16730	531	11980	548	15530	612	17780	220	15130	51	15555	26	16750	19
34	16210	496	17770	540	12840	581	16590	589	18730	224	16100	49	16485	28	17690	26
36	17350	476	18970	541	13550	577	17605	570	20140	211	17050	46	17615	24	18680	19
38	18410	445	19940	512	14470	574	18615	536	21220	205	18060	43	18695	23	19610	16
40	19550	434	20980	516	15550	573	19745	536	22185	206	18870	44	19825	26	20700	16
42	20550	428	21950	512	16430	558	20765	494	23145	207	19970	41	20875	25	21710	17

Table B-6. DO Data

DAY	VOL	L1	VOL	L2	VOL	L3	VOL	L4	VOL	L5	VOL	L6	VOL	L7	VOL	L8
2	500	7.7	700	7.62	0		300	7.79	1760	6.2	530	8.08	450	8.4	1030	8.28
4	1480	6.4	1680	6.14	0		1180	6.6	3220	5.36	1330	7.6	1300	8.17	2010	8.34
6	2500	5.8	2660	6.05	330	5.44	2040	6.04	4480	3.27	2140	6.82	2250	8.34	3070	8.35
8	3470	4.75	3910	5.32	1270	1.55	2980	5.31	5620	4.04	3020	5.57	3130	8.9	4210	8.8
10	4470	4.67	4930	4.86	2110	1.72	4070	5.39	6660	3.31	4000	4.97	4145	8.6	5210	8.64

Table B-6. Continued

DAY	VOL	L1	VOL	L2	VOL	L3	VOL	L4	VOL	L5	VOL	L6	VOL	L7	VOL	L8
12	5440	5.23	6170	5.25	3030	2.88	5070	5.46	7600	3.61	4970	4.54	5115	8.67	6310	8.65
14	6040	7.25	7310	5.84	3940	4.52	6220	6.6	8530	5.13	6030	6.05	6185	8.66	7440	8.78
16	7190	6.07	8480	5.41	4790	1.7	7230	6.21	9510	4.25	7110	6.37	7255	8.46	8500	8.41
18	8140	6.5	9530	5.53	5780	1.5	8350	5.88	10510	4.03	8090	6.41	8325	8.56	9510	8.64
20	9050	6.81	10610	6.27	6560	4.33	9310	6.84	11540	5.27	9120	6.97	9295	8.68	10450	8.68
22	9940	6.2	11790	6	7480	6.05	10380	5.7	12580	4.73	10190	6.75	10295	9.08	11490	8.46
24	11040	5.51	12700	5.72	8400	1.8	11350	5.71	13670	4.63	11130	6.58	11465	8.38	12450	8.38
26	12150	6.13	13700	6.01	9300	2.36	12430	6.43	14730	5.63	12190	7.25	12485	8.5	13540	8.5
28	13170	6.93	14720	6.35	10140	2.65	13480	6.57	15820	4.64	13220	8.54	13555	8.48	14550	8.48
30	14180	7.3	15680	6.7	10980	2.51	14510	6.7	16850	4.36	14230	7.57	14555	8.62	15600	8.55
32	15140	7.8	16730	6.48	11980	2.4	15530	6.62	17780	5.03	15130	7.57	15555	8.78	16750	8.5
34	16210	8.03	17770	7	12840	3.17	16590	6.93	18730	5.03	16100	7.77	16485	8.85	17690	8.6
36	17350	8	18970	7.07	13550	3.38	17605	7.18	20140	5.03	17050	7.87	17615	8.6	18680	8.49
38	18410	7.27	19940	6.47	14470	2.38	18615	6.62	21220	5.13	18060	7.42	18695	8.27	19610	8.31
40	19550	7.72	20980	6.78	15550	3.55	19745	7.5	22185	5.02	18870	7.75	19825	8.53	20700	8.63
42	20550	7.85	21950	6.91	16430	5.03	20765	7.45	23145	5.5	19970	7.34	20875	8	21710	7.9

Table B-7. ORP Data

DAY	VOL	L1	VOL	L2	VOL	L3	VOL	L4	VOL	L5	VOL	L6	VOL	L7	VOL	L8
2	500	608	700	592	0		300	631	1760	472	530	623	450	630	1030	680
4	1480	472	1680	476	0		1180	493	3220	558	1330	594	1300	606	2010	624
6	2500	500	2660	514	330	566	2040	432	4480	537	2140	585	2250	593	3070	618
8	3470	227	3910	226	1270	-30	2980	249	5620	560	3020	582	3130	507	4210	590
10	4470	451	4930	468	2110	-98	4070	194	6660	473	4000	467	4145	570	5210	572
12	5440	522	6170	518	3030	-133	5070	225	7600	520	4970	440	5115	529	6310	588
14	6040	530	7310	535	3940	-74	6220	560	8530	570	6030	611	6185	645	7440	613
16	7190	514	8480	497	4790	462	7230	476	9510	550	7110	559	7255	608	8500	614
18	8140	509	9530	527	5780	-53	8350	518	10510	530	8090	572	8325	600	9510	627
20	9050	344	10610	350	6560	-10	9310	517	11540	527	9120	580	9295	590	10450	598
22	9940	538	11790	527	7480	-35	10380	358	12580	558	10190	575	10295	594	11490	594
24	11040	324	12700	332	8400	-5	11350	391	13670	541	11130	560	11465	617	12450	641
26	12150	516	13700	514	9300	50	12430	527	14730	400	12190	430	12485	580	13540	599
28	13170	518	14720	516	10140	25	13480	515	15820	572	13220	585	13555	607	14550	604
30	14180	517	15680	510	10980	46	14510	521	16850	566	14230	579	14555	615	15600	617
32	15140	520	16730	515	11980	484	15530	559	17780	478	15130	595	15555	629	16750	648
34	16210	548	17770	547	12840	489	16590	558	18730	537	16100	547	16485	649	17690	658
36	17350	515	18970	510	13550	495	17605	516	20140	564	17050	590	17615	536	18680	558
38	18410	511	19940	475	14470	525	18615	542	21220	580	18060	615	18695	643	19610	656
40	19550	537	20980	540	15550	550	19745	561	22185	583	18870	600	19825	628	20700	637
42	20550	512	21950	515	16430	568	20765	577	23145	588	19970	604	20875	633	21710	640

APPENDIX C

BMP Document

Management of Solid Waste from Abrasive Blasting Operations:
A Guide for Industry, Consultants, and Regulators

Prepared by:
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Under a Grant from:
The Florida Center for Solid and Hazardous Waste Management
University of Florida
Gainesville, Florida

Management of Solid Waste from Abrasive Blasting Operations

ABRASIVE BLASTING

The process of abrasive blasting is used to remove paints and other coatings from primarily metal surfaces. The abrasive blasting process is an efficient means of surface treatment because as the old coatings are removed, the surface is prepared for the application of additional coatings. There are many types of media in use including some of the most common which are: silica sand, coal slag, plastic media, glass bead, steel shot and walnut shells.

After abrasive blasting a surface, a material remains that contains the original blast media, as well as the coatings removed from the surface.

WHAT INDUSTRIES PRACTICE ABRASIVE BLASTING?

A number of industries practice abrasive blasting. These industries include:

- Ship Maintenance Facilities
- Bridge Maintenance
- The Military
- Autoshops
- Metal Fabricators
- Airports
- Rail yards

Abrasive blasting may be performed by an individual industry, or by abrasive blasting contractors.

WHAT IS A SOLID WASTE?

The United States Environmental Protection Agency has defined the term solid waste as follows.

Any garbage, refuse, sludge......or other discarded materials, including solid, liquid, semisolid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations, and from community activities.

In short, a solid waste is anything that is discarded as a result of human activities. By this definition, used abrasive blasting media is defined as a solid waste, and must be managed according to appropriate federal, state, and local solid waste regulations.

WHY IS PROPER MANAGEMENT OF SOLID WASTE IMPORTANT?

The improper management of solid waste may pose a threat to human health and the environment. In some cases, a solid waste may be deemed hazardous, and thus require very controlled management. Even in cases when not hazardous, the waste must be managed in a way that it is not a threat to humans who may come into contact with the waste or to groundwater supplies.

In the case of abrasive blasting waste, some paints contain heavy metals that can be harmful to human health and the environment. Proper management is thus required. While added care may result in an increase in costs, growing recycling opportunities are available to manage used ABM solid waste.

USING THIS DOCUMENT

This document outlines the steps necessary for the proper management of solid waste generated during the process of abrasive blasting. The information presented is derived from current environmental regulations and policy toward solid waste management, and from current industry practices.

The Quick Reference section is provided for the convenience of locating answers to frequently asked questions.

Quick Reference Section

Is my waste ABM hazardous?

See page **3**

What kind of hazardous waste generator am I?

See page **4**

What are my requirements as a hazardous waste generator?

See page **4**

What if my ABM is not hazardous?

See page **5**

Where can I dispose of my non-hazardous waste ABM

*See page **7***

Can I land apply my waste ABM?

See page **7**

What tests do I need to run on my waste ABM if I leave it on site?

See page **8**

Can I use my knowledge of the process to leave my waste on site?

See page **8**

How can I reduce the amount of ABM waste I produce?

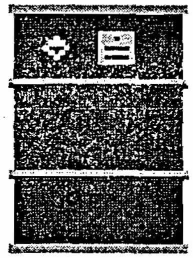
See page **8**

How can I recycle my waste ABM?

See page **8-10**

Who should I contact if I have questions about my waste ABM?

See page **11**



THE DEFINITION OF HAZARDOUS WASTE

A hazardous waste is defined in the code of regulations (CFR), section 40, part 261. A waste is hazardous if it is listed in the CFR or it exhibits characteristics of corrosivity, reactivity, ignigtability, or toxicity. Each characteristic is specifically defined in 40 CFR 261.

Waste ABM is not listed as a hazardous waste in the CFR and typically waste ABM will not exhibit any of the characteristics listed above, except for toxicity due to heavy metal content. This characteristic will be discussed in detail here.

If a generator questions whether the waste ABM generated is exhibiting any other hazardous characteristic, 40 CFR 261 should be referenced or a regulatory agency contacted.

IS MY ABRASIVE BLASTING WASTE A HAZARDOUS WASTE?

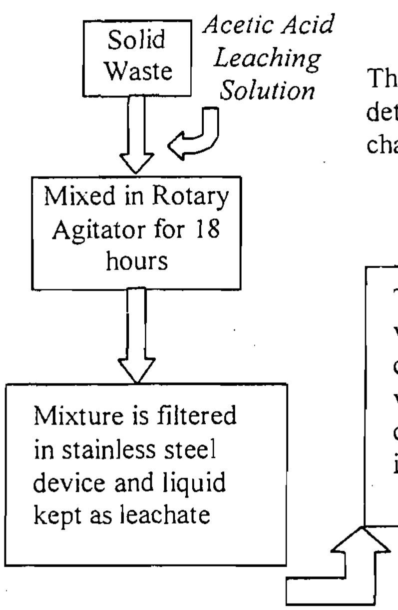
The test required by federal regulations to determine if a waste exhibits hazardous characteristics is the Toxicity Characteristic Leaching Procedure (TCLP)-see text box below. Every generation of new waste ABM must be tested.

The TCLP test must be run by a lab with a FDEP approved comprehensive quality assurance plan. If this test is run on the waste and the leachable metals are at or above limits set in 40 CFR 261, the waste is deemed hazardous. The following table gives the most common metals found in ABM and their TCLP limits.

Table 1. Toxicity Characteristic Maximum Contaminant Concentrations

Heavy Metal	Regulatory Level (mg/l)
Arsenic	5.0
Barium	100.0
Cadmium	1.0
Chromium	5.0
Lead	5.0
Mercury	0.2
Selenium	1.0
Silver	5.0

What is the TCLP Test?



The TCLP test is a procedure used by the U.S. EPA to determine whether a solid waste is hazardous by toxicity characteristics.

This leachate contains all of the contaminants which leached off the waste. The amounts of these contaminants are measured in mg/L and compared with the TCLP limits in 40 CFR 261. Table 1 contains metals commonly found or examined for in waste ABM.

REQUIREMENTS OF HAZARDOUS WASTE GENERATORS

Requirements for generators of hazardous waste differ by the quantity of hazardous waste which is produced. All hazardous waste generated in a month must be totaled to determine generator status, not just hazardous waste ABM. Any facility that stores hazardous waste ABM in piles, must do so in a containment building certified by a professional engineer and comply with the Large Quantity Generator rules regardless of generation rate.

Conditionally Exempt Small Quantity Generators- generate less than 100kg (220lb) of hazardous waste per month and accumulates less than 1000kg (2,200lb) of hazardous waste at any time.

Small Quantity Generators (SQG)- generate more than 100kg (220lb), but less than 1000kg (2,200lb) of hazardous waste per month and accumulate less than 6000kg (13,200lb) of hazardous waste at any time.

Large Quantity Generators (LQG)- generate more than 1000kg (2,200lb)of hazardous waste per month.

All hazardous waste generator classifications and requirements are listed in 40 CFR 262. This regulation should be referenced if there is any question to generator status or if a generator produces acutely hazardous waste as defined by 40 CFR 262.

Once generator status has been established, the requirements must be met for handling the hazardous waste. If a generator treats hazardous waste to render it non-hazardous, a waste analysis plan must be submitted to FDEP as well as required compliance with LQG/SQG regulations.

Containers All hazardous waste including waste blast that fails TCLP for any metals must be placed in a non-leaking, sealable container in good condition. All hazardous waste containers must be kept closed except when wastes are added or removed.

Storage *Large Quantity Generators* may not store waste over 90 days, *Small Quantity Generators* may not store waste more than 180 days, and *Conditionally Exempt Small Quantity Generators* can store waste as long as they need too as long as the amount does not exceed 1000kg. **HAZARDOUS WASTE ABM MAY NOT BE STORED ON THE GROUND AT ANY TIME.**

Labels All containers must have a hazardous waste label which identifies the waste, includes a federal waste code number, the accumulation start date, and the generators name and address. See Label example below.

Inspections of waste containers should be performed each week and records should be kept of inspections and all other transactions for 3-5 years.

Transportation of hazardous waste must be performed each week by certified persons with permits from regulatory agencies. Detailed shipping papers, called manifests, must be used for all shipments of any hazardous waste. The manifest records must be kept for 3-5 years.

Training must be given to all employees as to how to properly handle all wastes generated.

Disposal Hazardous waste may only be disposed of in permitted Treatment, Storage and Disposal facilities. Hazardous waste must be tracked and accounted for from "cradle to grave."

If a generator is not currently classified as a hazardous waste generator and finds that some waste ABM is hazardous, state and local regulators need to be notified and a hazardous waste contractor contacted to arrange for proper treatment and disposal of the waste.

LABEL EXAMPLE

HAZARDOUS WASTE

FEDERAL LAW PROHIBITS IMPROPER DISPOSAL.

IF FOUND, CONTACT THE NEAREST POLICE, OR PUBLIC SAFETY AUTHORITY, OR THE U.S. ENVIRONMENTAL PROTECTION AGENCY.

GENERATOR INFORMATION

NAME ______________________________

ADDRESS ____________________ PHONE ____________

CITY ______________ STATE ______ ZIP ________

EPA / MANIFEST
ID NO / DOCUMENT NO. ____________________ / ____________

ACCUMULATION
START DATE ____________________ EPA
WASTE NO. ____________

____

____

____

DOT PROPER SHIPPING NAME AND UN OR NA NO. WITH PREFIX

HANDLE WITH CARE!

DISPOSAL AND RECYCLING

The cost of management is greatly reduced when a solid waste is not hazardous by regulation. The requirements for proper management do not end however.

Waste ABM must still be managed in a manner to minimize impact to human health and the environment. While no specific regulation exists for the management of solid waste from abrasive blasting operations, a number of regulations and policy guidelines apply to non-hazardous solid waste in general.

Management decisions must be made as to how to best manage the solid waste on site (storage) and what the final disposition of the waste will be. The two primary options are disposal and recycling. In both cases, measure must be taken to minimize risk to human health and the environment.

EVALUATION OF ENVIRONMENTAL IMPACT

A number of factors must be considered when evaluating the potential risk to human health and the environment.

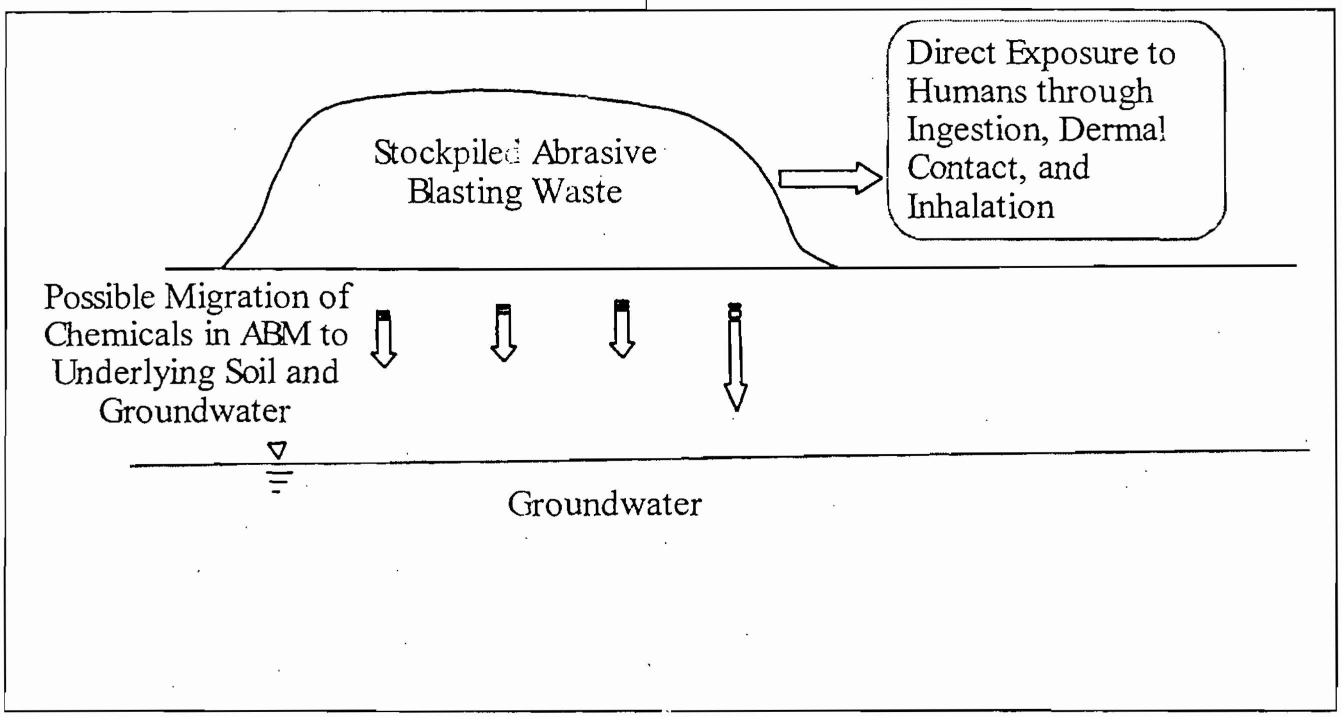
The potential exposure of a human to the waste must be examined. If the possibility exists that human exposure might result, either through direct ingestion, inhalation, or dermal contact, then the risk of such exposure must be evaluated.

This risk must consider the waste, not only in its present state, but also for the waste at some future period in time (e.g. after a site has been closed). A detailed, site-specific risk analysis may be performed, but in most cases a set of generic assumptions will be used to determine what contaminant concentration level is safe for a given use.

The possibility of chemicals leaching from the waste to the groundwater must also be considered. If a waste is placed in a manner where rainfall will percolate and result in the production of leachate, the leaching potential of the waste must be evaluated.

Impact to Human Health

Florida guidelines for assessing the impact to human health are the application of risk-based standards for the clean up of waste



sites. These standards are based on the waste placement in the top 2 feet of the surface and the total metal concentration in the waste in units of mg/kg. These same numbers can be applied to the application of a waste to the land.

These guidelines are referred to as the Florida Soil Cleanup Goals. The residential soil cleanup goals ar

e more restrictive and would be applied to areas where people live and have unrestricted access (e.g. parks). The industrial goals are less stringent because human exposure should be less in these areas. Table 2 contains the concentration limits for the soil cleanup goals for common metals found in ABM.

Table 2. Florida Soil Cleanup Goals for Heavy Metals

Heavy Metal	Residential Goal (mg/kg)	Industrial Goal (mg/kg)
Arsenic	0.8	3.7
Aluminum	75,000	-
Barium	5,200	84,000
Cadmium	37	600
Chromium	290	430
Cobalt	4,700	110,000
Lead	500	1,000
Mercury	23	480
Nickel	1,500	26,000
Selenium	390	9,900
Silver	390	9,000
Tin	44,000	670,000
Vanadium	490	4,800
Zinc	23,000	560,000

Impact to Groundwater

The impact to groundwater must be assessed for a waste in the environment. The test which simulates rainfall percolating through waste over an extended period of time is the synthetic precipitation leaching procedure (SPLP). This test is exactly like the TCLP in process, but uses an extraction fluid made from nitric and sulfuric acids

The metal concentrations found in the leachate of this test may be compared with Florida's Groundwater Guidance concentrations. If the metal concentrations in the leachate are above the guidance levels, the waste is determined to have the potential to affect groundwater quality.

Table 3. Florida Groundwater Guidance Concentrations for Heavy Metals

Heavy Metal	Regulatory Level (mg/l)
Arsenic	0.050
Aluminum	0.200
Barium	2.00
Cadmium	0.005
Chromium	0.100
Copper	1.00
Iron	0.300
Lead	0.015
Mercury	0.002
Nickel	0.100
Selenium	0.050
Silver	0.100
Tin	4.20
Vanadium	0.049
Zinc	5.00

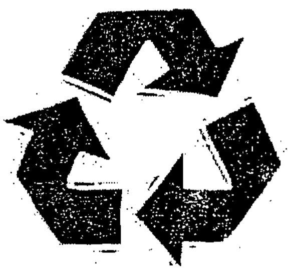
DISPOSAL IN LANDFILLS

A number of options are available in regard to disposal of waste ABM in solid waste landfills. These options include disposal in a Class I or Class III sanitary landfill, or disposal on site.

A "knowledge of the process," meaning the generator knows what is in the material being blasted, may be acceptable for determining disposal options once the original waste has been tested and the same media is used on similar coatings to generate waste. Contact your local regulator if you want to use your "knowledge of the process." This can greatly reduce analytical costs for small blasting operations, however disposal and recycling facilities may still require analytical test data.

Class I Sanitary Landfills A class I sanitary landfill is an engineered facility designed to receive and contain non-hazardous solid waste. Class I facilities are the repository of most household garbage, as well as other materials such as sludge and some industrial wastes. These facilities are lined and equipped to remove and treat leachate.

For ABM to be disposed of in a Class I landfill, no other regulatory requirements would need to be met other than the waste not being hazardous. The operator of a landfill is not required to accept a waste, however, and proof of passing



TCLP may be required. Some facilities may readily accept used ABM as it may serve as an excellent source of alternative daily cover. These facilities may ever lower or waive the tipping fee if the waste is useful to them

Class III Sanitary Landfills A class III landfill is used for the disposal of inert materials that will not leach contaminants into the environment. A class III landfill may only be used for disposal if the waste will not constitute a risk to groundwater quality. This means that a TCLP leaching test should be run on the waste, and the leachate contaminant results compared to the Groundwater Guidance concentrations.

The type of leaching test used may either be TCLP, or the SPLP test. It is important to specify to the laboratory that is testing the leachate, however, that the tests be performed at or below detection limits below the groundwater guidance concentrations. The TCLP limits are much greater than the groundwater guidance concentrations, and failure to specify may result in costly reanalysis.

Disposal On-Site A final disposal option is the disposal of the material on site. For a material to be recycled or "disposed" on-site, the material must not possess characteristics of a solid waste. Therefore, it must pose neither a risk to human health nor the environment through direct exposure, or a risk to groundwater quality.

For disposal on site two separate analyses of the waste must be run: A total metal analysis and a leaching analysis.

The waste must fall below the direct exposure limits in the soil clean up goals, and also be below groundwater guidance concentrations in the leaching tests used (most likely SPLP).

REUSE

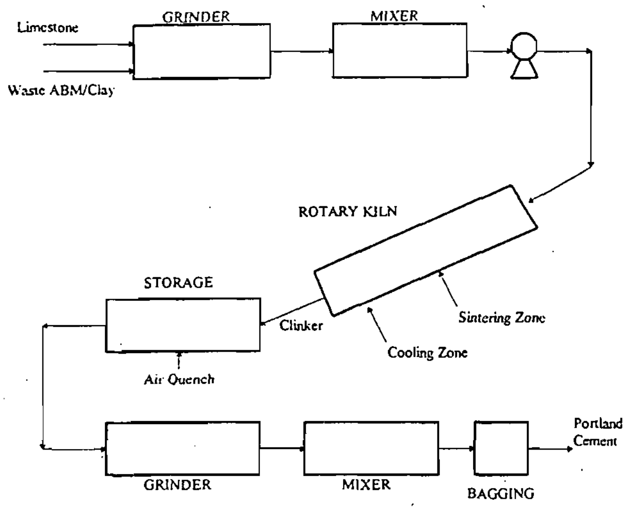
There are advantages and possibilities for recycling used ABM. One potential way to cut down on costs of disposal would be to use a reusable abrasive blasting media. Media that can be screened and reused include garnet, aluminum oxide, steel shot, sponge media, and plastic media. Reuse of reclaimed media can concentrate a waste stream creating a smaller volume, but with more contamination.

Recycling

Recycling and beneficial reuse options for the ABM waste after generation are also available.

Production of Portland Cement This recycling option is excellent for coal slag ABM waste. The media contains alumina, silica, and iron, which are feedstock for a cement kiln. A generator of non-hazardous waste ABM can pay much lower disposal costs to have the cement kiln take the waste and the cement kiln is getting paid to take a feedstock they would normally have to purchase.

Not only must the waste ABM be non-hazardous, it must also be chemically compatible as a feedstock in the cement-making process. Calcium silicate based additives to stabilize heavy metals are compatible to the process, however other additives such as phosphates and fluorides are not. The waste ABM is fed into the cement making process right at the beginning. The chemical process of making the cement changes the ABM into a new product, therefore the waste does not exist anymore. See diagram of cement making process.



Aggregate in Concrete Waste ABM may also be used as aggregate in Portland Cement concrete or Asphalt concrete. These concretes are a mixture of a binder (cement or asphalt) and an aggregate. Waste ABM which is angular in shape is better suited to asphalt concrete. These concretes can be used in non-structural situations, such as roadways and sidewalks.

If the ABM waste is high in contaminants, problems with setting may occur, but most non-hazardous ABM used as aggregate should set fine.

Construction Fill Waste ABM used as construction fill would have to meet the same standards as for disposal on-site (no solid waste characteristics). This includes proving that the waste will cause no harm to humans through direct exposure and no harm to the environment through groundwater contamination. As before, if both of these requirements are met, the waste may be used as construction fill, however physical properties of the waste may need to be examined for this recycling option.

Contact Information

Federal Contacts	
RCRA Hotline	(800)-424-9346
State Contacts	
Florida Bureau of Solid and Hazardous Waste	(850)-488-0300
District Contacts	
Solid Waste Section	
Northwest District	
Pensacola	(850)-444-8360
Northeast District	
Jacksonville	(904)-448-4300
Central District	
Orlando	(407)-894-7555
Southwest District	
Tampa	(813)-744-6125
South District	
Fort Myers	(941)-332-6975
Southeast District	
West Palm Beach	(561)-681-6770

Department of Environmental Protection

A Guide on Hazardous Waste Management

CONDITIONALLY EXEMPT SMALL QUANTITY GENERATORS

INTRODUCTION

Many businesses, both large and small use hazardous materials in their processes. Many of these processes produce wastes. A portion of these wastes may be hazardous. The method a business manager employs to manage hazardous waste will have a direct influence on business profits and future liabilities for the property, the business, and its owners.

The purpose of this paper is to provide basic information to industry and public agencies that may be generators of small quantities of hazardous waste and to inform them of their responsibilities for proper hazardous waste management.

HOW CAN I DETERMINE IF I HAVE HAZARDOUS WASTE?

All generators of waste materials are required by law to identify and evaluate their waste. Evaluating waste streams means determining whether or not the waste is hazardous. Evaluate each waste you produce using Step 1 below to determine whether you are a generator.

Step 1: Evaluate Your Waste

First, inventory and assemble information about your waste. An inventory consists of identifying all wastes that your business discards including sewered and recycled waste, unusable products, and by-products.

Material Safety Data Sheets (MSDSs) for your raw materials can be used to help identify your waste. Your Trade Association may be a good source of information. They can provide assistance for evaluating your wastes as well as assistance in handling, packaging and labeling your waste. If you have no information about your waste, it may be necessary to have the waste analyzed by a laboratory.

To determine whether your waste is hazardous, answer the following questions for each waste on your inventory.

1. Is the waste exempt from regulation? (i.e., recycled used oil, lead acid batteries that are reclaimed, domestic sewage, permitted industrial discharges, see Table 1)
2. Is the waste listed as a hazardous waste? (i.e., spent halogenated and certain non-halogenated solvents, see Table 2)
3. Is the waste hazardous because it exhibits a hazardous characteristic? (ignitable, corrosive, reactive, toxic, see Table 3)

Call DEP for a list of EPA Hazardous Waste codes for waste streams commonly generated.

If your waste is not exempt and you answered yes to questions 2 or 3 for any waste produced then your business is a generator of hazardous waste.

Step 2:Determine Generator Size

The amount of all hazardous waste generated or accumulated at your business will determine which category you fit in (see Table 4). Each category has its own requirements for waste management. If you generate less than 100 kg (220 lbs.) per month of hazardous waste and no more than 1kg (2.2 lbs.) of acutely hazardous waste in a calendar month, you are a conditionally exempt small quantity generator (CESQG) and the RCRA hazardous waste regulations require you to:

1. Determine whether the wastes you generate are regulated as hazardous waste under RCRA law (see Steps 1 & 2).
2. Keep the amount of hazardous waste you generate in one month under 220 pounds or under 2.2 pounds for an acute hazardous waste (i.e., arsenic and cyanide compounds) in one month.
3. Keep the amount of hazardous waste you have accumulated on your site under 2,200 pounds.
4. Dispose of your waste only at a site that is approved by the Florida Department of Environmental Protection (DEP).[1]

Step 3:Record Keeping

A conditionally exempt small quantity generator that chooses to send its hazardous waste to an off-site treatment, storage or disposal facility shall document delivery of its hazardous waste through written receipts and other records, which are retained for at least three years. The written receipts and other records shall include:

1. Name and address of the generator and the treatment, storage or disposal facility,
2. Type hazardous waste delivered,
3. Amount of hazardous waste delivered, and the
4. Date of shipment.

For additional information on the Small Quantity Generator requirements call or write for:

FLORIDA'S HANDBOOK FOR SMALL QUANTITY GENERATORS OF HAZARDOUS WASTE

Small Quantity Generator Program Coordinator, MS4555 Florida Department of Environmental Protection Hazardous Waste Management Section 2600 Blair Stone Road Tallahassee, Florida 32399-2400 Phone: (850) 488-0300 www.dep.state.fl.us

April 7, 1998

[1] Solid Waste facilities cannot accept these wastes pursuant to 62-701.300 F.A.C. Many counties have hazardous waste collection centers that will accept hazardous waste from conditionally exempt small quantity generators for a reduced fee during scheduled collections. Contact your county solid waste agency or DEP at (850) 488-0300 for more information.

Department of Environmental Protection

A Guide on Hazardous Waste Management

SMALL QUANTITY GENERATORS

INTRODUCTION

Many businesses, both large and small use hazardous materials in their processes. Many of these processes produce wastes. A portion of these wastes may be hazardous. The method a business manager employs to manage hazardous waste will have a direct influence on business profits and future liabilities for the property, the business, and its owners.

The purpose of this paper is to provide basic information to industry and public agencies that may be generators of small quantities of hazardous waste and to inform them of their responsibilities for proper hazardous waste management.

RESOURCE CONSERVATION AND RECOVERY ACT

The Resource Conservation and Recovery Act (RCRA) was enacted by Congress in 1976 to protect public health and the environment from improper management of hazardous waste. RCRA was primarily written to regulate hazardous waste managed by the larger generator. Since the initial enactment, RCRA has been amended to regulate the previously exempted small quantity generator. The State of Florida has adopted by reference the federal regulations governing the small quantity generator.

HOW CAN I DETERMINE IF I HAVE HAZARDOUS WASTE?

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2. Is the waste listed as a hazardous waste? (i.e., spent halogenated and certain non-halogenated solvents, see Table 2)
3. Is the waste hazardous because it exhibits a hazardous characteristic? (ignitable, corrosive, reactive, toxic, see Table 3)

Call DEP for a list of EPA Hazardous Waste codes for waste streams commonly generated

If your waste is not exempt and you answered yes to questions 2 or 3 for any waste produced then your business is a generator of hazardous waste.

Step 2:Determine Generator Size

The amount of all hazardous waste generated or accumulated at your business will determine which category you fit in (see Table 4). Each category has its own requirements for waste management. If you generate between 100 kg and 1,000 kg (220-2,200 lbs.) per month of hazardous waste and no more than 1kg (2.2 lbs.) of acutely hazardous waste in a calendar month, you are a regulated small quantity generator and the RCRA hazardous waste regulations require you to:

The Following Steps Apply to 100-1,000 Kg/month Small Quantity Generators

Step 3:Obtain an EPA Identification number

As a small quantity generator, you are required to obtain an EPA/DEP identification number by completing and submitting EPA Form 8700-12, Notification of Waste Activity. These forms can be obtained from DEP Tallahassee office or from any of the DEP district offices. The EPA/DEP I.D. number is site specific, so if you move to a new location you must get a new EPA/DEP I.D. number.

Step 4:Place Waste in a Labeled, Leak proof Container

The label must include:

1. The words "Hazardous Waste-Federal Law Prohibits Improper Disposal. If found, contact the nearest police or public safety authority or the U.S. Environmental Protection Agency";
2. Generator's Name and Address;
3. Manifest Document Number.
4. The container should also include:

- Description of the waste; and,
- The date the waste was first put into the container (accumulation start date).

In addition, you must follow DOT labeling requirements when you ship your container off-site. Your transporter should be familiar with these requirements, otherwise, call the Florida Department of Transpiration, Hazardous Materials Compliance Officer at 850-488-6289.

Step 5:Store Waste Properly; Accumulate Up To The Limits

General requirements for handling storage containers:

1. They must be in good condition.
2. Replace leaking containers.
3. Keep containers closed.
4. The containers must be compatible with the hazardous waste stored in them, and must meet DOT standards.
5. Do not mix wastes.
6. Provide adequate aisle space for easy access and visibility.
7. Containers must be inspected at least weekly to check for leaks and signs of corrosion.

As a small quantity generator, you are allowed to store on-site up to 6,000 kg (13,200 lb.) of hazardous waste for a period of 180 days.

Step 6: Transport and Dispose of Waste Properly

A generator is forever responsible for his or her hazardous waste. To reduce your liability and to ensure the waste is transported and properly disposed, choose a transporter that has met the following requirements:

1. Obtained an EPA/DEP I.D. number;
2. Use manifests;
3. Ablity to clean up hazardous waste discharges during transportation-related incidents;
4. Documentation of financial liability.

Transporters storing more than 24 hours at a transfer facility must notify the DEP and meet many TSD requirements, including containment, contingency plan, training, security and closure.

Step 7: Manifests and Transport of Hazardous Waste

The Uniform Hazardous Waste Manifest is a multi-copy shipping document that must accompany hazardous waste shipments. The State of Florida requires the use of this manifest when disposing of hazardous waste.

Step 8: Emergency Procedures Plan

1. Designate an emergency coordinator;
2. Post emergency information by the phone; and,
3. Provide and document adequate training for personnel handling hazardous waste.

Step 9: Preparedness and Prevention Plan

If you accumulate hazardous waste on-site, you are required to prepare a Preparedness and Prevention Plan.

1. Maintain a safe work place;
2. Accessible telephones;
3. Maintain fire extinguishers and spill control equipment;
4. Maintain aisle space in work area;
5. Notify police, fire department, and state emergency response teams of the types of wastes handled at your facility.

Step 10: Keep Records

Maintain these records for a minimum of three years:

1. Manifests;
2. Land Disposal Restriction (LDR) Forms;
3. Manifest exception reports;
4. Analytical and other reports;
5. Training documents;
6. Inspection logs; and,
7. Correspondence.

For additional information on the Small Quantity Generator requirements call or write for:

FLORIDA'S HANDBOOK FOR SMALL QUANTITY GENERATORS OF HAZARDOUS WASTE

Small Quantity Generator Program Coordinator, MS4555
Florida Department of Environmental Protection Hazardous
Waste Management Section
2600 Blair Stone Road Tallahassee, Florida 32399-2400
Phone: (850) 488-0300
www.dep.state.fl.us

April 7, 1998

LEACHING CHARICTARISTICS AND ASSESSMENT OF ABRASIVE BLASTING WASTE FROM SHIP MAINTENANCE FACILITIES AND SANDBALSTING CONTRACTOR SITES

By

Jenna Jambeck Carlson

A THESIS PRESENTED TO THE GRADUATE SCHOOL
OF THE UNIVERSITY OF FLORIDA IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR THE DEGREE OF
MASTER OF ENGINEERING

UNIVERSITY OF FLORIDA

1998

This thesis is dedicated to my husband, Brian John Carlson.

and adding a prescribed amount of extraction fluid to the top of the column and draining the leachate produced from the bottom. There is no proscribed leaching column procedure by the U.S. EPA and there are many variations to this type of study. The method used in this study was developed at the University of Florida and used for other waste studies (Brantley, 1998).

Both of the leaching processes discussed are useful in assessing the leachability of a waste. This study will compare these leaching processes with analytical data. Table 4-1 contains advantages and disadvantages to batch and lysimeter leaching tests.

Table 4-1. Comparison of Batch and Lysimeter Leaching

	ADVANTAGES	DISADVANTAGES
Batch Leaching	Reproducible	Not field conditions
	Simple design	Smaller sample/less
	Standardized test available	representative
Lysimeter Leaching	Larger, more representative sample	Channeling may occur
	Better simulates field conditions	Variable results
	More freedom in design	Difficult to set up

Methodology

The samples gathered for this study were apart of a sampling process done for each separate waste stream. The samples were collected over a two-day sampling trip in January 1998.

Sample Collection

All samples were collected in 13.2-Liter containers. Since metals were the primary pollutants of interest, nitric acid rinsed plastic containers and utensils were used. plastic containers and stainless steel sample utensils were used.

The containers were used to gather a large sample volume from each sample area to assure a representative sample of that area of the pile. The top of each sample area was scraped off and the sample taken from approximately 0.5-1m into pile. Samples were gathered systematically from a random starting point around the circumference of the piles, and encompassed a few weeks of compiled media. All sample areas were recorded and mapped for future reference. Table 4-2 contains descriptions and number of samples collected from each site.

Table 4-2. Ship Maintenance Facilities Sampled

Site	Media	Pile Mass (kg)	Dimensions (m)	No. of samples
Ship Blast A	Coal slag	27,000	12x5x3	12
Ship Blast B	Coal Slag	54,000	18x9x2	6
Sand Blast A	Silica Sand	91,000	600x600x1	6
Sand Blast B	Silica Sand	900	12x6x2	4 (19-L Cont.)

Unused ABM collected

Samples of raw ABM were obtained from the supplier to each site. The samples were taken from 22.7-kg bags purchased from Standard Sand and Silica. As discussed earlier, metals may exist in the raw ABM, which could classify the material as hazardous (very rare) or in which leachate from the raw ABM could cause groundwater contamination problems. The raw samples were treated the same as the used samples and all of the same analyses were performed on these samples.

Batch Leaching Tests

Batch leaching tests were performed on each sample that went into the lysimeters. A toxicity characteristic leaching procedure (TCLP) test was done as well as the synthetic precipitation leaching procedure (SPLP). These batch leaching test results could then be compared to the lysimeter leachate formed.

For both the TCLP and SPLP, the waste sample is size-reduced to a particle size below 9.5mm, and added to a leaching solution at a 20:1 liquid to solid ratio. The solid and liquid is mixed for 18 hours in a rotary extractor, the leachate is filtered, and then preserved and stored according to the parameter of interest (preserved at a pH of <2 for metals).

Lysimeters

Leaching columns, commonly called lysimeters, were filled with each site's waste stream. Two columns were also filled with the raw media to obtain background metal concentrations. A blank column, with only the drainage material was also used in the experiment to make sure no contamination came from the gravel used as drainage material. Figure 4-1 is a diagram of the filled lysimeter.

Filling process

The lysimeters were filled starting from the bottom with a stainless steel screen followed by acid rinsed gravel. This process was repeated three times and then the waste (approximately 1m) was placed on top. The gravel served as drainage material for the leachate so that it did not sit in the waste stream after it filtered through the material. The lysimeters are approximately 1.2m tall and 15cm in diameter.

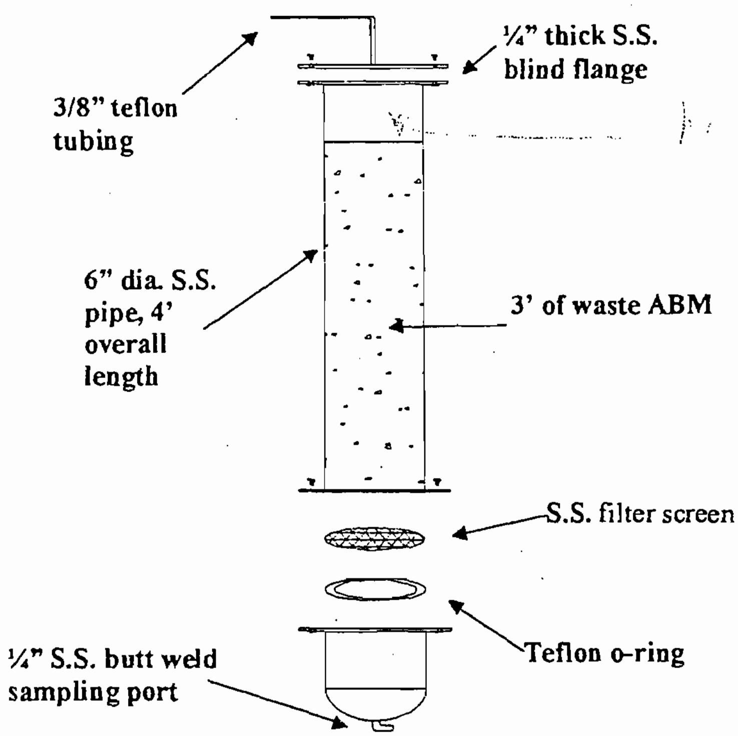

Figure 4-1. Diagram of Lysimeter Apparatus (Brantley, 1998)

The lysimeters are made of all stainless steel and Teflon tubing. The waste was loaded by creating a composite sample from each site and loading them into each column. Composite samples were formed by mixing a bowl full of waste from each sample container. These bowls were weighed separately and the total weight of each lysimeter recorded. Table 4-3 contains the lysimeter number and the type of sample contained in each. Sub-samples of approximately 300g were taken from the waste as it was loaded into the columns. These sub-samples were utilized for other tests including total metal analyses.

Table 4-3 Lysimeter Sample Information

Lysimeter	Site	Sample	Sample Wt. (kg)	Bulk Density (kg/m^3)
1	SM-A	Coal Slag	26	1477
2	SM-ADuplicate	Coal Slag	27	1495
3	SC-B	Silica Sand	28	1591
4	SM-B	Coal Slag	26	1369
5	SC-A	Silica Sand	31	1716
6	Unused	Raw Coal Slag	28	1591
7	Unused	Raw Silica Sand	29	1627
8	Control Blank	-	N/A	N/A

SM=Ship Maintenance Facility, SC=Sandblasting Contractor

Lysimeter leaching

Rainfall conditions were simulated in the lysimeter by discharging 1 liter of SPLP solution, with a pH of 4.2 into the lysimeter every other day. The leachate was added at a rate of 50ml per minute, which is equivalent to 5 cm of rainfall over the surface area of the waste. Every other day before the new SPLP solution was added, the leachate produced was drained. The volume of leachate was recorded and general parameters of the leachate were measured at this time. These parameters included pH, conductivity, oxygen reduction potential and dissolved oxygen. Portions of unpreserved leachate were saved for total dissolved solids, alkalinity, and anion analysis. Another portion was preserved for metal analysis with nitric acid. And a third potion was preserved with sulfuric acid for nonpurgible organic carbon (NPOC), and cation analysis.

how distributed

Results

A number of results were recorded for each composite sample. The results included a total metal analysis, batch-leaching study, and the six-week simulated leaching process. The total metal analysis and batch leaching study were performed on the composite sub-samples taken when the lysimeters were filled.

Composite Sample Analyses

The batch tests included both the SPLP and TCLP test. The sample taken from each site was non-hazardous for the 8 metals in 40 CFR 261 (arsenic, barium, cadmium, chromium, lead, mercury, silver, and selenium). The TCLP extract was also tested for copper, iron, nickel, and zinc. The SPLP extract analyses included the same metals, except for silver. Tables 4-4 through 4-6 are a summary of each lysimeter batch characteristics including total metal concentration, TCLP and SPLP Leaching.

The total metals found in the lysimeter samples are common metals that are found in paint and coal slag media. Lysimeters 1, 2, and 4 have similar characteristics because they are all ship maintenance used coal slag media. The similar characteristics of the unused coal slag media (Lysimeter 6) compared to the used media indicate that some of the metals (As, Cr, Ni) are inherent to the media and other metals (Cu, Zn, Pb) come more from the blasting residuals. The sandblasting contractor samples (Lysimeters 3 and 5) are similar except lysimeter 3 has more iron and lysimeter 5 has more zinc. The unused silica sand media contains no metals above detection limits except for a small amount of mercury and some iron.

The leaching concentrations of the samples vary somewhat, indicating that complex leaching mechanisms are involved in the batch processes. Lysimeter 1 and 2 duplicate well for some metals (Zn, Cu) but not as well for others (Fe). For TCLP tests, Lysimeter 4 leached the most copper and lead, lysimeter 6 leached the most iron and nickel, and lysimeter 5 leached the most zinc. For the SPLP results lysimeter 3 leached the most iron and lysimeter 5 leached the most zinc.

Table 4-4. Total Metal Concentration for each Comp. Sample (mg/Kg).

Metal	L1	L2	L3	L4	L5	L6	L7
As	1.99	2.38	0.1	1.92	<0.5	2.36	<0.5
Cd	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Cr	98.57	114.5	49.0	133.6	48.10	265.2	<5
Cu	1,910	1,125	<25	3,336	<25	28.10	<25
Fe	80,810	72,500	3,164	62,682	2,080	74,571	168.95
Pb	26.67	23.0	37.0	67.27	<20	<20	<20
Ni	59.05	68.5	12.0	56.36	12.38	129.52	<5
Hg	.004	.004	.002	.001	.002	.003	.001
Se	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Zn	1,464	1,523	104.5	1,623	1,145	98.62	<5

Table 4-5. TCLP Metal Concentration for each Comp. Sample (mg/L).

Metal	L1	L2	L3	L4	L5	L6	L7
As	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cd	0.004	0.004	0.015	0.004	0.001	<0.001	<0.001
Cr	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
Cu	17.5	20.0	<0.5	27.9	<0.5	<0.5	<0.5
Fe	5.58	1.54	4.97	1.47	<0.1	21.13	<0.1
Pb	0.103	0.080	0.062	0.171	0.084	<0.010	<0.010
Ni	<0.100	<0.100	<0.100	<0.100	<0.100	0.280	<0.100
Hg	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
Se	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Zn	62.6	57.9	26.4	58.8	81.0	0.100	<0.100

Table 4-6. SPLP Metal Concentration for each Comp. Sample (mg/L).

Metal	L1	L2	L3	L4	L5	L6	L7
As	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cd	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cr	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
Cu	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Fe	0.12	0.68	0.70	0.50	0.41	0.61	0.44
Pb	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Ni	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
Hg	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
Se	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Zn	1.68	2.63	0.25	1.07	1.81	<0.100	<0.100

Lysimeter Analyses

The first characteristics of interest for the lysimeters are the general parameters. These parameters can give some idea of what kind of processes are occurring inside the lysimeters and what type of conditions the waste was exposed to.

General Water Quality Parameters

Table 4-7 contains the number of readings, the range found, and the averages for many general parameters. Some of the parameters (pH, Conductivity, and NPOC) expressed trends that will be examined further. The pH is an important parameter that can affect the leachability of many substances as well as metal speciation. Figure 4-2 is the plot of pH for the lysimeters. Buffer capacity is the ability of a substance to resist pH change with the addition of a strong acid or base.

? X

Table 4-7. General Parameters for Lysimeters

	L1	L2	L3	L4	L5	L6	L7	L8
No. Collected	20	20	20	20	20	20	20	20
Avg. DO[1]	6.61	6.11	2.67	6.39	4.65	6.88	8.56	8.50
Max	8.03	7.07	6.05	7.5	5.63	8.54	9.08	8.8
Min	4.67	4.86	1.5	5.31	3.27	4.54	8.00	7.9
Avg. ORP	481.3	480.6	181.4	464.5	539.6	563.5	599.0	614.8
Max	548	547	568	577	588	615	649	658
Min	227	226	-133	194	400	430	507	558
Avg. pH	7.20	7.15	7.03	7.22	7.00	5.96	4.36	4.04
Max	7.35	7.29	7.38	7.44	7.12	7.54	5.04	4.30
Min	6.90	6.94	6.67	6.12	6.84	2.88	2.97	3.16
Avg. TDS[1]	476	404	513	518	238	91	61	48
Max	980	980	1830	1340	1320	400	360	180
Min	160	120	280	280	60	0	0	0
Avg. Conduct.[2]	729	672	685	785	248	146	106	55
Max	1551	1265	1494	1850	344	985	782	464
Min	428	512	525	494	205	41	23	16
Avg. NPOC[1]	9.81	6.0	50	11	5.0	0	1	0
Max	23.1	18.0	341	32.5	34.7	0.999	2.44	1.26
Min	5.19	4.05	18.9	7.75	2.13	0.06	0.124	0
Avg. Alk.[3]	321	291	273	280	118	1	0	0
Max	449	375	320	370	131	3	0	0
Min	210	250	246	230	106	1	0	0

[1]Units in mg/L
[2]Units in uS
[3]Units in mg/L as $CaCO_3$

Other pH buffers include metal ions and oxidation reduction potential buffers (Snoeyink and Jenkins) and ions like carbonate contribute to the buffering capacity. Lysimeters 1 through 5 had some buffering capacity as they brought the pH of the fluid up to approximately 7. Lysimeter 6 (raw coal slag) also had buffering capacity, but expressed it at a slower rate. Lysimeter 7 (raw silica sand) had little buffering capacity expressed late. As expected, the SPLP fluid did not change pH in the control lysimeter.

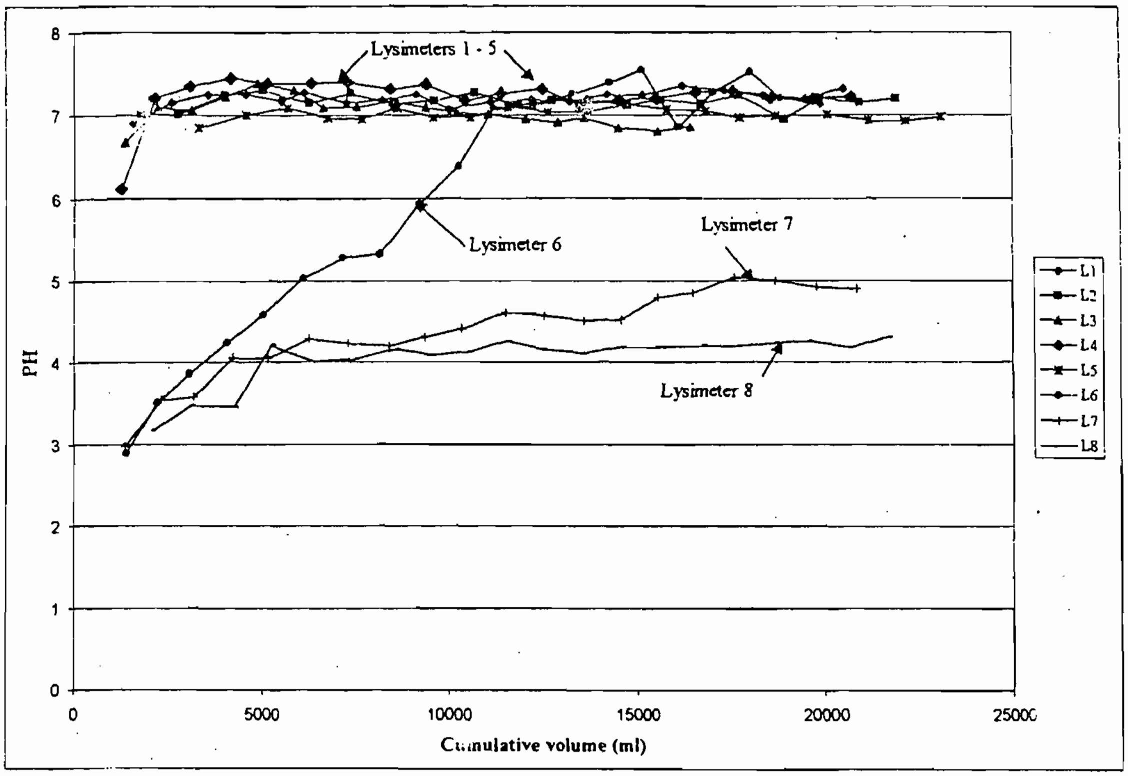

Figure 4-2. Lysimeter pH graph.

The DO level may indicate whether biological reactions are occurring in the lysimeters. From Table 4-7 DO data, Lysimeter 3 is the only lysimeter with some potential biological activity. This data is confirmed by the nonpurgible organic carbon data following. There was little organic carbon in these lysimeters except for lysimeter 3. The graph of the nonpurgible organic carbon follows a typical leaching curve for lysimeter 3 (Figure 4-3).

Direct Human Exposure

The total metal concentrations of the waste ABM samples were compared to the EPA SSLs and the Florida Soil Cleanup Goals. As discussed previously, these goals are tools for assessing the contamination or cleanness of soil. Further investigation of a site or monitoring may be suggested for a site that exceeded risk-based limits. No samples exceeded any federal risk-based SSL. None of the samples exceeded the residential or industrial limits of the Florida Soil Cleanup Goals. These sites are in industrial areas and typically the industrial goals would apply. Many states may have similar or stricter guidelines, and all local regulations apply to the management of this waste.

Risk to Groundwater

The drinking water standards used as groundwater guidance concentrations are regulations that can be enforced by federal and state agencies. In this study, one sample out of 15 exceeded a primary drinking water standard. The sample exceeded the 0.005 mg/L limit for cadmium at 0.009 mg/L. Both the arithmetic and geometric mean of the cadmium data were under the primary standard. One metal exceeded secondary drinking water limits in other samples. Seven samples exceeded the 0.3 mg/L limit for iron. The arithmetic mean for iron exceeded the secondary standards by .01 mg/L, however the geometric mean did not exceed the standard. The distribution of iron looks normal and so the arithmetic mean would be applied.

1 primary hit for cadmium

7 secondary hits all for iron

The U.S. EPA leaching based SSLs are based on the theoretical leaching model discussed previously for soils. Because waste ABM possesses soil-like characteristics, this model was applied. These numbers are an indication of a potential leaching concern for soils with these total metal concentrations. The leaching based SSL for chromium of

38mg/kg was exceeded by seven of the waste ABM samples. None of the other leaching based SSLs were exceeded. However, none of the SPLP samples actually leached above the drinking water standard for chromium even though they exceeded the leaching based SSL total metal concentration. This may indicate that the waste ABM possesses different leaching mechanisms than the ones used to calculate the theoretical leaching model. Table 3-8 is a summary of the leaching limit (batch and theoretical) and which samples exceeded the respective limits

Table 3-8. Summary of Leaching Limits and Comparative Results.

	As	Cd	Cr	Cu	Fe	Pb	Ni	Se	Zn
Prim. DWS (mg/L)	.05	.005	0.1	-	-	0.015	0.1	.05	-
Secd. DWS (mg/L)	-	-	-	1.0	0.3	-	-	-	5.0
SSL-Leach (mg/kg)	29	8	38	N/A	N/A	N/A	130	5	12,000
No. above Prim.	0	1	0	-	-	0	0	0	-
No. above Secd.	-	-	-	0	7	-	-	-	0
No. above SSL	0	0	7	-	-	-	0	0	0

Correlation of Data

These leaching numbers correlate with the total metal data shown earlier. A correlation of total metal amounts and leachability was done for the individual samples above the detection limits. There was no correlation found between the leachable and total metals concentrations (correlation coefficient <0.1). The range of percent leaching (of total metal concentration) was 0.7-13.4% for zinc. The range for percent leaching of iron was <6.3%-53.5%.

Conclusions

Sandblasting contractor waste was non-hazardous from the sites characterized in this study. The sites sampled for this research blasted various equipment from scaffolding to heavy machinery. The concentration of heavy metals in the sandblast grit did not pose direct threat to human health when compared both state and federal risk-based standards. Although the leaching level for chromium was exceeded for the federal SSL, the samples did not leach above the primary drinking water standard when extracted with either TCLP or SPLP.

The secondary drinking water standard for iron is exceeded in the SPLP leachate produced by this waste 46% of the time. Results exceeding this standard could force generators to dispose of this waste in lined landfills. If this waste must be stored on property, care should be taken to minimize the amount of leachate produced.

CHAPTER 4
LEACHING CHARACTERISTICS OF WASTE ABRASIVE BLASTING MEDIA

Introduction

Abrasive blasting removes paint, coatings, and corrosion from primarily metallic surfaces. This blasting process produces a solid waste, which contains the media used to blast as well as any material removed from the surface. This solid waste often contains measurable levels of heavy metals from paints, coatings (pigments and additives) and the blasting media itself. The management of waste abrasive blasting media (ABM) includes discard on-site, landfilling, and recycling. A framework for determining proper management has been previously outlined (Carlson and Townsend, 1998). Consideration must be given to the risk to human health through direct exposure and to the risk of groundwater contamination through chemical leaching.

The largest producers of this waste stream are ship maintenance facilities, military operations, and the transportation departments (steel bridges) (Townsend and Carlson, 1997). The characteristics of waste ABM from military operations and bridge blasting have been investigated to some extent (EPA, 1994, Medford, 1989) because of the potential for this material to be hazardous and the coordinated environmental efforts of these organizations. Waste ABM from operations such as shipyards and sandblasting contractors have received less attention. This results from the smaller nature of these organizations and the greater likelihood for this material to be non-hazardous. However, even a material that is non-hazardous potentially poses a risk to the environment if managed improperly.

This study focuses on the leaching characteristics of waste abrasive blasting media from ship maintenance facilities and sandblasting contractor sites. The general characteristics of these waste streams and their proper management under current regulatory policy has been previously reported in Chapters 2 and 3. These chapters raised concern over waste ABM exceeding some secondary drinking water limits when extracted with the synthetic precipitation leaching procedure. More investigation of the leaching mechanisms was needed to properly address this issue. This chapter analyzes the phenomenon of chemical leaching from waste ABM through column leaching tests to better simulate field conditions, in addition to standardized regulatory leaching tests. The relationship between these tests and the impact of waste ABM chemical leaching on the environment are explained.

Background

Leaching tests have been used for many years to determine what leaches off a material under various conditions. Standardized leaching tests have been developed for regulatory work and site assessment. These standard tests are typically easy to replicate batch leaching tests, however leaching column studies also have been developed to determine the leachability of a waste.

Batch Leaching

The Toxicity Characteristic Leaching Procedure (TCLP) is a batch leaching extraction test prescribed by the U.S. EPA for determination of the toxic characteristic of a hazardous waste (40 CFR 261). In this test, a solid waste is extracted using a leaching fluid for 18 hours. The leaching fluid is an acetic acid based solution, with a pH that is dependent on the buffering capacity of the waste. The leaching solution is designed to simulate anaerobic conditions within a landfill. If a waste is not landfilled, the TCLP may not be an accurate representation of what would happen in the natural environment. A test called the Synthetic Precipitation Leaching Procedure (SPLP) may predict leachate in the environment more accurately. This test is exactly like the TCLP except the extraction fluid is made from dilute nitric and sulfuric acids (simulating rainfall), with a pH 4.2 for sites east of the Mississippi River.

Many other leaching tests have been proposed and used in the past and still may be in use today. These tests include the Monofilled Waste Extraction Procedure (MWEP), U.S. EPA Extraction Procedure (EP replaced by TCLP), Ham Procedure C, Acetate Buffer Extraction Procedure (ABEP), and Saturated Paste Procedure (PASTE), (Jackson and Bisson, 1990). These tests are all batch extraction processes with liquid added to a prescribed amount of solid sample and agitated for a certain amount of time. Some of the tests involve multiple additions of extraction fluid. The extraction fluid is then analyzed for contaminants of concern.

Column Leaching

Leachability of waste can also be assessed in column leaching studies. Column leaching, or lysimeter studies consist of filling a container (often a cylinder) with a particular waste

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1
INTRODUCTION

Abrasive Blasting

Abrasive blasting removes paint and coatings from surfaces. It proves advantageous over chemical stripping in many cases because while removing coatings, the abrasive blasting also prepares the surface for repainting. Abrasive blasting is also utilized to prepare clean new surfaces (e.g. steel) for a first coat of paint. The process of abrasive blasting involves a high-pressure spray of media at the surface. After contacting the surface, the media falls to the ground carrying materials from the blasted surface with it. This used media is a solid waste, but many times has not been recognized as such in the past.

The waste abrasive blasting media (ABM) has many soil-like properties and many generators have allowed this waste to accumulate on site. Concerns for waste contamination have focused primarily on the heavy metals in this waste stream. Many heavy metals are used in coatings for pigments, anti-corrosive agents, and biocides (Lambourne, 1987). This thesis discusses the management of this waste stream and begins to characterize the metals in waste ABM from a few specific generators to assess the possible risk to human health and the environment. Management concerns with this waste include direct human exposure, as well as leaching characteristics of the waste.

Management

Because the proper management of ABM waste stream is a relatively new concern, the correct management techniques and regulatory practices required for generators have not always been clearly outlined. Previous research by the author involved the development of a management strategy for generators to follow. This strategy provided a stepwise approach to evaluate options for management as well as the analytical testing needed for each option (Figure 1-1). With a non-hazardous waste a generator may simply dispose of it in an acceptable lined landfill, recycle it, or continue testing for other less expensive potential disposal options including disposal in an unlined landfill or land application (Carlson and Townsend, 1998).

Regulations and Standards

Regulations exist regarding the leachability of chemicals from a waste. As seen in the flow chart, a solid waste is determined to be hazardous or not through the Toxicity Characteristic Leaching Procedure (TCLP) (waste ABM is not listed and typically possesses no other hazardous characteristics). Once a waste has been determined to be non-hazardous, other analytical assessments may be made to assist in management decisions. A waste can potentially cause a threat to human health and the environment through direct human exposure and groundwater contamination.

Risk-based standards are used to assess the direct exposure threat of this solid waste. Risk-based standards are in use or will be in use soon by many federal and state regulatory groups. These standards are developed through a "risk assessment" of contaminants including a hazard identification, dose-response assessment, exposure estimate, and risk-characterization (Andrews, 1997). Many assumptions are made in these analyses, making them controversial and open to challenge. Regardless of the validity of these standards at this time, they do exist at federal, state, and local levels, and so they must be considered.

Examples of risk-based standards include the soil screening guidelines (SSLs) written by the U.S. EPA in 1995, the sewage sludge application rules in Chapter 40 Part 503 of the Code of Federal Regulations, and the Florida Soil Cleanup Goals (1996). These standards are used as tools for determining "cleanliness" in site assessment.

Other leaching tests may be performed to assess the risk to groundwater from waste leachability, like the Synthetic Precipitation Leaching Procedure (SPLP). The concentration of chemicals in the SPLP leachate may be compared to Primary and Secondary drinking water standards. These standards have been adopted by many states as the maximum permissible level in groundwater supplies. Management of a solid waste such as ABM in a manner that results in off-site groundwater contamination above drinking water limits is typically not permitted.

The increased regulation of solid wastes ABM has confused many generators and added to their operating expenses. This research was a part of a project to develop best management practices for the abrasive blasting industry. A consistent regulation and management of this waste stream was needed. This research strives to highlight possible environmental concerns for this waste, and to characterize some waste through total metals and leachability. A proper management plan for this waste stream could conserve on analytical costs for the generator, while protecting the environment from potential contamination.

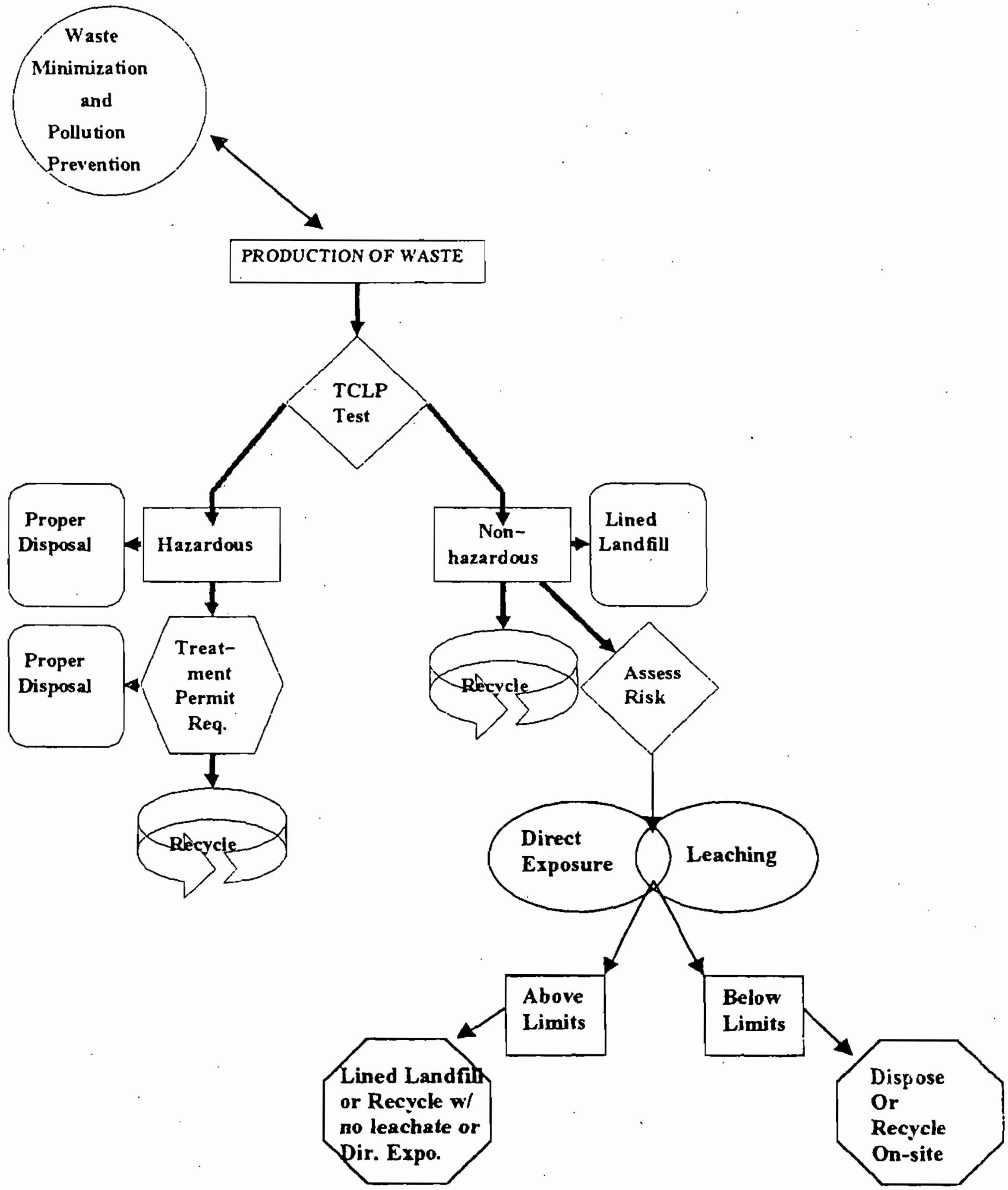


Figure 1-1. Management Flow Chart for ABM waste

Organization of Thesis

This thesis is divided into three separate papers. Each paper will eventually stand alone for publication. Chapter two and chapter three have similar formats for characterizing waste but discuss different waste streams in the ABM industry. These two waste streams generated by ship maintenance facilities and sandblasting contractors need to be separated because of the very different media and applications used by each generator. The leachability concerns of chapters two and three lead to the development of chapter four. Chapter four compares the batch leaching tests similar to those used in chapters two and three with a leaching column (lysimeter) study for the same waste streams. The goal of the lysimeter study was to provide more field-like conditions and then compare the results with the batch leaching procedures. All three chapters relate to each other and tie in the relationship of the management and characterization of this waste stream. Chapter five discusses conclusions to this research and includes ideas for possible future work.

CHAPTER 2
CHARACTERISTICS OF WASTE ABRASIVE BLASTING MEDIA FROM SHIP MAINTENANCE FACILITIES

Introduction

Ship maintenance facilities utilize abrasive blasting to remove coatings from ships and barges and to prepare those surfaces for painting. The process of abrasive blasting, which involves a high-pressure spray of an abrasive media at a surface, generates a solid waste. This waste is composed of the media itself as well as any material removed from the surface of the ship. The waste typically has sand and soil-like physical properties but these characteristics are also dependent on the type of media used.

Normally, the abrasive blasting is performed at a "dry dock" facility where the waste is allowed to accumulate around the ship on the dock surface. The waste must be removed periodically and then the waste is typically stored on site. It is not economical to remove small amounts of this waste and it is normally stockpiled until a large enough quantity accumulates to make transportation for disposal or recycling economically feasible. In some areas the waste may not be removed and allowed to accumulated on site or even fall into the water surrounding the dock area.

As with any solid waste, abrasive blasting media (ABM) waste must be properly stored and managed to minimize impact on human health and the environment. A main concern with waste ABM is the heavy metal content resulting from the paint and coatings or from the media itself. A waste pile could pose a risk to human health through direct exposure or through leachate produced when it rains. This chapter reports the results of research conducted to collect information necessary for the decision making process involved with the storage and management of waste ABM from ship maintenance facilities. This research characterized waste ABM from three ship facilities to address direct human exposure, leaching risks and assess the potential impacts this waste stream could have on the environment. While these results do not universally characterize waste ABM from ship maintenance facilities, the information provided does set a foundation for the potential concerns facility operators and regulators should address.

Background

Abrasive Blasting Media

Many different types of media are used for abrasive blasting. Silica sand has traditionally been the most widely utilized, but other media include coal slag, garnet, plastic, glass bead, steel shot/grit, and crushed walnut shells. Specific types of ABM are used for different processes depending on the media characteristics. These characteristics also dictate the options for reuse and recyclablility of the spent media (Townsend and Carlson, 1997). A recent study (1997) by the National Shipbuilding Research Program found that coal slag and copper slag comprise almost 90% of the ship rehabilitation and maintenance industry's use of abrasives. The other 10% is made up of steel grit and shot and sand media.

The most common abrasive blasting media encountered at ship maintenance facilities in this study was a coal slag media sold by the trade name, Black Beauty™. Coal slag is produced during the coal burning process when the bottom ash/slag (molten material) produced from the hot temperatures of coal combustion is rapidly quenched, shattering apart to create small irregular shaped particles. These particles are then graded and sold as ABM.

The major constituents of coal ash, aluminum and silicon, almost always occur in a virtually insoluble form of aluminosilicate (Wu and Chen, 1987). In general, the largest quantity of soluble material in coal ash is composed of calcium, magnesium, potassium, sodium sulfates, and anhydrous oxides. The soluble matter also includes several mg/L of iron, nickel, and zinc sulfates, as well as trace amounts of chromium, copper, lead, arsenic, and cadmium (Hart and DeLaney, 1978). The amount of trace metal contaminants in this slag media is variable and dependant on type and grade of coal burned as well as the plant operating procedures and conditions (Wu and Chen, 1987). The metal content of the unused slag media may also play a role in determining management requirements.

Origination of Metals in Waste ABM

Even though raw ABM may contain heavy metals, the traditional concern with ABM waste has been from metal contaminants introduced by the paint removal process. Coatings and paint contain various constituents, including binders, solvents, additives, primary pigments, and extenders. Many of these constituents may be either organic or inorganic. Typically the organic components are the binders and solvents, but additives, pigments and extenders may also be synthetic organic compounds. The inorganic components, usually composed of a metallic compound, are commonly primary pigments, additives, and extenders (Lambourne, 1987).

The principal pigment in use is titanium dioxide, which is a white pigment made popular because of fashion concerns. In the past, a common pigment used was lead silicate or sulfate, because other metals were used as additives and not pigments

(Lambourne, 1987). The toxicity of this metal has required the phasing out of the use of lead for many applications (Stoffer, 1997). However, lead contaminated ABM waste may still be encountered if an older coating is removed from a ship surface. Other highly toxic pigments including cadmium and chromium are normally used in specific industrial applications where needed and are being phased out of more general use (Lambourne, 1987).

Pigments are not the only metallic component of paints and coatings. Coatings and paints for ships also include additives such as anti-corrosive agents and biocides. Anti-corrosive agents help extend the life of the paint in the harsh marine environment and biocides minimize the growth of algae and barnacles (Munger, 1984). Controversial biocides include mercury and the butyltin compounds, including tributyltin. Because of its acute toxicity, mercury has been phased out and is often prohibited as use of a biocide (Munger, 1984). The butyltin compounds remain in use but have been found to bioaccumulate in the blubber of some marine animals (Kannan et al., 1997). To control the leaching of this compound in the aquatic environment, the Organotin Antifouling Paint Control Act of 1988 limits the use of tributyltin to ships over 25ft in length (except for aluminum hulls) and limits the overall leaching rate of a coating. However, there are currently no direct exposure, primary or secondary drinking water standards for this compound.

Table 2-1 is a list of common metals used for pigments, anti-corrosive agents, and biocides. The heavy metals evaluated in this research focused on the metals listed in the table, as well as other trace metals sometimes encountered in the unused coal slag media.

research has indicated that organic compounds are not usually encountered when dealing with waste ABM (Townsend and Carlson, 1997).

Direct human exposure limits

A non-hazardous waste is still a solid waste and is subject to state and federal regulation. When waste is allowed to accumulate on-site, as ABM typically is, it may be subject to direct exposure and groundwater contamination limits. Once a waste has been found to be non-hazardous, other analytical assessments may be made. The total metal concentration is a measure of the total amount of metal in a solid sample of the waste ABM. This metal content can be compared to both federal regulations and state direct exposure guidelines as presented in Table 2-2. Direct exposure limits are a tool to assess the contamination or cleanliness of a site. The U.S. Environmental Protection Agency has published a Soil Screening Guidance Document with limits (SSLs) for many contaminants in soil based on a risk-associated calculation. When the SSLs are exceeded further investigation may be required, but the result does not necessitate cleanup (U.S. EPA, 1995). Many states have their own soil screening, guidance levels, or goals. State limits may be more stringent than the federal limits, requiring further investigation at the state level.

Leaching model limits

Along with the risk-based concentration limit in the SSLs is a leaching concentration limit for total metals. This second set of total metal concentrations was calculated from the drinking water standards with a theoretical leaching model. First, the drinking water standard was multiplied by a dilution/attenuation factor of 20. This factor was selected by a "weight of evidence" approach by EPA. This overall factor accounted

Table 2-1. Application of Metals in Ship Coatings.

Metal	Pigment Color	Anti-corrosive	Biocide
Cadmium	Orange, Yellow, Red	Good (Red Compounds)	N/A
Chromium	Orange, Yellow, Green	Good (Green Compounds)	N/A
Copper	Red	Good	Yes
Iron	Blue, Yellow, Red, Black, Brown	Good	N/A
Lead	White, Red, Blue	Good	N/A
Nickel	Yellow	Good	N/A
Zinc	White, Yellow	Excellent	N/A

Regulation

A number of regulatory issues must be addressed in regard to the management of any solid waste, including waste ABM. The regulatory steps that must typically be evaluated for management have been previously summarized (Carlson and Townsend, 1998). Federal regulations require a generator to characterize waste produced as hazardous or non-hazardous. A hazardous waste must be managed strictly according to federal regulations. Waste ABM is not a listed hazardous waste and the characteristic most encountered to classify the waste as hazardous is toxicity.

Hazardous characteristic

The toxicity characteristic leaching procedure (TCLP) test is the assay described by the EPA to determine whether a solid waste is hazardous by toxicity characteristics (40 CFR 261). In this test, a solid waste is extracted using an acetic acid based leaching solution, with a pH that is dependent on the buffering capacity of the waste. The leaching solution is designed to simulate anaerobic conditions within a landfill. TCLP leachate concentration limits have been established for a number of metals and organic compounds. If the leachate concentration from a waste is at or above these limits, it is hazardous. Past for dilution and attenuation in the environment for a 0.5-acre area. A total metal concentration was calculated that would result in the augmented drinking water standard. The model for this calculation incorporated the partition coefficient of each compound. Figure 2-1 is the equation used by the U.S. EPA to calculate the total metal concentration from the drinking water standards.

$$C_t = C_w\left(K_d + \frac{\theta_w + \theta_a H'}{\rho_b}\right)$$

Where C_t=screening level in soil (mg/kg)
C_w=target soil leachate concentration (mg/L)
K_d=soil-water partition coefficient (L/kg)
θ_w=water-filled soil porosity (assumed 0.3)
θ_a=air-filled soil porosity (assumed 0.13)
ρ_b=dry soil bulk density (assumed 1.5 kg/L)
H′=dimensionless Henry's Law Constant (H-atm-m^3/mol x 41(C.F.))

Figure 2-1. U.S. EPA Soil Screening Guidance Theoretical Leaching Equation

The EPA recognized that partition coefficients, especially for metals, are affected by many situational circumstances. The K_d may be affected by pH, oxidation-reduction potential, iron oxide content, soil organic matter content, cation exchange capacity, and major ion chemistry, among others (U.S. EPA, 1995). Therefore, some actual testing of a contaminated site should follow the theoretical values calculated.

Batch leaching limits

Drinking water limits, often used as groundwater limits, are state and federal regulatory limits that must not be exceeded. Federal groundwater limits may be supplemented by more stringent and extensive state regulations. Although the TCLP test is primarily used to determine hazardous characteristics, it is sometimes used to determine potential

the impact of a waste on groundwater when the waste is stored or disposed in non-landfill conditions. A more suitable test for this scenario is the synthetic precipitation leaching procedure (SPLP). The SPLP assay uses a leaching solution made from nitric and sulfuric acid that simulates acid rain with a pH of 4.20 (sites located east of the Mississippi River). It is the preferred choice by many regulators for determining impacts of waste on groundwater(WDNR, 1997). Other than the leaching solution, which is less aggressive than the TCLP solution to simulate rainfall, all other aspects of the test remain the same as the TCLP test.

Table 2-2 contains primary and secondary federal drinking water standards, as well as the federal generic SSLs (risk-based and leaching) for a number of metals. The Florida soil cleanup goals are included as an example of state ~~regulatory standards~~, for both a residential and an industrial setting.

risk-based contaminant guidelines

Table 2-2. Regulations and Guidelines for metal concentrations.

Metal	Drinking water Primary (ug/L)	Drinking water Secondary (ug/L)	SSLs (mg/kg) Risk	SSLs (mg/kg) Leach.	Residential FSCG (mg/kg)	Industrial FSCG (mg/kg)
As	50	-	0.4	29	0.8	~~3.1~~ 3.7
Ba	2,000	-	5,500	1,600	~~5,200~~ 105	~~84,000~~ 87000
Cd	5	-	78	8	~~37~~ 75	~~600~~ 1300
Cr	100	-	390	38	290	430
Cu	-	1,000	N/A	N/A	~~N/A~~ 105	~~N/A~~ 11000
Fe	-	300	N/A	N/A	~~N/A~~ 23000	~~N/A~~ 490,000
Pb	15	-	400	N/A	500	~~1,000~~ 920
Hg	2	-	23	23	~~23~~ 3.7	~~480~~ 28
Ni	100	-	1,600	130	~~1,500~~ 105	~~26,000~~ 28000
Se	50	-	390	5	390	~~9,900~~ 10,000
Ag	-	100	390	34	390	~~9,000~~ 9100
Zn	-	5,000	23,000	12,000	23,000	560,000

Methodology

Sample Collection

The samples collected as part of this study all came from ship maintenance facilities located at a port in Tampa, Florida. Several different facilities were sampled on the same day (January 9,1998). Since metals were the primary pollutants of interest, nitric acid rinsed plastic containers and stainless steel sample utensils were used.

All samples were collected in 13-Liter containers. The containers were used to gather a large sample volume from each sample area to assure a representative sample of that area of the pile. The top of each sample area was scraped off and the sample taken from approximately 0.5-1m into pile. Samples were gathered systematically from a random starting point around the circumference of the piles, and encompassed a few weeks of compiled media. All sample areas were recorded and mapped for future reference. Table 2-3 contains descriptions and number of samples collected from each site.

Table 2-3. Ship Maintenance Facilities Sampled

Site	Media	Pile(s) Mass (kg)	Dimensions (m)	No. of samples
Ship Blast A	Coal slag	27,000	12x5x3	12
Ship Blast B	Coal Slag	54,000	18x9x2	6
Ship Blast C	Coal Slag	36,000/18,000	15x4x5/10x5x4	8

Unused ABM collected

Samples of raw ABM were obtained from the supplier to each ship maintenance facility. The samples were taken from 23-kg bags purchased from Standard Sand and Silica. As discussed earlier, metals may exist in the raw ABM, which could classify the material as hazardous (very rare) or in which leachate from the raw ABM could cause groundwater contamination problems. The raw samples were treated the same as the used samples and all of the same analyses were performed on these samples.

Sub-sampling

The 13-Liter containers collected at each site were mixed thoroughly in the lab. A sub-sample of 400g was taken from each bucket. Sub-sampling created a smaller volume for analytical analysis and ensured similar sample was used for both total metal and leaching analyses. A composite sample from each site was formed at a later time. The composite sample was used to determine if the waste was hazardous or not.

Analysis of Waste ABM

The waste ABM was tested for both total metal concentrations and leachable metal concentrations. Two primary leaching methodologies from EPA SW-846 were used, the TCLP (EPA Method 1311) and the SPLP (EPA Method 1312) For both leaching tests, 2 liters of appropriate fluid was added to 100g of the solid material. The solid and liquid was mixed for 18 hours in a rotary extractor, the leachate was filtered, and then preserved and stored according to the parameter of interest (preserved at a pH of <2 for metals). The metals chosen for examination from a leaching and groundwater contamination perspective consisted of metals that were detected in the total metal content of the samples.

The methods used for the digestion and analysis of the samples are also from the EPA SW-846 manual. These methods included 3050b for digestion of solid samples and methods 3010 and 3020 for digestion of liquid samples for the flame and furnace, respectively. Samples were analyzed on a Perkin Elmer 5100 atomic absorption spectrophotometer equipped with a flame and a furnace.

Results

TCLP Leaching

The composite samples from each ship maintenance facility were analyzed using the TCLP test to determine whether or not they were hazardous by toxicity characteristic. Table 2-4 contains the TCLP limits and results from this study.

Table 2-4. TCLP Limits and Results.

	As	**Ba**	**Cd**	**Cr**	**Pb**	**Hg**	**Se**	**Ag**
TCLP Limit	**5.0**	**100.0**	**1.0**	**5.0**	**5.0**	**0.2**	**1.0**	**5.0**
Det. Limit	.001	10	.001	.100	.010	.001	.010	1
Ship Site A	BDL	BDL	.004	BDL	.103	BDL	BDL	BDL
Ship Site B	BDL	BDL	.004	BDL	.171	BDL	BDL	BDL
Ship Site C	BDL	BDL	.005	BDL	.155	BDL	BDL	BDL

*Units mg/L, BDL=Below Detection Limit

Total Metals

Table 2-5 presents an overview of the total metal data for each metal including the detection limits, the percent of samples above the detection limit, and the maximum and minimum concentration for each metal. All metals analyzed for were 100% detected, except for cadmium and selenium, which were below the detection limit for all samples. The standard deviations for the arithmetic means of the data sets were high and variable so a log transformation was performed on each data set. The transformation was done to make the variances uniform to facilitate future comparisons (Berthouex and Brown, 1994). Figures 2-2 through 2-5 show the histograms for the distributions of zinc, lead, copper, and nickel, which fit the lognormal distribution.

Table 2-5. Total Metal Content in Ship Maintenance Waste ABM (mg/kg).

	As	Cd	Cr	Cu	Fe	Pb	Ni	Se	Zn
No. of Samples	23	23	23	23	23	23	23	23	23
Detection Limit	0.05	2.5	5	25	5	25	5	0.5	5
% Detects	100%	0%	100%	100%	100%	100%	100%	0%	100%
Minimum	0.23	N/A	39.7	62.19	42,881	25.6	41.7	N/A	119.7
Maximum	4.46	N/A	135.3	4,131	109,479	446	100.8	N/A	8,885
Geo. Mean	1.07	N/A	76.6	607.6	53,084	77.3	58.2	N/A	1,262
Geo. Std. Dev.	0.68	N/A	1.50	2.88	1.28	2.06	1.21	N/A	3.04
Arith. Mean	1.72	N/A	82.6	1,007	54,909	102	59.3	N/A	2,054
Arith. Stnd. Dev.	1.29	N/A	31.0	1,100	17,008	94.0	12.3	N/A	2006

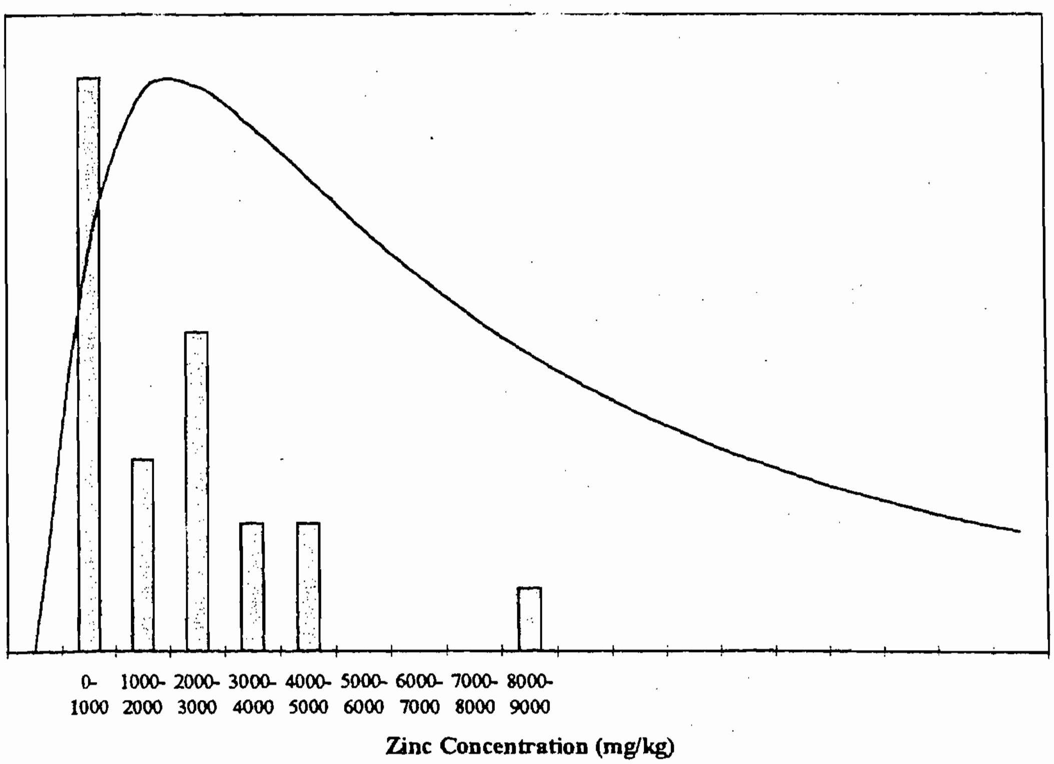


Figure 2-2. Zinc Histogram and Lognormal Distribution

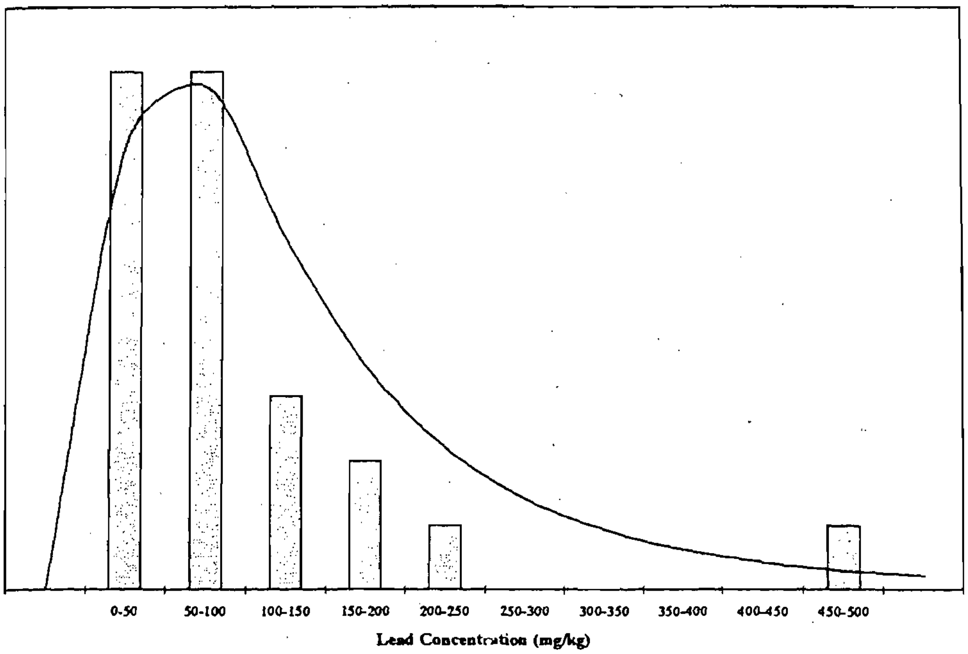


Figure 2-3. Lead Histogram and Lognormal Distribution.

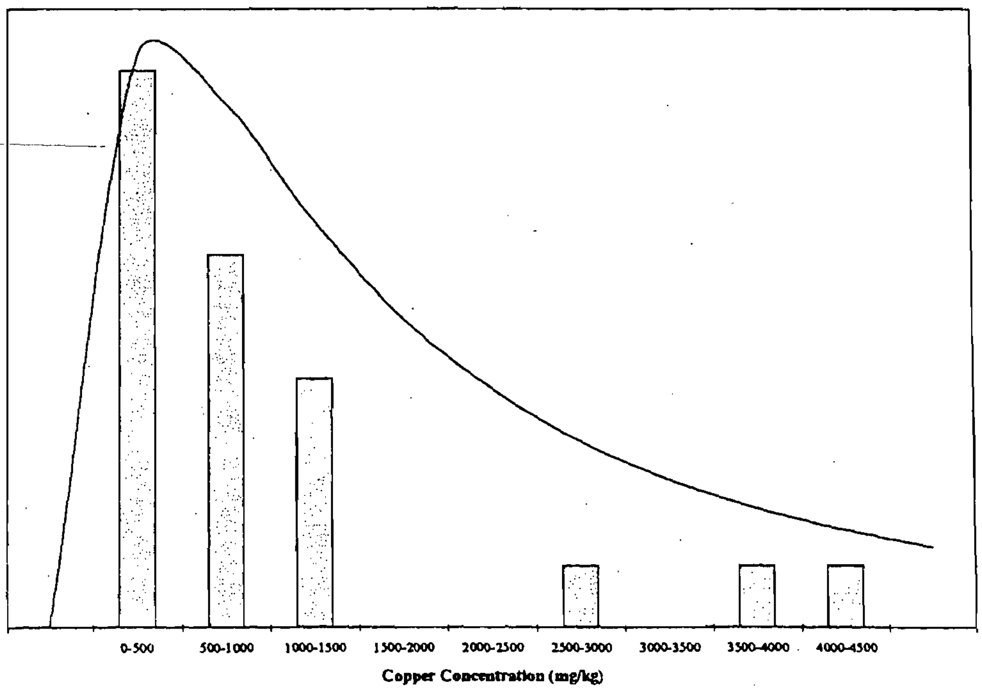


Figure 2-4. Copper Histogram and Lognormal Distribution.

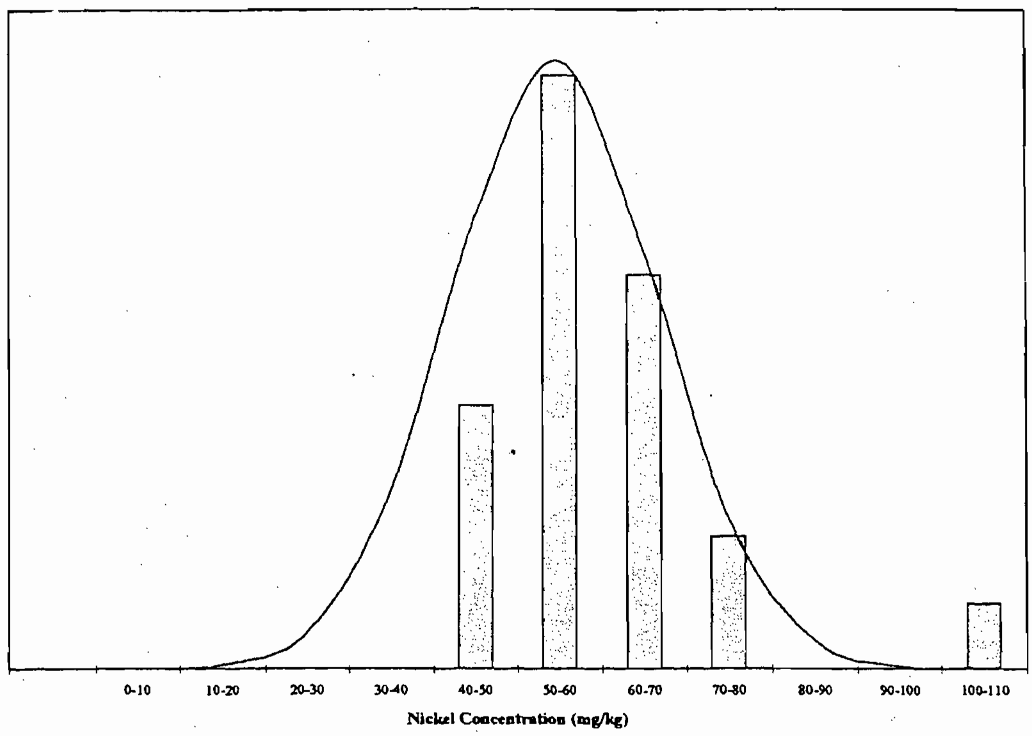


Figure 2-5. Nickel Histogram and Lognormal Distribution.

As discussed earlier, raw coal slag media may contain heavy metals, which contribute to the metal content of this waste stream. Figure 2-6 compares the concentrations of metals in the raw and used media.

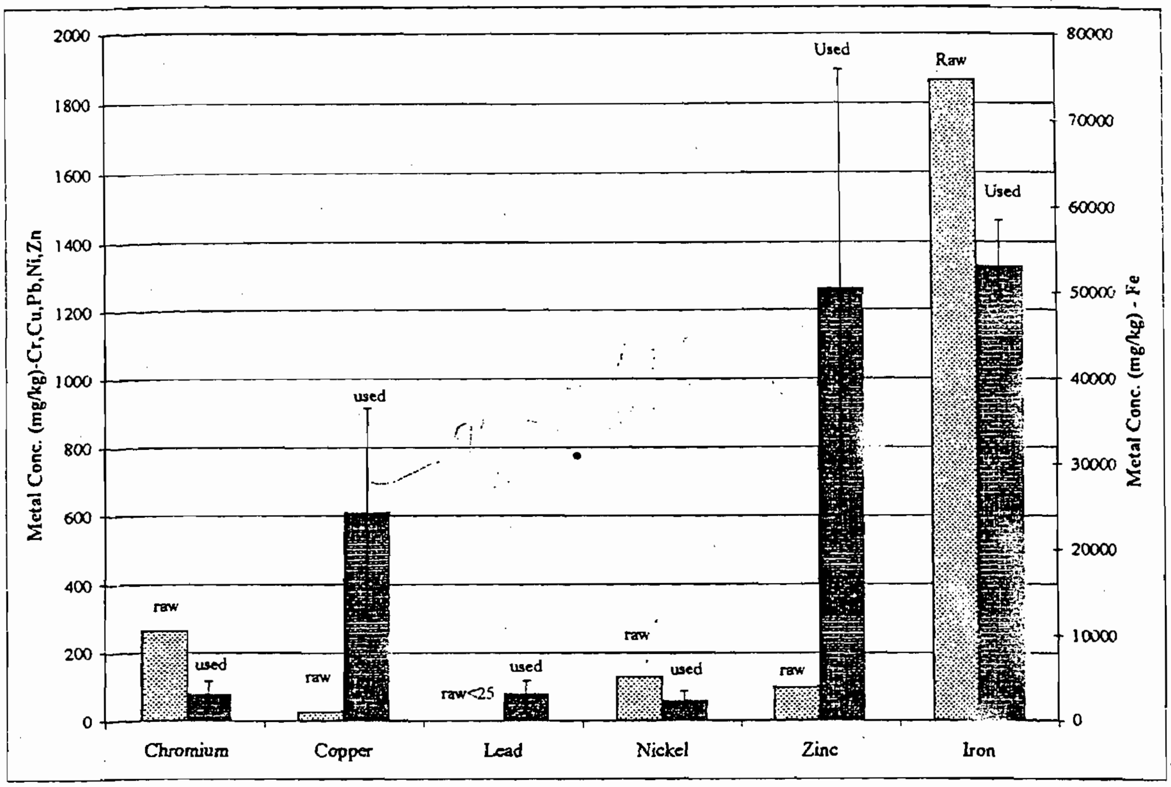


Figure 2-6. Comparison of Raw and Used Media

A 95% confidence interval was constructed for each geometric mean for the used data. The raw media data fell outside the confidence intervals. The bar graph shows that most of the copper, zinc, and lead come from the use of the media while the chromium, nickel, and iron concentrations may come from the unused coal slag media. The raw media can be extremely variable (Townsend and Carlson, 1998) and users should take care to obtain this media from a reliable supplier.

SPLP Leaching

The SPLP test was performed on all samples collected to assess the potential impact of the waste on groundwater. Table 2-6 lists the leachable metal content of the ABM samples for the SPLP test.

do you have a table showing total analysis for unused media? would be useful.

The federal risk-based Soil Screening Guidelines were exceeded for two metals. Sixty-five percent of the samples were above the federal arsenic guideline of 0.4 mg/kg. One sample exceeded the 400 mg/kg guideline for lead, however the arithmetic and geometric mean were below this limit. Metals in the Florida Soil Cleanup Goals were not exceeded by any samples except for arsenic. Sixty-five percent of the samples were above the 0.8 mg/kg residential limit and two samples (9%) were over the industrial limit of 3.1 mg/kg. This waste material is in industrial areas and unless moved or used somewhere else, the industrial soil cleanup goals would apply. The unused media did not exceed the industrial goal for arsenic but did exceed the residential goal. Both the arithmetic and geometric mean for the arsenic data were below the industrial Florida Soil Cleanup Goal. Many states have similar or stricter guidelines, and all local regulations apply to the management of this waste.

3.7

Would conclusion change using 3.7 mg/l

Suggest using upper 95% conf. lim

Risk to Groundwater SPLP Tests

The drinking water standards used as groundwater guidance concentrations are regulations that can be enforced by federal and state agencies. In this study, one sample out of 22 exceeded a primary drinking water standard. The sample exceeded the 0.15 mg/L limit for lead at 0.41 mg/L. Both the arithmetic and geometric mean of the lead data were under the primary standard. Three metals were exceeded for secondary drinking waste limits in other samples. Samples exceeded the 10. Mg/L and the 0.3 mg/L limits for copper and iron, respectively. Neither the arithmetic nor geometric mean for copper or iron exceeded the secondary standards. Half of the samples, as well as both the geo metric and arithmetic mean exceeded the 5.0 mg/L limit for zinc.

lead hit in 1 sample.

3 hits for secondary stds.

copper iron zinc

typo 1.0 not 10.

SPLP

Table 2-6. Leachable Metal Content in Waste ABM (mg/L).

	As[2]	Cd	Cr	Cu	Fe	Pb	Ni	Se[2]	Zn
No. of Samples	3	22	22	22	22	22	22	3	22
Detection Limit		0.001	0.100	0.200	0.100	0.010	0.100	0.010	0.100
% Detects		74%	0%	95.4%	59%	26%	0%	0%	100%
Minimum		<.001	N/A	<0.2	<0.1	<.010	N/A	N/A	0.81
Maximum		0.002	N/A	2.91	0.71	0.041	N/A	N/A	26.97
Geo. Mean[1]		0.001	N/A	0.72	0.16	0.006	N/A	N/A	5.84
Geo. Std. Dev.		0.001	N/A	0.46	0.17	0.008	N/A	N/A	1.28
Arith. Mean[1]		0.001	N/A	1.00	0.25	0.008	N/A	N/A	8.92
Arith. Stnd. Dev.		.0001	N/A	0.83	0.21	0.008	N/A	N/A	7.67

[1]Average calculated by using ½ the detection limit for undetected samples
[2]Analysis on composite sample from each site

0.005 0.05 0.1

Discussion

Hazardous Characteristic

Waste ABM is not a listed hazardous waste and does not normally exhibit the characteristics of corrosivity, reactivity, and ignitability. The hazardous waste characteristic that ABM may possess is toxicity. The TCLP test was used to test for this characteristic. The composite sample from each site tested below the TCLP limits for the eight heavy metals listed in 40 CFR 261. These results show that the samples collected are not hazardous for the toxicity characteristic.

Direct Human Exposure

The total metal concentrations of the waste ABM samples were compared to the EPA SSLs and the Florida Soil Cleanup Goals. As discussed previously, these goals are tools for assessing the contamination or cleanliness of soil. Further investigation of a site or monitoring may be suggested for a site that exceeded risk-based limits.

The U.S. EPA leaching based SSLs are based on the theoretical leaching model discussed previously for soils. Because waste ABM possesses soil-like characteristics, this model was applied. These numbers are an indication of a potential leaching concern for soils with these total metal concentrations. The leaching based SSL for chromium of 38mg/kg was exceeded by 100% of the waste ABM samples. None of the other leaching based SSLs were exceeded. However, none of the SPLP samples actually leached above the drinking water standard for chromium even though they exceeded the leaching based SSL total metal concentration. This may indicate that the waste ABM possesses different leaching mechanisms than the ones used to calculate the theoretical leaching model. Table 2-7 is a summary of the leaching limit (batch and theoretical) and which samples exceeded the respective limits

Table 2-7. Summary of Leaching Limits and Comparative Results.

	As	Cd	Cr	Cu	Fe	Pb	Ni	Se	Zn
Prim. DWS (mg/L)	.05	.005	0.1	-	-	0.015	0.1	.05	-
Secd. DWS (mg/L)	-	-	-	1.0	0.3	-	-	-	5.0
SSL-Leach (mg/kg)	29	8	38	N/A	N/A	N/A	130	5	12,000
No. above Prim.	0	0	0	-	-	1	0	0	-
No. above Secd.	-	-	-	8	7	-	-	-	11
No. above SSL	0	0	22	-	-	-	0	0	0

Correlation of Data

typo

As proof of some correlation between total metal content ~~an~~ and leachable metal content, the same sample that was highest for lead was the same sample which exceeded the primary drinking water standard. To investigate leaching characteristics further, a correlation test was performed on the samples exhibiting leaching behavior. Figures 2-7 and 2-8 show the relationship and correlation between total metal and leachable metal concentrations for zinc and copper. The correlation coefficients were 0.82 and 0.72 for zinc and copper respectively. There is some scatter in the correlation suggesting the leaching mechanisms of this waste stream are complex and not always predictable. A similar correlation for iron produced a correlation coefficient of less than 0.1. This indicates the leaching variability of metals, and that each metal may behave in a different manner.

The batch tests may not be a correct representation of what will actually occur in the environment, but they do give some indication as to the leachability of waste ABM. The range of percent leaching (of total metal concentration) for zinc was 1.5-18.6%. The range of percent leaching for copper was <0.8-9.3%. The percent leaching for iron was much lower than zinc or copper and ranged from <0.004-0.03%.

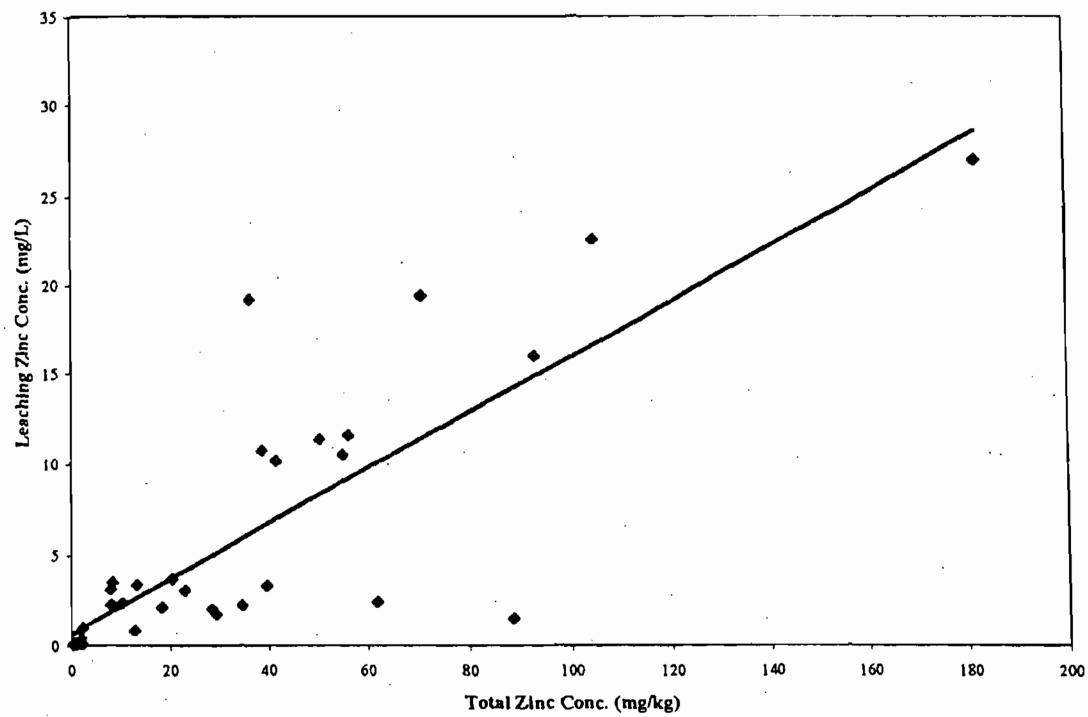


Figure 2-7. Correlation of Leachable and Total Metals for Zinc

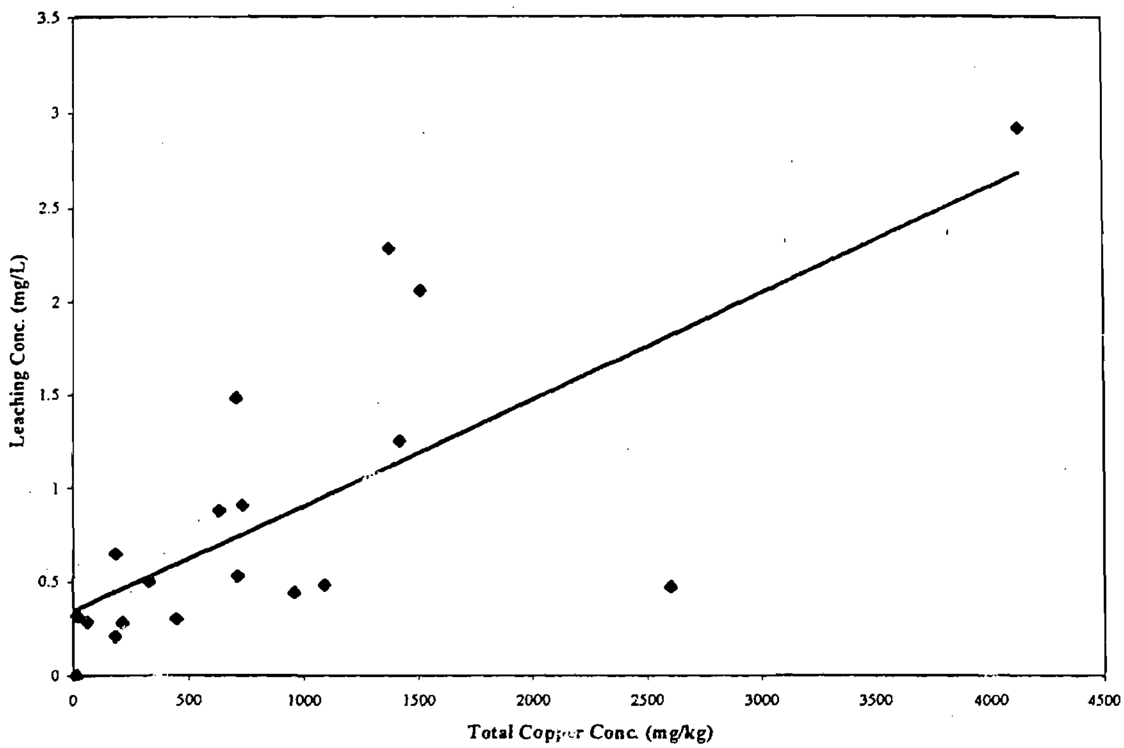


Figure 2-8. Correlation of Leaching and Total Metals for Copper

Implication for Management

The concern over the management of this waste stream is relatively new. In the past, this waste was many times left on site or allowed to fall into the water. With knowledge of environmental impacts and regulatory standards increasing, the management of this waste stream can become complicated and costly.

The abrasive blasting media itself has some metal concentration and then the paint removed with this media creates higher concentrations for some metals. Typically those metals are the one used as pigments, anti-corrosives, and biocides in marine paint. Many ship maintenance facilities have knowledge of the process they use and are typically blasting ships that they painted. The facilities are then aware of the metals in the paint and need to know how to best manage the waste stream created by the blasting process. If an unknown ship is blasted, the paint/coating may be tested first to see which metals may be of concern in the waste stream.

When a non-hazardous waste is produced it typically may go to a lined municipal solid waste facility or other comparable facility. Disposal at a landfill can be costly and other less costly options have been considered. Recycling operations are available for abrasive blasting waste. A promising recycling process is in use by two of the maintenance facilities sampled for this study. These facilities recycle the waste produced in a cement kiln. The coal slag contains ingredients used a feedstock for the production of portland cement. Other recycling options include use as aggregate in asphalt or concrete (Townsend and Carlson, 1997).

The results of the research of these three ship maintenance facilities indicate that this waste stream has the potential to exceed secondary drinking water standards. This waste would typically not be allowed to be disposed of on-site unless a permit is issued. If stockpiling the waste is needed before transportation to a disposal or recycling facility, care must be taken to not pollute the site if contaminants are known or suspected in the used media. Leachate must be controlled and minimized during the storage of this waste.

typo

Conclusions

The abrasive blasting waste generated by the ship maintenance facilities in this study was non-hazardous. For the most part, the total heavy metal concentration does not pose a threat to human health for direct exposure in an industry setting, with the exception of an occasional arsenic and lead sample. The lead in this waste stream should also be decreasing as lead pigments in paints are phased out. The chromium SSL for leaching was exceeded by all of the samples, however, chromium did not leach above drinking water standards when extracted with both the TCLP and SPLP tests.

Other leaching concerns would be an occasional lead sample for primary drinking water standards. A few metals exceeded secondary drinking water standards (Cu, Fe, Mn) and so this waste must be managed in a way to minimize leachate. In most situations, this waste could not be disposed of in an unlined landfill because it exceeds secondary drinking water standards. Many states classify ABM type wastes as "special wastes" to be handled a little differently than regular wastes. Local regulations should always be reviewed to determine what management options are available to the generator.

Agree

CHAPTER 3
CHARACTERISTICS OF WASTE ABRASIVE BLASTING MEDIA FROM SANDBLASTING CONTRACTORS

Introduction

Abrasive blasting is a practical form of paint removal with many applications. Sandblasting contractors are hired by individuals who need a surface cleaned and prepared for painting through abrasive blasting, but do not have the capability to do it themselves. The process of abrasive blasting, commonly called sandblasting among contractors, relies on a high-pressure spray of abrasive media at a surface to remove any unwanted materials from it. The spent media falls to the ground and is a solid waste that includes the material removed from the surface blasted. Many times this waste product is allowed to accumulate on site. The soil-like appearance of this material facilitates this activity. These blasting operations are typically small operations with an extremely variable waste stream.

As with any solid waste, abrasive blasting media (ABM), or sandblast grit waste must be properly stored and managed to minimize impact on human health and the environment. A main concern with waste ABM is the metal content of the waste attributed to the paint and coatings removed from surfaces. A waste pile could cause a potential threat through direct exposure or through leachate produced when it rains. This chapter reports the results of research conducted to address the issues impacting the storage and management of this waste ABM from sandblasting contractors.

The research conducted for this study will benefit the abrasive blasting industry and others with similar waste and storage problems. This study characterizes three separate sandblasting contractor sites and though the results do not apply universally to every sandblast site, but give an indication of the impact this waste stream may have on human health and the environment. The data from these sites may also assist in the decision making process for proper management if this waste stream. This decision making process has been outlined previously (Carlson and Townsend, 1998) and will be used as the format for presenting the discussion of this chapter.

Background

Sandblasting

Sandblasting contractors typically utilize silica sand media. Although this media has been known to cause health problems in the past, with the proper worker and air protection, it is still the best all-purpose and most economical media (Addison, 1997). All of the sites studied in this research utilized silica sand. Other sandblasting media include coal slag, garnet, plastic, glass bead, steel shot/grit, and crushed walnut shells. Specific types of ABM are used for different processes depending on the media characteristics. These characteristics also dictate the options for reuse and recyclability of the spent media (Townsend and Carlson, 1997).

Sandblasting is used for a multitude of applications. Industries which create the largest amount of waste ABM include the ship maintenance industry, Department of Transportation (DOT), and the military (Townsend and Carlson, 1997). These industries blast many of the same items repeatedly and are familiar with the content of coatings removed. A sandblasting contractor may not produce as much waste as these industries, but the waste is more likely to be variable and managed incorrectly. Table 3-1 contains some of the common applications for sandblasting and the industry that would typically provide the service.

Table 3-1. Applications of Sandblasting/Abrasive Blasting Media

APPLICATION	INDUSTRY
Military ships and airplanes	Military (usually Navy)
Bridges	DOT (may sub-contract but still oversees mgmt.)
Ships/Barges	Ship Maintenance Facilities/Marinas
Airplanes/parts	Airplane Maintenance Facility
Autos	Auto Body Shops
Semi-trailers	Sandblasting Contractor
Scaffolding	Sandblasting Contractor
Heavy Machinery	Sandblasting Contractor
Water tanks/towers	Sandblasting Contractor
Railroad Cars	Sandblasting Contractor/Rail Facility

Pigments in Paint

Concern at sandblasting sites would be any metals used as a pigments or additives in the paints removed. Coatings and paint contain various constituents, including binders, solvents, additives, primary pigments, and extenders. Many of these constituents may be either organic or inorganic. Typically the organic components are the binders and solvents, but additives, pigments and extenders may also be synthetic organic compounds. The inorganic components, usually composed of a metallic compound, are commonly primary pigments, additives, and extenders (Lambourne, 1987).

The principal pigment in use is titanium dioxide, which is a white pigment made popular because of fashion concerns. In the past, a common pigment was lead silicate or sulfate, because other metals were used as additives, not pigments (Lambourne, 1987).

The toxicity of this metal has required the phasing out of the use of lead for many applications (Stoffer, 1997). However, lead contaminated ABM waste may still be encountered if an older coating is removed from a surface. Other highly toxic pigments including cadmium and chromium are normally used in specific industrial applications where needed and are being phased out of more general use (Lambourne, 1987). Paints may also contain additives for anti-corrosion to prolong the life of the coating. The metallic compounds for pigments and the anti-corrosion agents may be different or the pigment may act in a dual manner to satisfy both components (Lambourne, 1987). Table 3-2 lists common pigments used in paint and their respective colors as well as their levels of anti-corrosivity.

Table 3-2. Application of Metals in Coatings.

Metal	**Pigment Color**	**Anti-corrosive**
Cadmium	Orange, Yellow, Red	Good (Red Compounds)
Chromium	Orange, Yellow, Green	Good (Green Compounds)
Copper	Red	Good
Iron	Blue, Yellow, Red, Black, Brown	Good
Lead	White, Red, Blue	Good
Nickel	Yellow	Good
Zinc	White, Yellow	Excellent

Regulation

A number of regulatory issues must be addressed in regard to the management of any solid waste, including waste ABM. Federal regulations require a generator to characterize waste produced as hazardous or non-hazardous. A hazardous waste must be managed according to the Code of Federal Regulations. Waste ABM is not a listed hazardous waste and the characteristic most encountered to classify the waste as hazardous is toxicity.

Hazardous characteristic

The toxicity characteristic leaching procedure (TCLP) test.is the assay prescribed by the EPA to determine whether a solid waste is hazardous by toxicity characteristics (40 CFR 261). In this test, a solid waste is extracted using an acetic acid based solution, with a pH that is dependent on the buffering capacity of the waste. The leaching solution is designed to simulate anaerobic conditions within a landfill. TCLP leachate concentration limits have been established for a number of metals and organic compounds. If the leachate concentration from a waste is at or above these limits, it is hazardous. Past research has indicated that organic compounds are not usually encountered when dealing with waste ABM (Townsend and Carlson, 1997).

Direct human exposure limits

A non-hazardous waste is still a solid waste and is subject to state and federal regulation. When waste is allowed to accumulate on-site, as ABM typically is, it may be subject to direct exposure and groundwater contamination limits. Once a waste has been found to be non-hazardous, other analytical assessments may be made. The total metal concentration is a measure of the total amount of metal in a solid sample of the waste ABM. This metal content can be compared to both federal regulations and state direct exposure guidelines as presented in Table 3-3. Direct exposure numbers are set from a risk-based standpoint, but these are goals and not regulations. The U.S. Environmental Protection Agency has published a Soil Screening Guidance Document with limits (SSLs) for many contaminants based on a risk-associated calculation. When the SSLs are

why didn't you say something similar in Chap. 2? (p. 9) exceeded further investigation is required, but the result does not necessitate cleanup (U.S. EPA, 1995). Many states have their own soil screening, guidance levels, or goals. State limits may be more stringent than the federal limits, requiring further investigation at the state level.

Leaching model limits

Along with the risk-based concentration limit in the SSLs is a leaching concentration limit for total metals. These second set of total metal concentrations were calculated from the drinking water standards with a theoretical leaching model. First, the drinking water standard was multiplied by a dilution/attenuation factor of 20. This factor was selected by a "weight of evidence" approach by EPA. This overall factor accounted for dilution and attenuation in the environment for a 0.5-acre area. A total metal concentration was calculated that would result in the augmented drinking water standard. The model for this calculation incorporated the partition coefficient (K_d) of each compound. Figure 3-1 is the equation used by the U.S. EPA to calculate the total metal concentration from the drinking water standards.

$$C_t = C_w\left(K_d + \frac{\theta_w + \theta_a H'}{\rho_b}\right)$$

Where C_t=screening level in soil (mg/kg)
C_w=target soil leachate concentration (mg/L)
K_d=soil-water partition coefficient (L/kg)
θ_w=water-filled soil porosity (assumed 0.3)
θ_a=air-filled soil porosity (assumed 0.13)
ρ_b=dry soil bulk density (assumed 1.5 kg/L)
H'=dimensionless Henry's Law Constant (H-atm-m^3/mol x 41(C.F.))

Figure 3-1. U.S. EPA Soil Screening Guidance Theoretical Leaching Equation

The EPA recognized that partition coefficients are affected by many situational circumstances, especially for metals. The K_d may be affected by pH, oxidation-reduction potential, iron oxide content, soil organic matter content, cation exchange capacity, and major ion chemistry, among others (U.S. EPA, 1995). Therefore, some actual testing of a contaminated site should follow the theoretical values calculated.

Batch leaching limits

Drinking water limits, often used as groundwater limits, are state and federal regulatory limits that cannot be exceeded. Federal groundwater limits may be supplemented by more stringent and extensive state regulations. Although the TCLP test is primarily used to determine hazardous characteristics, it is sometimes used to determine potential the impact of a waste on groundwater when the waste is stored or disposed in non-landfill conditions. A more suitable test for this scenario is the synthetic precipitation leaching procedure (SPLP). The SPLP assay uses a leaching solution made from nitric and sulfuric acid that simulates acid rain with a pH of 4.20 (sites located east of the Mississippi River). It is the preferred choice by many regulators for determining impacts of waste on groundwater (WDNR, 1997). Other than the leaching solution, which is less aggressive than the TCLP solution to simulate rainfall, all other aspects of the test remain the same as the TCLP test.

Table 3-3 contains primary and secondary federal drinking water standards, as well as the federal generic SSLs (risk-based and leaching) for a number of metals. The Florida soil cleanup goals are included as an example of state ~~regulatory standards~~ (risk-based contaminant guidelines, for both a residential and an industrial setting

See comm... on Table 2-2 p. 11

Table 3-3. Regulations and Guidelines for metal concentrations.

Metal	Drinking water Primary (ug/L)	Drinking water Secondary (ug/L)	SSLs (mg/kg) Risk	SSLs (mg/kg) Leach.	Residential FSCG (mg/kg)	Industrial FSCG (mg/kg)
As	50	-	0.4	29	0.8	3.1
Ba	2,000	-	5,500	1,600	5,200	84,000
Cd	5	-	78	8	37	600
Cr	100	-	390	38	290	430
Cu	-	1,000	N/A	N/A	N/A	N/A
Fe	-	300	N/A	N/A	N/A	N/A
Pb	15	-	400	N/A	500	1,000
Hg	2	-	23	23	23	480
Ni	100	-	1,600	130	1,500	26,000
Se	50	-	390	5	390	9,900
Ag	-	100	390	34	390	9,000
Zn	-	5,000	23,000	12,000	23,000	560,000

Methodology

Sampling

The samples obtained in this study all came from sandblasting contractor facilities in Central Florida. Two facilities were sampled on the same day (January 8, 1998) and a third was sampled on January 19, 1998. Since metals were the primary pollutants of interest, nitric acid rinsed plastic containers and stainless steel utensils were used.

All samples were collected in 13.2-Liter containers. The containers were used to gather a large sample volume from each sample area to assure a representative sample of that area of the site. The top of each sample area was scraped off and the sample taken from approximately 0.5-1m into the pile. Samples were gathered systematically from a random starting point around the circumference of the piles, and encompassed anywhere from a few weeks to months of compiled media. At sites where the media was spread out over the site, systematic random sampling was used. A random start point was chosen and samples were gathered at set distances from there. All sample areas were recorded and mapped for future reference. Table 3-4 contains descriptions and number of samples collected from each site.

Table 3-4. Sandblasting Contractor Sites Sampled

	Sand Blast Site A	Sand Blast Site B	Sand Blast Site C
Media	Silica Sand	Silica Sand	Silica Sand
Pile(s) Mass (kg)	91,000 (spread)	900	900
Dimensions (m)	600x600x1	12x6x2	10x6x2
No. of samples	6	4 (19-L container)	5
Area Blasted	Out-doors	Blasting Bay	Out-Doors
Primary Work	Scaffolding/Semis	CAT Equipment	Various

Raw ABM collected

Samples of raw ABM were obtained from the supplier to each general contractor. The samples were taken from 23 Kg bags purchased from Standard Sand and Silica. It was not expected to find metals in the raw silica sand, but the raw samples were treated the same as the used samples and all of the same analyses were performed on these samples.

Sub-sampling

The 13-Liter containers collected at each site were mixed thoroughly in the lab. A sub-sample of 400g was taken from each bucket. Sub-sampling created a smaller volume for analytical analysis and ensured similar sample was used for both total metal and leaching analyses. A composite sample from each site was formed at a later time. This sample was used to determine if the waste was hazardous or not.

Analysis of Waste ABM

The waste ABM was tested for both total metal concentrations and leachable metal concentrations. These metal concentrations are then compared to both state and federal regulatory limits and goals. Two primary leaching methodologies were used, the TCLP (EPA Method 1311) and the SPLP (EPA Method 1312). For both leaching tests, 2 liters of appropriate fluid was added to 100g of the solid material. The solid and liquid was mixed for 18 hours in a rotary extractor, the leachate was filtered, and then preserved and stored according to the parameter of interest (preserved at a pH of <2 for metals).

The methods used for the digestion and analysis of the samples are from the EPA SW-846 manual. Method 3050b was used to digest the solid samples, while 3010 and 3020 were used for the liquid samples for the flame and furnace, respectively. Samples were analyzed on a Perkin Elmer 5100 atomic absorption spectrophotometer equipped with a flame and a furnace.

The metals examined for the samples included the required TCLP metals for the hazardous characteristic (As, Ba, Cd, Cr, Pb, Hg, Se, Ag). The next set of metals included typical metals found in paints and coatings and possibly in the unused media (As, Cd, Cr, Cu, Fe, Pb, Ni, Se, Zn). Total metal analyses were completed first and then the same metals were examined from a leaching standpoint.

Results

The results of the chemical analyses of the ship blast samples are grouped into two areas: the total metal content and the leachable metal content. These two characteristics are compared to both federal and state regulations and guidelines.

TCLP Results

The composite samples from each ship maintenance facility were tested to see if they were hazardous or not. Table 3-5 contains the TCLP limits and results from this study.

Table 3-5. TCLP Limits and Results.

	As	Ba	Cd	Cr	Pb	Hg	Se	Ag
TCLP Limit	**5**	**100**	**1**	**5**	**5**	**0.2**	**1**	**5**
Det. Limit	.001	10	.001	.100	.010	.001	.010	1
Sndblst Site A	BDL	BDL	.001	BDL	.008	BDL	BDL	BDL
Sndblst Site B	BDL	BDL	.015	BDL	.006	BDL	BDL	BDL
Sndblst Site C	BDL	BDL	.009	BDL	.002	BDL	BDL	BDL

*Units mg/L, BDL=Below Detection Limit

Total Metal Results

Table 3-6 contains the total metal concentrations examined for each sample as well as the detection limits, the percent of samples above the detection limit, the range of values found and two different averages and standard deviations for each metal. The distribution of the data can affect the averages and standard deviation of each data set. Typically, these data followed a logarithmic distribution, except for iron; therefore the geometric mean was used for future comparisons. Figures 3-2 through 3-6 present the histograms formed by the data sets as well as the distributions for zinc, lead, chromium, nickel and iron.

Table 3-6. Total Metal Content in Sandblasting Contractor Waste ABM.

(mg/kg)	As	Cd	Cr	Cu	Fe	Pb	Ni	Se	Zn
No. of Samples	15	15	15	15	15	15	15	15	15
Detection Limit	0.05	2.5	5	25	5	25	5	0.5	5
% Detects	27%	0%	100%	0%	100%	67%	100%	0%	100%
Minimum	<.05	N/A	12.6	N/A	826.8	<25	4.78	N/A	24.3
Maximum	.08	N/A	59.1	N/A	2,801	99.5	53.1	N/A	4,328
Geo. Mean[1]	.05	N/A	32.8	N/A	1,300	36.6	13.2	N/A	211.1
Geo. Std. Dev.[1]	.04	N/A	1.56	N/A	1.42	2.26	2.21	N/A	5.83
Arith. Mean[1]	.06	N/A	35.6	N/A	1,380	47.3	18.1	N/A	759.6
Arith. Stnd. Dev.[1]	.04	N/A	13.3	N/A	523	29.4	16.1	N/A	1,173

[1]Calculated with undetected samples at ½ detection limit.

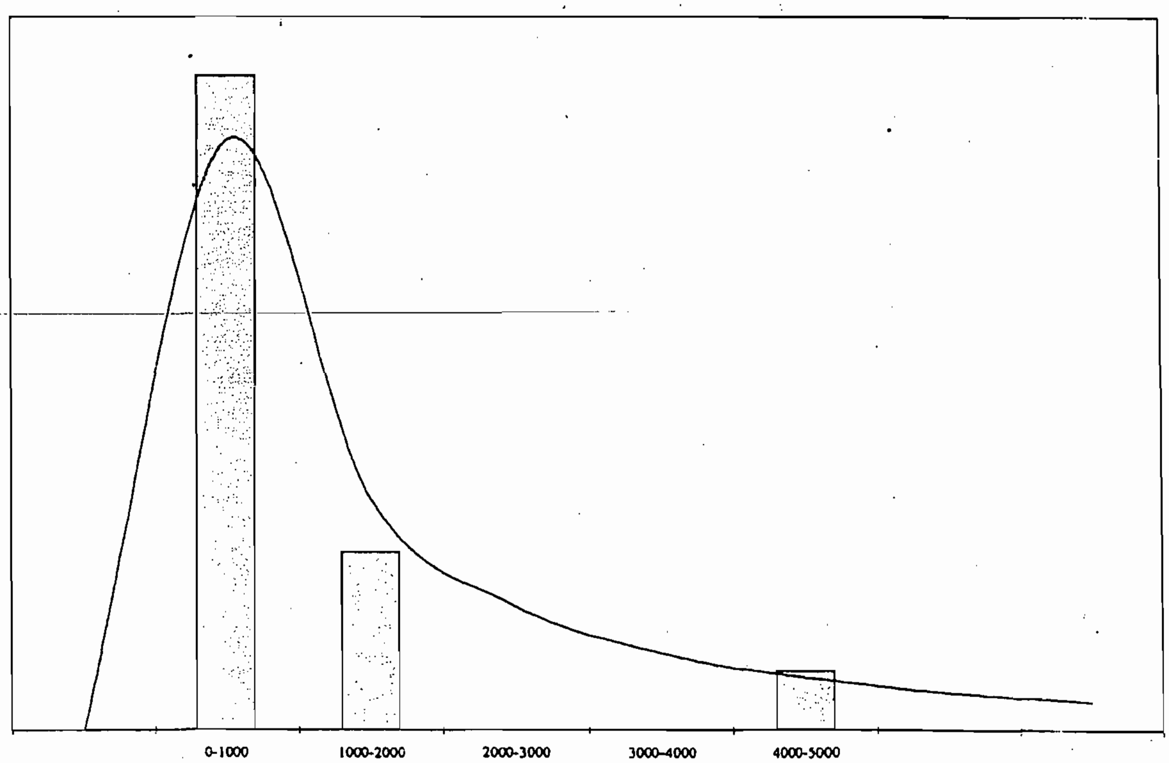


Figure 3-2. Zinc Histogram and Lognormal Distribution.

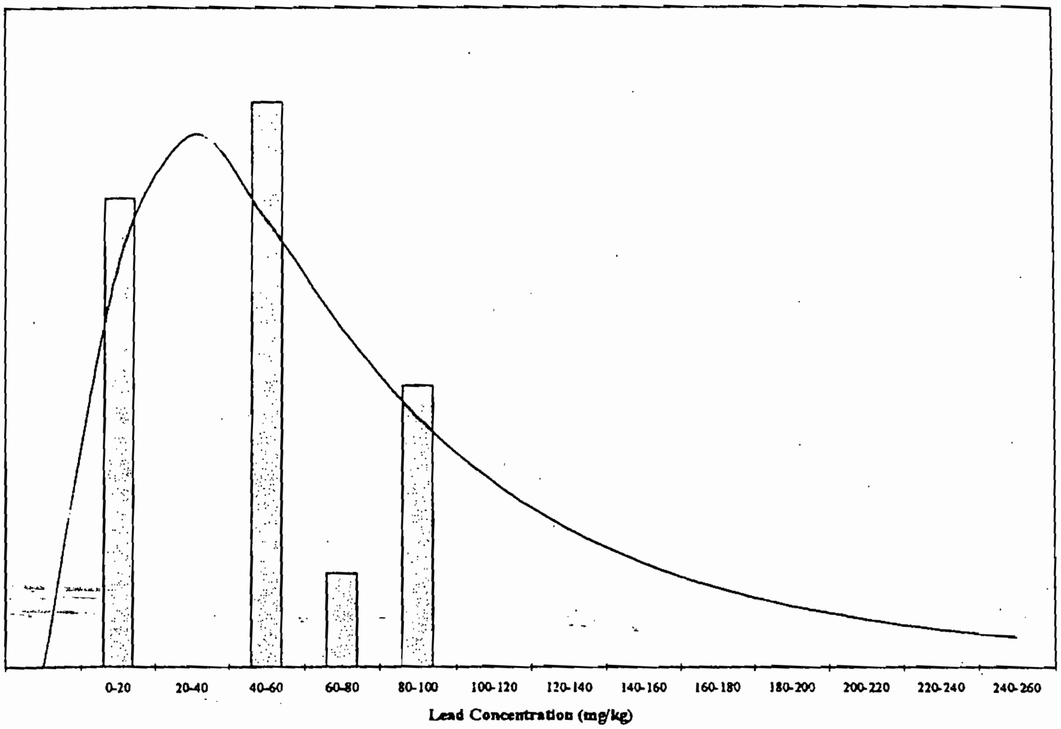


Figure 3-3. Lead Histogram and Lognormal Distribution.

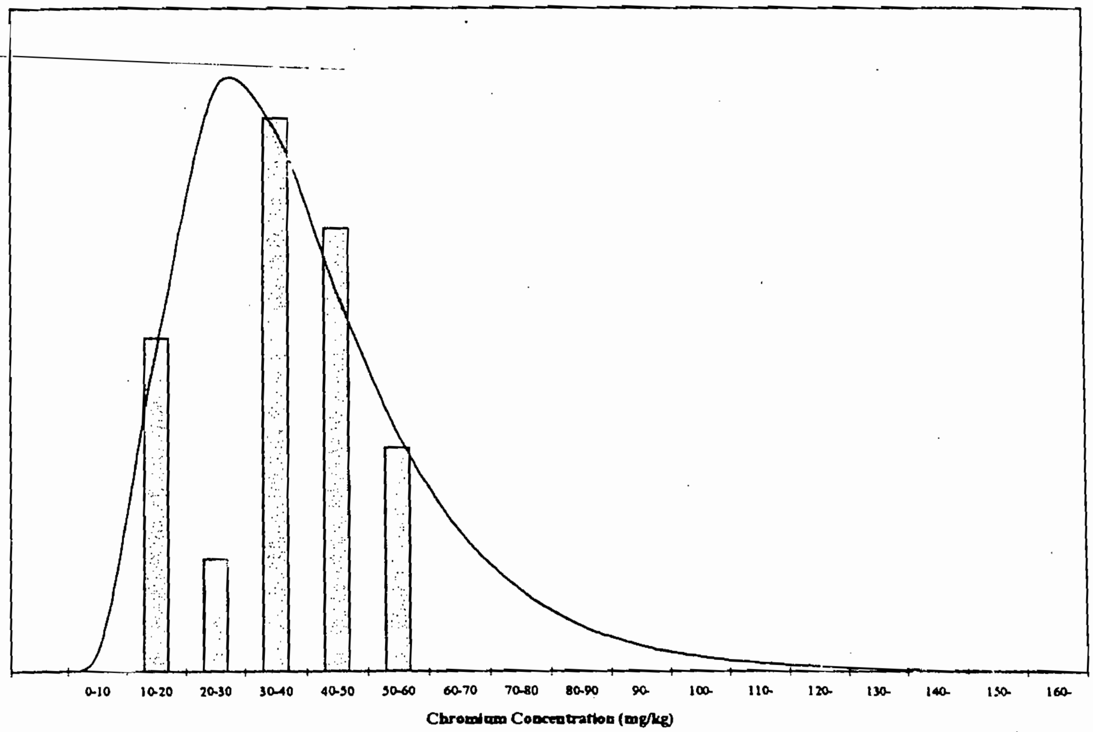


Figure 3-4. Chromium Histogram and Lognormal Distribution.

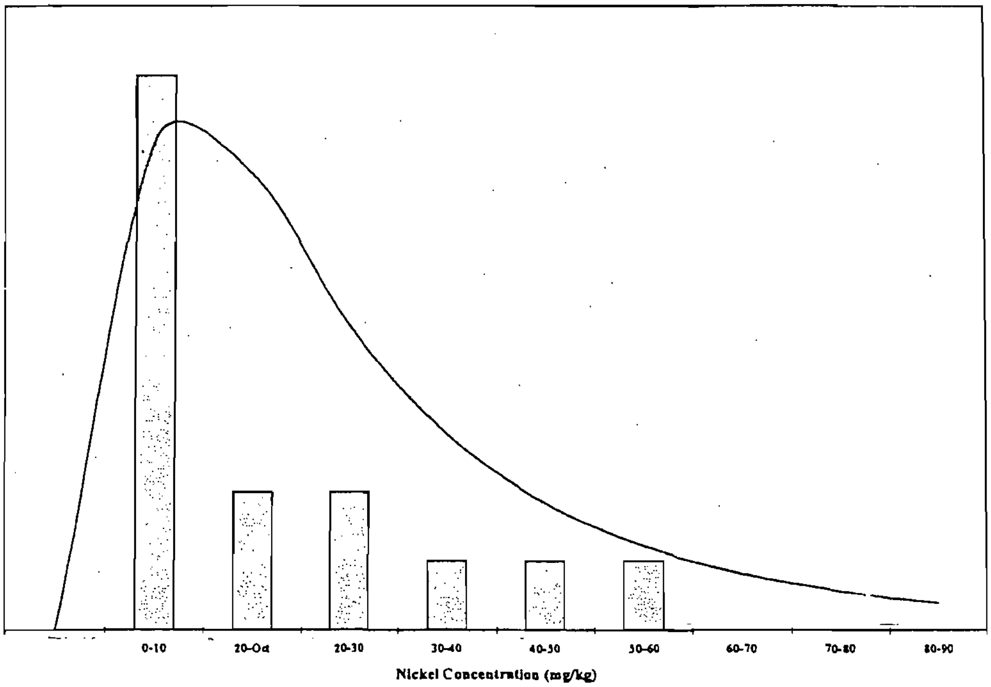


Figure 3-5. Nickel Histogram and Lognormal Distribution.

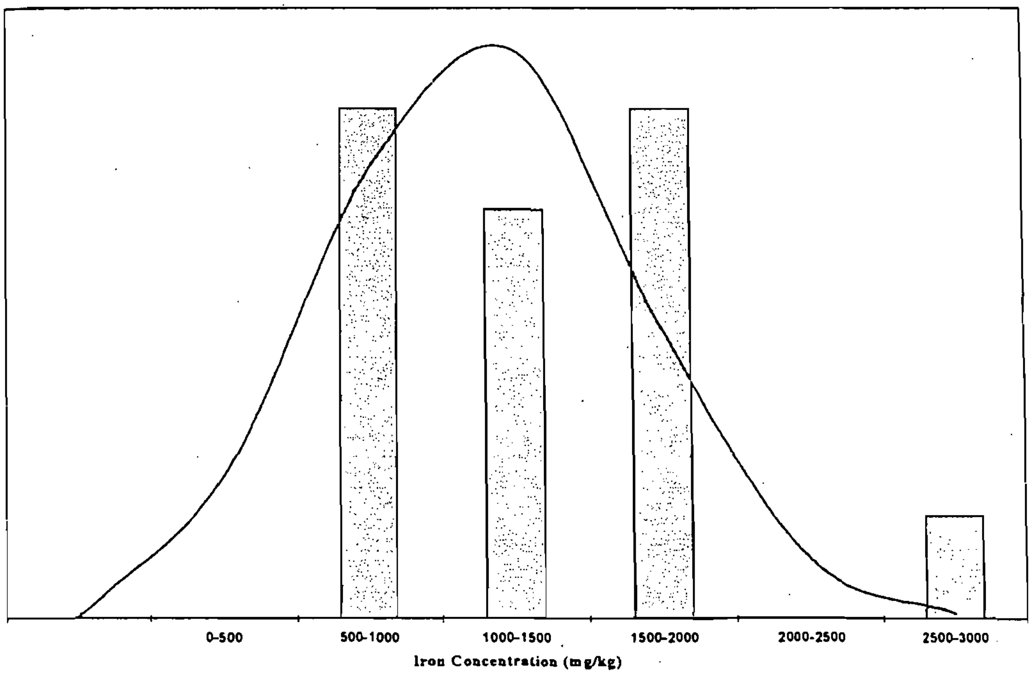


Figure 3-6. Iron Histogram and Normal Distribution. OK

Leachable Metal Content

The SPLP test was performed on all samples collected to assess the potential impact of the waste on groundwater. Table 3-7 lists the leachable metal content of the ABM samples for the SPLP test.

SPLP

Table 3-7 Leachable Metal Content in Waste ABM (mg/L).

	As[2]	Cd	Cr	Cu	Fe	Pb	Ni	Se[2]	Zn
No. of Samples	3	15	15	15	15	15	15	3	15
Detection Limit	0.010	0.001	0.100	0.200	0.100	0.010	0.100	0.010	0.100
% Detects	0%	12.5%	0%	0%	94%	0%	0%	0%	40%
Minimum	N/A	<.001	N/A	N/A	<0.1	N/A	N/A	N/A	<0.10
Maximum	N/A	.009	N/A	N/A	1.14	N/A	N/A	N/A	2.56
Geo. Mean[1]	N/A	.001	N/A	N/A	0.25	N/A	N/A	N/A	0.18
Geo. Std. Dev.	N/A	.002	N/A	N/A	0.14	N/A	N/A	N/A	0.63
Arith. Mean[1]	N/A	.002	N/A	N/A	0.31	N/A	N/A	N/A	0.67
Arith. Stnd. Dev.	N/A	.002	N/A	N/A	0.18	N/A	N/A	N/A	0.93

[1]calculated by using ½ the detection limit for undetected samples
[2]Analysis on composite sample from each site

5 0.005 0.1 0.015 0.1

0.05 1.0 5.0

Discussion

Hazardous Characteristic

Waste ABM is not a listed hazardous waste and does not normally exhibit the characteristics of corrosivity, reactivity, and ignitability. The hazardous waste characteristic that ABM may possess is toxicity. The TCLP test was used to test for this characteristic. The composite sample from each site tested below the TCLP limits for the eight heavy metals listed in 40 CFR 261. These results show that the samples collected are not hazardous for the toxicity characteristic.

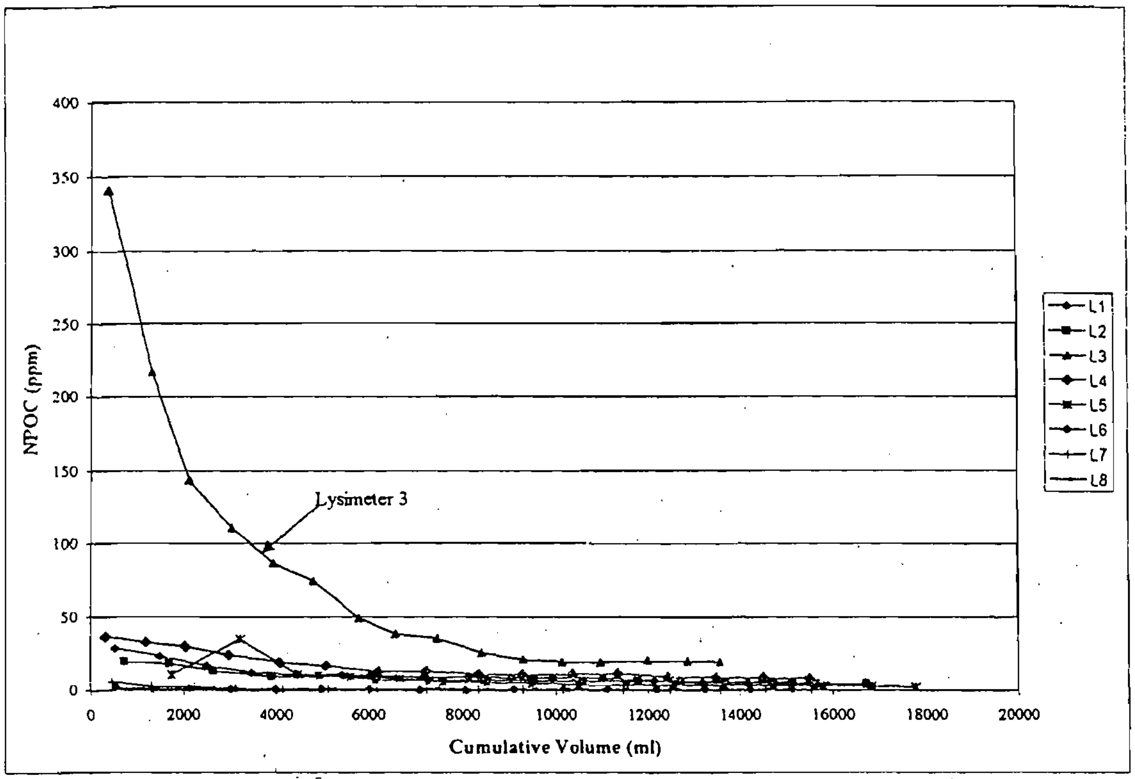


Figure 4-3. Nonpurgible Organic Carbon

Conductivity and TDS are related. The more total dissolved solids, the more ions available to produce conductance. Table 4-7 shows some relationship between them, and this was further investigated. The ions contribute to the TDS and conductivity and Table 4-8 contains all of the ions analyzed for as well as their ranges and averages. As mentioned earlier, a relationship exists between conductivity, ions, and TDS. Table 4-9 is a "solids balance" for the total amount of ions leached and the total TDS leached for each lysimeter. The sums match up well, with all ion sums slightly lower. Differences may be explained by organic matter (Lys 3) and other non-detected ions. Figure 4-4 presents the leaching curve for conductivity. This same trend was followed by TDS and ions.

Table 4-8. Ions found in Lysimeter Leachate (mg/L).

	L1	L2	L3	L4	L5	L6	L7	L8
No. Collected	20	20	20	20	20	20	20	20
Avg. Sulfate	32.3	26.9	49.8	67.0	8.2	26.6	25.4	4.0
Max	129.2	115.7	275.4	195.2	14.5	107.2	108.[illegible]	10.6
Min	15.9	5.9	9.3	31.1	5.4	3.9	8.8	2.9
Avg. Nitrate	11.9	8.7	8.5	21.4	3.9	9.6	8.3	6.8
Max	109.6	84.9	107.3	285.5	30.1	111.6	90.8	43.1
Min	3.6	2.5	2.0	2.0	2.1	2.2	2.7	3.0
Avg. Chloride	24.3	21.1	6.5	35.7	4.4	6.2	[illegible].0	2.5
Max	129.8	113.7	28.4	159.9	10.6	26.7	5.0	3.2
Min	9.0	4.9	2.8	7.8	2.9	2.7	2.5	0.0
Avg. Fluoride	1.2	1.1	1.0	0.9	1.0	0.7	0.4	0.0
Max	1.6	1.4	1.3	1.0	1.1	1.0	0.8	0.0
Min	1.0	0.9	0.8	0.7	0.8	0.5	0.0	0.0
Avg. Calcium	76.4	73.7	84.5	71.8	43.5	14.0	10.8	2.5
Max	104.8	96.1	122.0	97.1	55.1	44.7	48.3	11.3
Min	58.2	48.6	53.4	50.0	34.9	4.2	0.0	0.0
Avg. Potassium	4.6	3.6	4.9	9.1	1.1	1.1	0.3	0.0
Max	14.9	11.3	12.8	20.3	2.7	3.1	1.2	0.1
Min	1.7	1.7	2.6	3.7	0.5	0.6	0.0	0.0
Avg. Magnesium	39.1	34.0	14.3	46.9	3.1	3.8	1.0	0.0
Max	87.2	77.8	48.3	92.5	6.8	21.9	8.5	0.2
Min	14.7	16.0	4.5	22.7	0.0	0.4	0.0	0.0
Avg. Sodium	12.6	10.0	5.7	35.8	1.8	4.7	0.3	0.2
Max	105.1	75.1	31.0	172.4	7.9	21.2	1.7	0.5
Min	1.9	2.1	0.2	3.1	0.1	0.7	[illegible]	0.0

Table 4-9. Solids Balance for Ions and TDS (g).

	LYS 1	LYS 2	LYS 3	LYS 4	LYS 5	LYS 6	LYS 7	LYS 8
Sulfate	0.64	0.57	0.81	1.33	0.18	0.50	0.49	0.08
Nitrate	0.23	0.18	0.14	0.39	0.09	0.16	0.15	0.14
Chloride	0.48	0.44	0.10	0.68	0.10	0.12	0.06	0.05
Fluoride	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.00
Carbonate	3.73	3.74	2.63	3.46	1.52	0.01	[illegible]	0
Calcium	1.53	1.56	1.42	1.47	0.93	0.27	0.21	0.05
Potassium	0.09	0.08	0.08	0.18	0.02	0.02	0.01	0.00
Magnesium	0.76	0.73	0.25	0.95	0.07	0.07	0.02	0.00
Sodium	0.25	0.21	0.11	0.69	0.04	0.09	0.01	[illegible]
Ion Sum	**7.73**	**7.52**	**5.55**	**9.16**	**2.97**	**1.24**	[illegible]	[illegible]
TDS	**9.45**	**8.77**	**8.26**	**10.38**	**5.65**	**1.71**	[illegible]	[illegible]

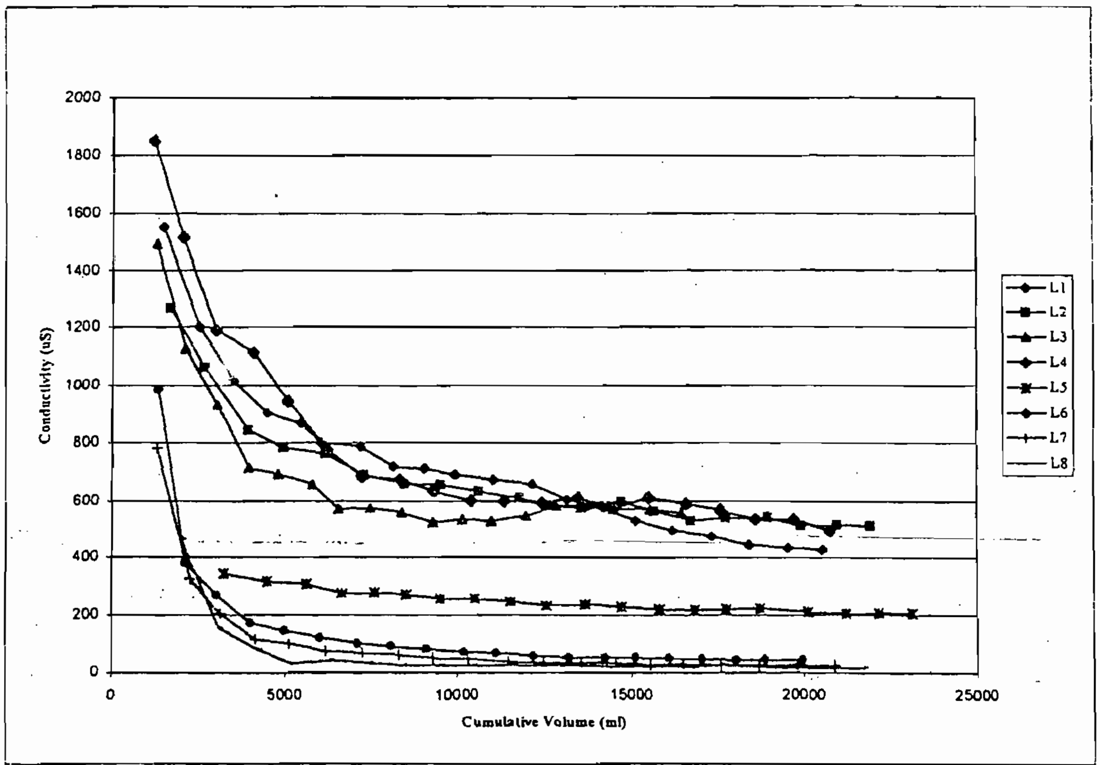


Figure 4-4. Conductivity

<u>Heavy Metals</u>

Many of the general parameters and ions followed a similar leaching curve. Leachate samples were analyzed for typical metals found in waste ABM (Chapter 2 and 3) to see if like curves were formed by the leaching of the metals from this waste stream. Metal samples were taken 10 times (except lysimeter 3,8 times) during the 6 week study. Table 4-10 presents the number of detected samples out of 10 (8 for L3) for each metal.

Table 4-10. Heavy Metals found in Lysimeter Leachate (mg/L).

	L1	L2	L3	L4	L5	L6	L7	L8
No. Detected	0	0	2	0	10	0	0	0
Max Cadmium	N/A	N/A	10.81	N/A	3.94	N/A	N/A	N/A
Min Cadmium	N/A	N/A	<.001	N/A	0.48	N/A	N/A	N/A
No. Detected	1	1	2	3	2	2	2	1
Max Chromium	.034	.027	.082	.107	.005	.035	.042	.013
Min Chromium	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
No. Detected	10	10	0	10	0	0	0	0
Max Copper	0.74	1.3	N/A	1.9	N/A	N/A	N/A	N/A
Min Copper	0.22	0.28	N/A	0.44	N/A	N/A	N/A	N/A
No. Detected	6	6	8	4	7	8	6	6
Max Iron	0.59	0.69	20.61	1.27	0.95	1.35	1.23	0.27
Min Iron	<0.01	<0.01	1.34	<0.01	<0.01	<0.01	<0.01	<0.01
No. Detected	3	1	1	2	9	1	1	0
Max Lead	.011	.005	.028	.023	.043	.002	.001	N/A
Min Lead	0.001	0.001	0.001	0.001	0.000	0.001	0.001	N/A
No. Detected	0	0	0	1	1	1	0	0
Max Nickel	N/A	N/A	N/A	0.16	0.12	0.18	N/A	N/A
Min Nickel	N/A	N/A	N/A	0.01	0.01	0.01	N/A	N/A
No. Detected	10	10	3	10	10	0	0	0
Max Zinc	7.29	7.77	1.59	6.82	86.79	N/A	N/A	N/A
Min Zinc	2.09	2.62	0.01	1.93	9.35	N/A	N/A	N/A

The metals that expressed leaching curves in various lysimeters were zinc, copper, lead, and iron. Figures 4-5 through 4-8 show the leaching curves for these metals from their respective lysimeters.

L1, L2, L4 — all ship #B4N1

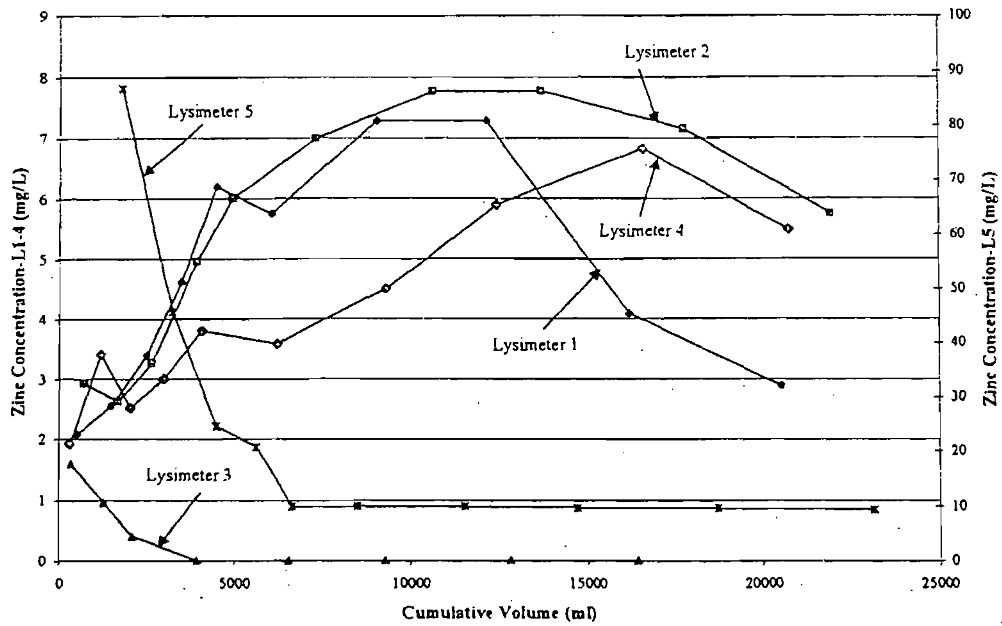


Figure 4-5. Zinc Leaching from Lysimeters.

Can you include straight line for corresponding gw standard?

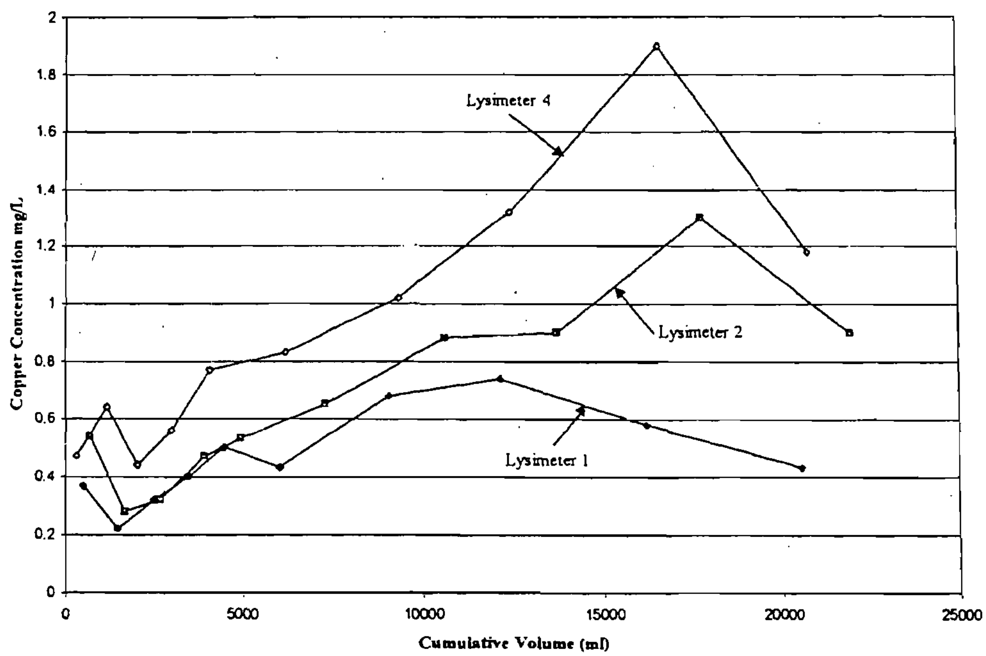


Figure 4-6. Copper Leaching from Lysimeters.

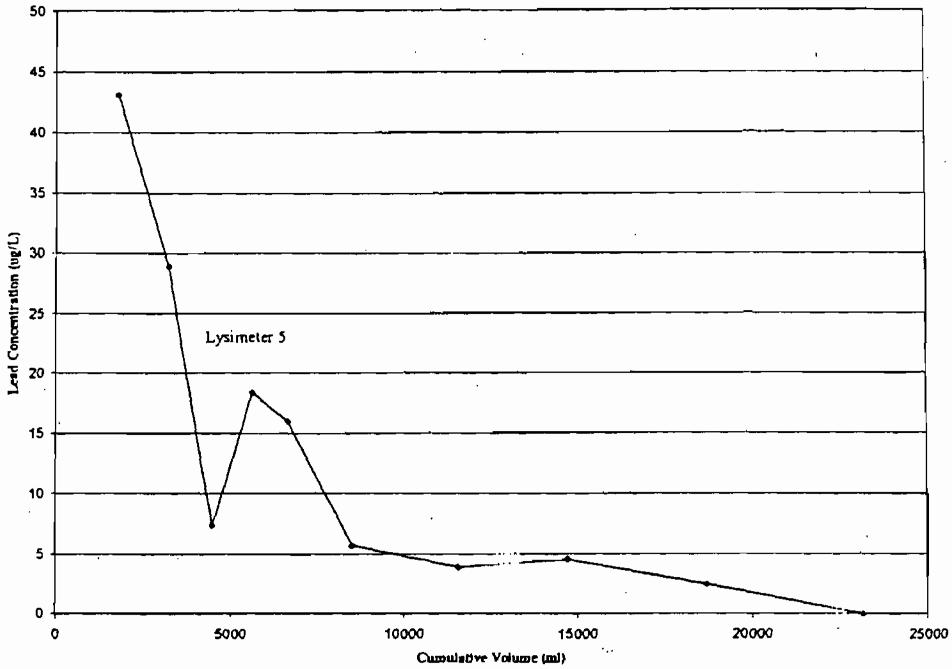


Figure 4-7. Lead Leaching from Lysimeter 5.

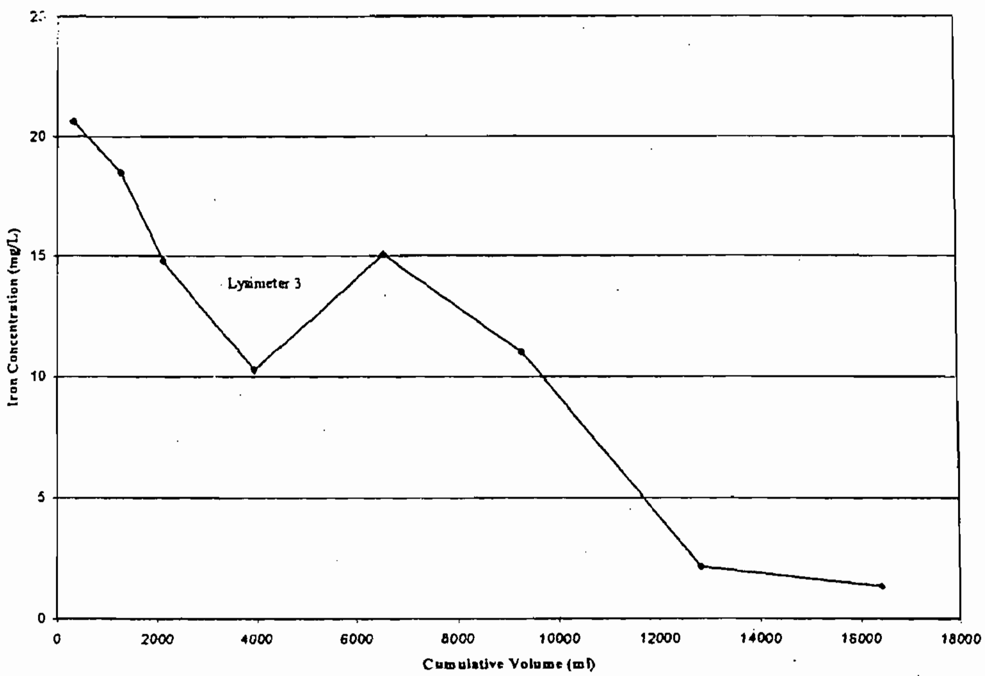


Figure 4-8. Iron Leaching from Lysimeter 3.

Discussion

Leaching Curves

All of the measured parameters from the lysimeters demonstrated leaching characteristics. These characteristics plotted versus cumulative volume presented a leaching curve. Many of the general water quality parameters and all of the ions had a similar curve, starting at a maximum value then decreasing to a steady state. One reason for this phenomenon is that concentrations in the waste stream are high to begin with and then as constituents get washed away, the concentrations fall to a steady state. Normally, leaching mechanisms are much more complex than that and are affected by physical (e.g. particle size, porosity) and chemical parameters (e.g. pH and oxidation reduction potential). A brief discussion of some of these parameters follows.

The relationship of pH on the leaching of wastes has been examined to some extent and the leaching behavior of contaminants as a function of pH is very systematic (van der Sloot, 1991). There is typically a pH range where maximum and minimum leaching will occur for separate metals.

Physical parameters can also affect the leachability of contaminants from waste. A smaller particle size allows for more surface area for a contaminant to leach from. A paint chip in waste ABM would leach differently than a particle of the media itself. As presented earlier, in coal slag media, zinc, copper, and lead for the most part came from the use of the media (paint or coating) and other metals are inherent to the media (As, Ni, Cr).

Generally, highly soluble constituents will wash out of a system quickly and less soluble constituents will leach at a consistent rate leading to a continuous increase (van der Sloot, 1991) and then decrease again as the contaminant is washed away. This leaching characteristic may explain why some of the leaching graphs increase and then decrease while others simply decrease. The solubility of the same metal in a different lysimeter would be affected by the individual conditions of that lysimeter.

Another leaching mechanism that may produce different leaching curves is channeling. Fluid may be traveling through certain paths and then find its way into other areas causing the "bump" produced in the leaching curves of lead and iron. A chemical parameter may also have caused those two metals to react that way.

Leaching Comparisons

The concentrations of metals leached from the TCLP correlated with the total metal concentrations for zinc, copper and lead. The correlation coefficient for this relationship for zinc, copper, and lead are 0.89, 0.93, and 0.82 respectively (Figures 4-9 through 4-11). Samples which leached, but were below the total metal detection limit were assumed half of the limit (for copper and lead only). Good

Probably not. TCLP too aggressive?

Were the SPLP tests not a good correlation with total metals?

Does This suggest a mechanism for managing The ABM? Test for total zinc, copper & lead waste pile for to decide what amt is too high use correlation other approach. Start with gw or use the standard & back calculate max allowable concentration for these metals recommended max.

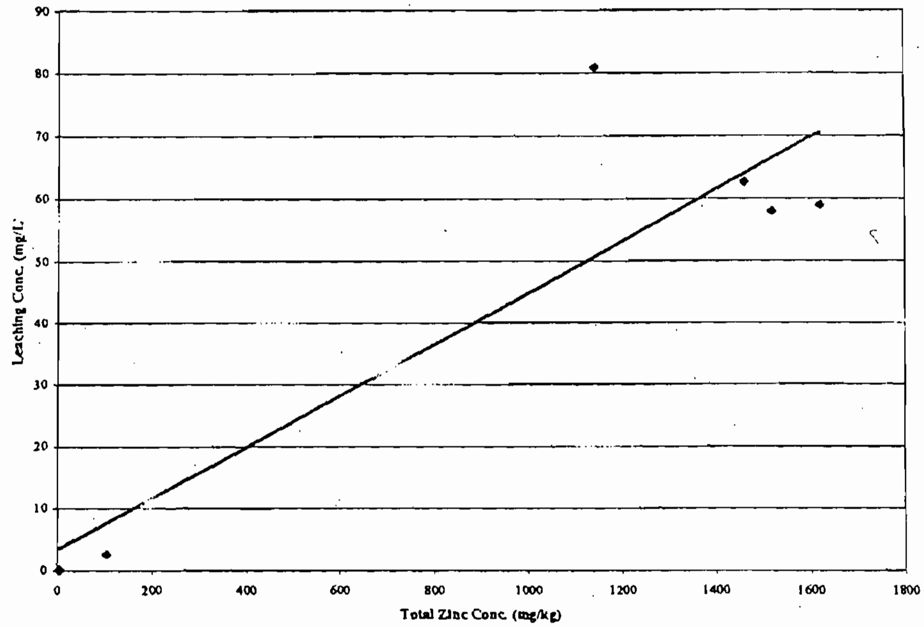


Figure 4-9. Zinc TCLP and Total Metal Correlation.

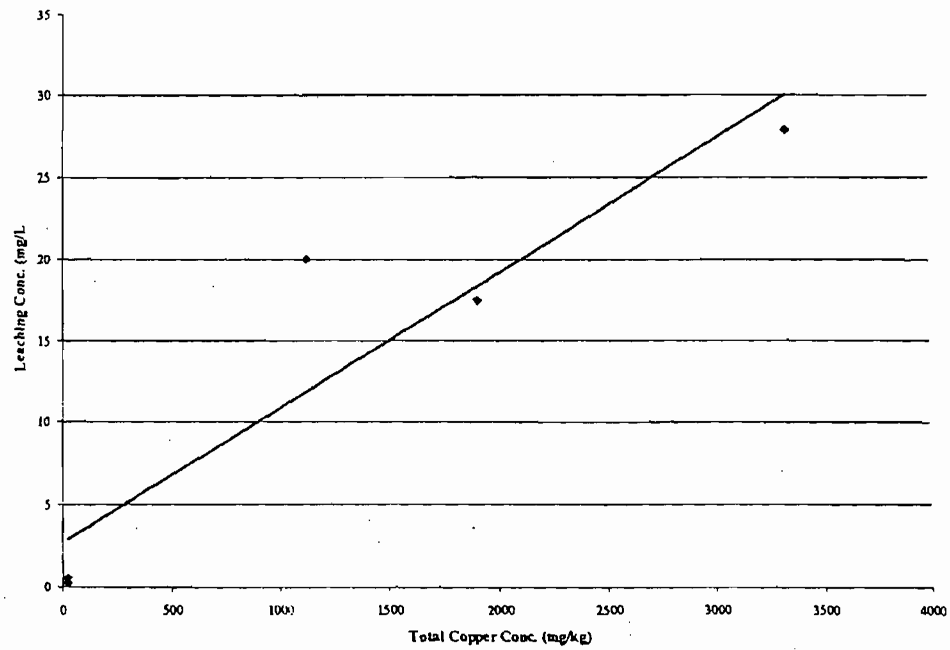


Figure 4-10. Copper TCLP and Total Metal Correlation.

not many data pts for correlation theory

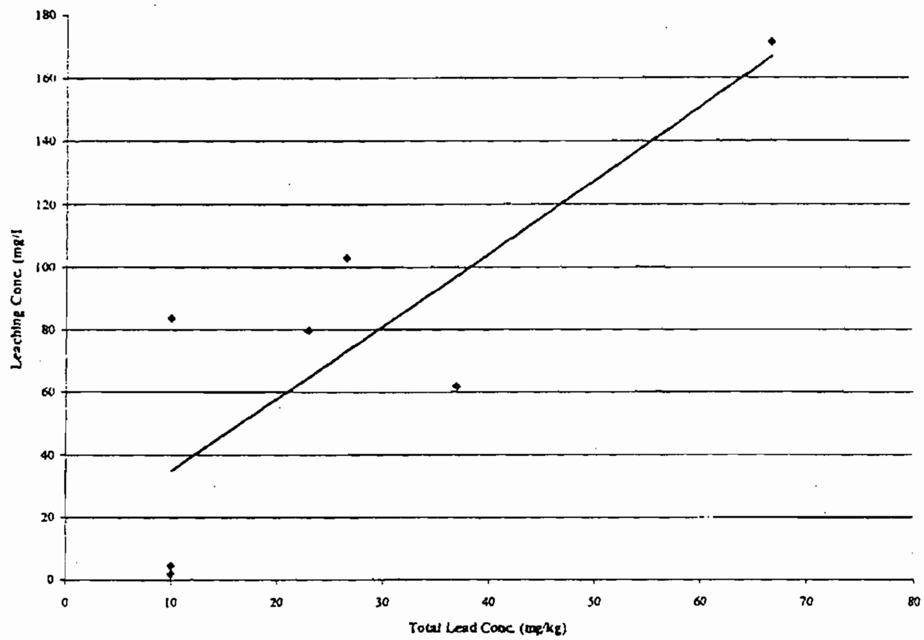
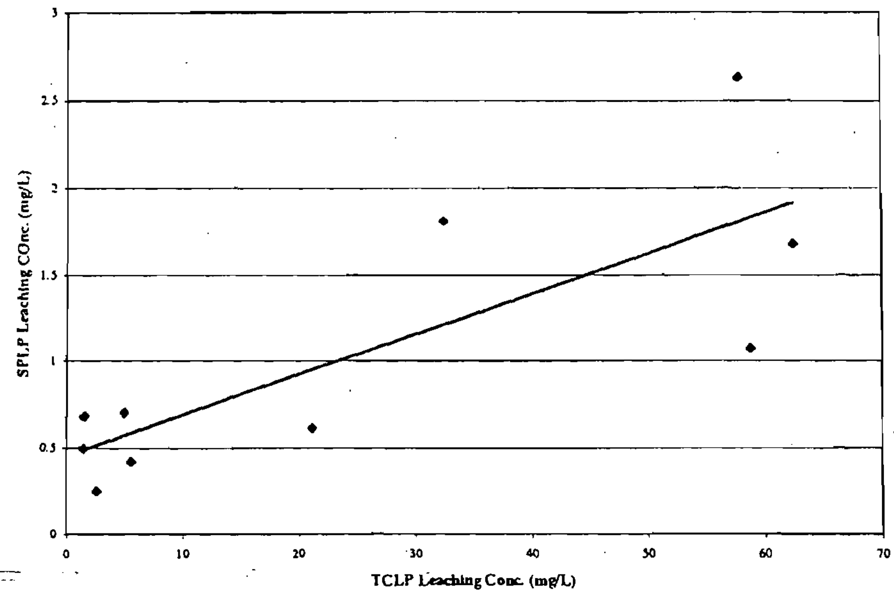


Figure 4-11. Lead TCLP and Total Metal Correlation.

A percentage of the total metals leached during the TCLP, SPLP, and lysimeter tests. Tables 4-6 through 4-8 show the percent leaching for all tests. The leaching mechanisms of the TCLP and SPLP test also differ. However, there was some correlation for all samples leaching above detection limit for SPLP and TCLP. Figure 4-12 illustrates this correlation with a 0.80 coefficient.



interesting ?

Figure 4-12. TCLP and SPLP Correlation

Table 4-6. Percent Leaching for Copper.

Copper	**L1**	**L2**	**L4**
TCLP	18.3%	35.6%	16.7%
SPLP	<0.52%	<0.89%	<0.30%
Lysimeter	0.2%	0.5%	0.2%

Table 4-7. Percent Leaching for Lead.

Lead	**L1**	**L2**	**L3**	**L4**	**L5**
TCLP	7.7%	6.9%	3.3%	5.1%	8.4%
SPLP	<0.75%	<0.87%	<0.5%	<0.3%	<1.0%
Lysimeter	0.04%	0.02%	0.04%	0.03%	0.49%

Table 4-8. Percent Leaching for Zinc.

Zinc	**L1**	**L2**	**L3**	**L4**	**L5**
TCLP	85.5%	76.0%	50.5%	72.5%	56.5%
SPLP	2.3%	3.5%	4.8%	1.3%	3.2%
Lysimeter	2.5%	2.9%	1.7%	2.0%	15.4%

Implications for Characterization

The leaching percentages of the TCLP test are higher than the SPLP or lysimeter leaching. The TCLP test is more aggressive in simulating the anaerobic leaching conditions at the bottom of a landfill with acetic acid. The TCLP would not be a good representation of the leaching of a waste in non-landfilled or open environmental conditions. The SPLP test is much better suited for predicting the leachate produced in the environment and is recommended by some regulators (WDNR). Tables 4-6 through 4-8 show that the lysimeter column was very similar to the SPLP test for percentage of total metal leached.

The batch leaching tests predict the concentration of metals in leachate produced, while taking into account the dilution of the leachate in the environment, by keeping the liquid to solid ratio at 20:1. The lysimeters, although they may simulate field and environmental conditions more accurately, by allowing the liquid to percolate though the waste, do not account for dilution in the environment. This can be seen by the high maximums on the lysimeter metal leaching curves. A dilution factor may need to be incorporated into the lysimeter leaching numbers to properly asses the impact of this waste stream on the natural environment.

?

When a dilution factor of 20 is applied to the lysimeter leaching data one secondary drinking water standard is exceeded by an average concentration. Lysimeter 3 exceeds the secondary limit of 0.3 mg/L for iron. All other lysimeters are under primary and secondary limits. This characterization of these wastes is somewhat different than the characterization made in chapters 2 and 3. Some ship maintenance facility media exceeded secondary drinking waster levels for zinc, iron, and copper. The sandblasting contractor sites exceeded for iron also. Even though exact environmental conditions are not simulated by the lysimeter leaching tests, these tests can give an indication of how this waste will behave when it is exposed to rain that filters through the waste to produce leachate.

Conclusions

The management of waste abrasive blasting media is a relatively new problem. Many times in the past, the waste was allowed to accumulate on site, with out any disposal. This accumulation of waste is normally a regulatory violation, as a landfill cannot be operated with out a permit and other provisions. A recommendation by regulators for the disposal of ABM waste has been in a lined landfill, because the characteristics leaching from the waste were unknown. This study researched the different leaching characteristics and total metal content of the waste stream. These characteristics may be used by generators and regulators to better understand the mechanism of leaching for this and other ABM-like waste streams.

Similar metals showed up in the leaching columns that were considered an issue from Chapters 2 and 3. When a dilution factor is applied to the lysimeter data, one metal still exceeds the secondary drinking water standard for iron at the top of the leaching curve.

CHAPTER 5
CONCLUSION

With regulatory trends moving towards risk-based standards and guidelines, the management of small specific waste streams, such as abrasive blasting waste, will become more complex. Through previous research a decision-making process was developed for the assessment and management of waste ABM (Carlson and Townsend, 1998).

This Research

This research utilized the decision making process for the assessment of two different waste streams of ABM (ship maintenance facility waste and sandblasting contractor waste). A brief outline of the conclusions from the decision making process follows:

1. Both waste streams from the sites sampled were non-hazardous for the toxicity characteristic.
2. Comparing total metal concentrations to direct exposure standards showed that in the ship maintenance waste ABM, arsenic was over the federal SSL 65% of the time, however only 2 samples exceeded the Industrial Florida soil cleanup goal (FSCG). The geometric average for the arsenic data was below the industrial FSCG. Another ship maintenance sample exceeded the federal limit for lead, however the average remained below the limits. None of the sandblasting contractor waste exceeded any risk-based direct exposure limits.

3. Comparing leachable metal concentrations to drinking water standards showed that ship maintenance facility waste ABM could occasionally exceed the primary standard for lead (1 sample) and may exceed the secondary standards for copper, iron, and zinc. Both geometric means for copper and iron were below the secondary drinking water standards, however the mean for zinc exceeded the limit. The sandblasting contractor waste had one sample exceeding the primary standard for cadmium, while the geometric mean was below the limit. The secondary limit for iron was exceeded by the geometric mean of the sandblasting contractor samples.
4. Options for management of these waste streams include disposal in a lined landfill and recycling in manner which does not produce leachate that enters the environment. Storage on-site would be allowed as long as production of leachate was kept to a minimum.

Since Chapter 2 and 3 indicate that these waste streams could potentially pose a risk to human health and the environment when compared to secondary drinking water standards, this leaching behavior was investigated further in Chapter 4. Chapter 4 compared batch tests similar to those used to regularly characterize waste (TCLP and SPLP) to a leaching column study. A leaching column study can be more representative of how waste may actually leach in the environment because the leaching fluid flows through the waste in a similar manner to rain. Chemical conditions inside the lysimeter also affect the leachability of a waste and may over or under-estimate the actual leaching that could occur in the environment (van der Sloot, 1991).

Future Work

This research provides insight into the characteristic of the two waste streams studied, but also raises some questions regarding the characteristics and management of abrasive blasting media. The leaching column study provided some indication on how this waste behaves in the environment, but actual field-testing would greatly increase the confidence of these results. The comparison of leaching methods in Chapter 4 can be beneficial for future testing purposes.

The theoretical leaching approach could be explored further. With the extensive leaching studies completed for this research and many general parameters recorded, a leaching model could be developed for the waste ABM from the lysimeter leaching situation. This model could theoretically predict a total metal concentration (similar to the federal SSLs that did not seem appropriate for ABM waste) that would be likely to exceed drinking water standards. These would be highly useful numbers to generators of this waste because total metal analyses are less expensive that leaching analyses.

A final option that could be explored would be to examine the leachability of this waste as treatment. When the waste has conditions similar to those in this study, the contaminants leach off relatively quickly and if the leachate is collected and treated, this may be a less expensive way to handle this waste stream.

APPENDIX A

QA/QC DATA

Table A-1. QA/QC Data

	TOTALS			LEACH				
	Blk.Spike	MS1	MS2	Blk. Spike	MS1	MS2	MS3	MS4
Zinc	92%	112%	111%	101%	79%	65%	101%	72%
Copper	94%	112%	112%	136%	105%	108%	141%	147%
Lead	90%	82%	82%	110%	119%	132%	115%	110%
Chromim	105%	74%	66%	103%	105%	104%	107%	108%
Cadmium	92%	89%	92%	80%	85%	75%	80%	85%
Nickel	100%	94%	86%	85%	90%	88%	84%	79%
Iron	106%	60%	79%	121%	112%	133%	88%	115%
Arsenic	128%	60%	54%	98%	-	-	-	-
Selenium	75%	84%	78%	85%	-	-	-	-
Barium	-	-	-	90%	80%	120%	-	-
Silver	-	-	-	-	41%	71%	-	-
Mercury	-	87%	109%	-	83%	66%	-	-

NOTE: MS=MATRIX SPIKE

APPENDIX B

LYSIMETER DATA

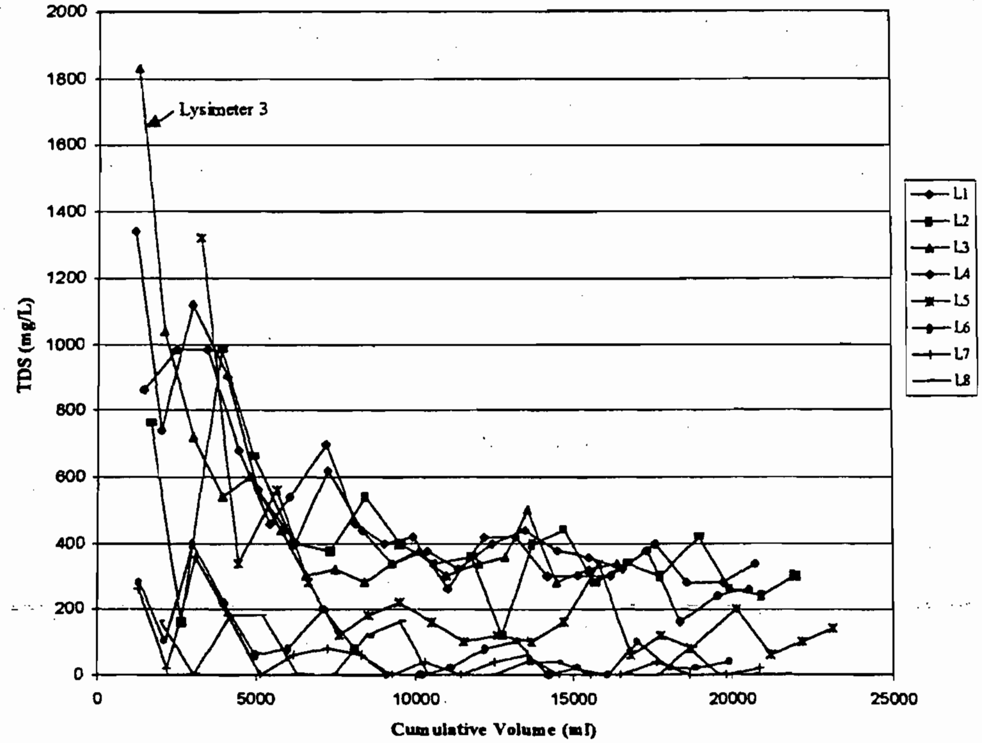


Figure B-1. TDS Leaching Curves .

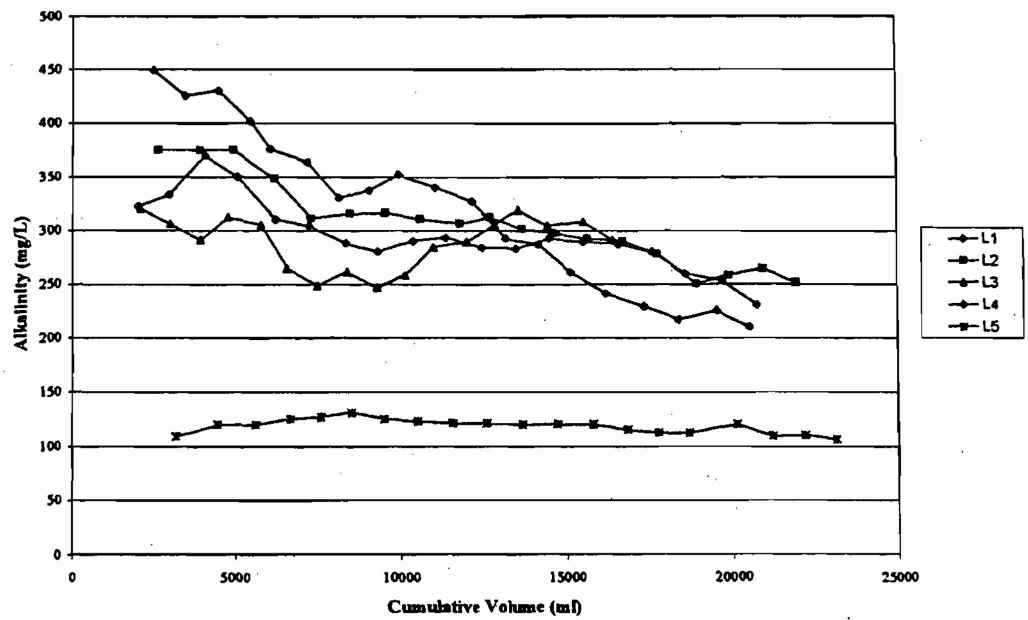


Figure B-2. Alkalinity Leaching Curves.

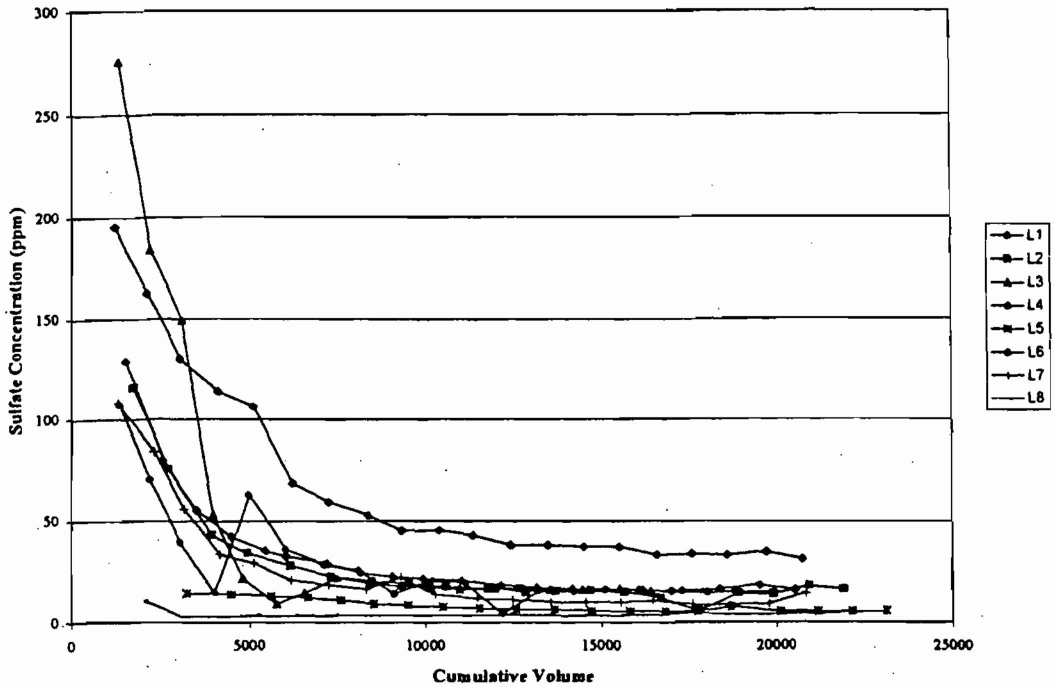


Figure B-3. Sulfate Leaching Curves

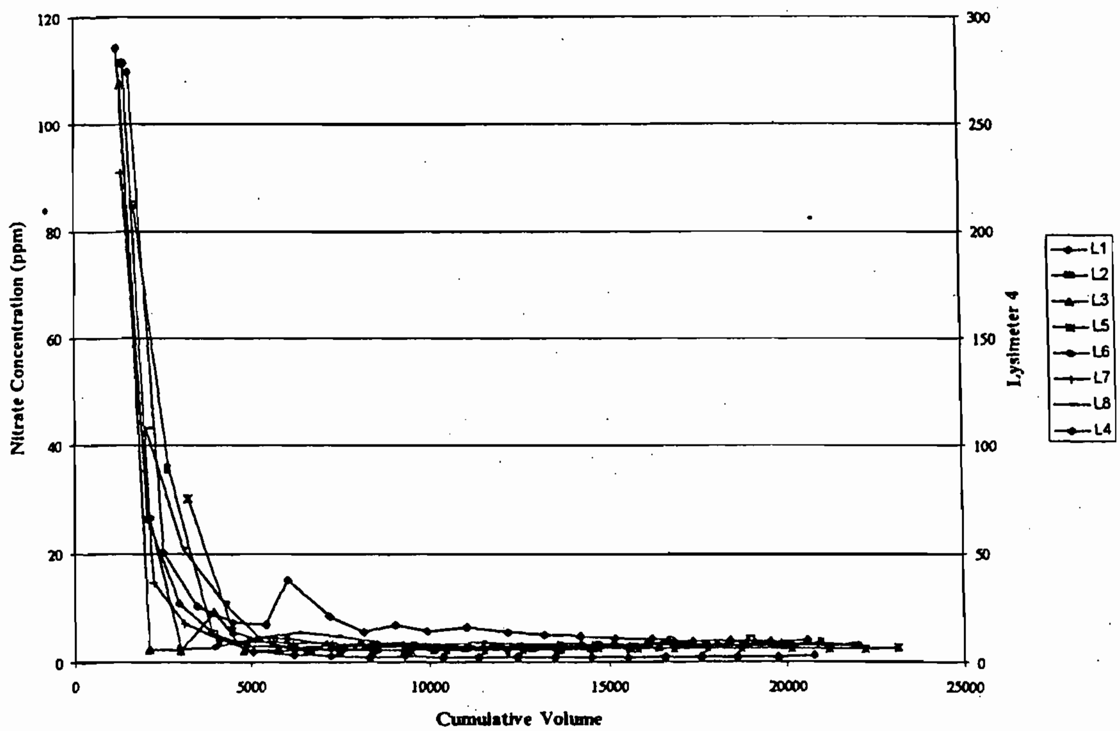


Figure B-4. Nitrate Leaching Curves

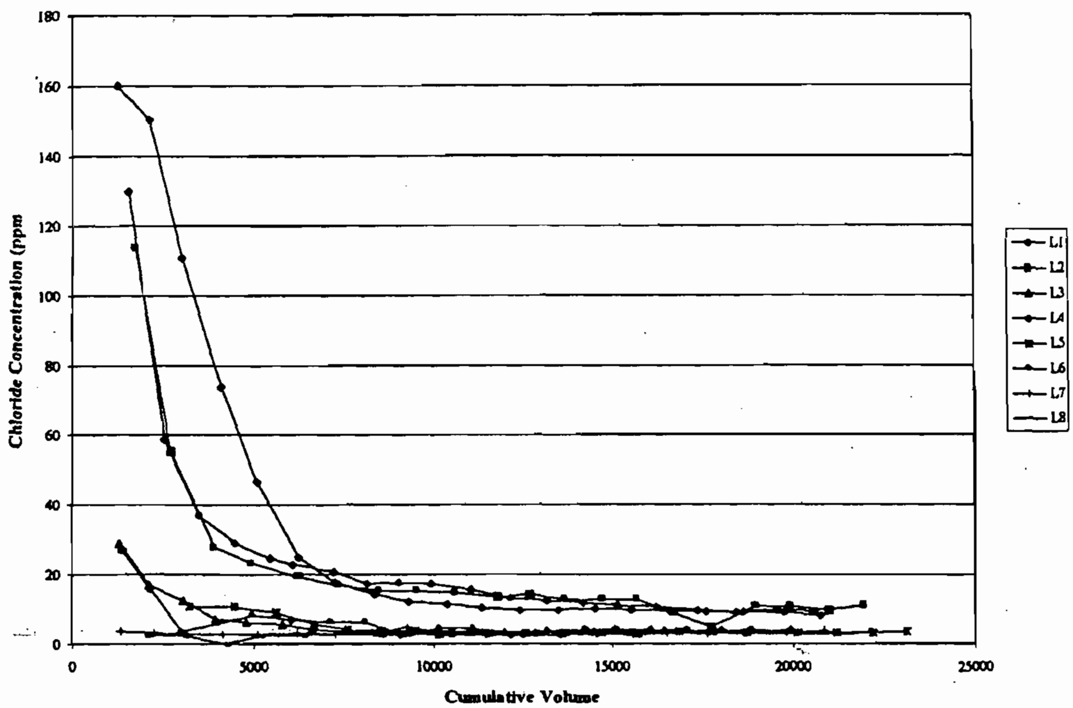


Figure B-5. Chloride Leaching Curves.

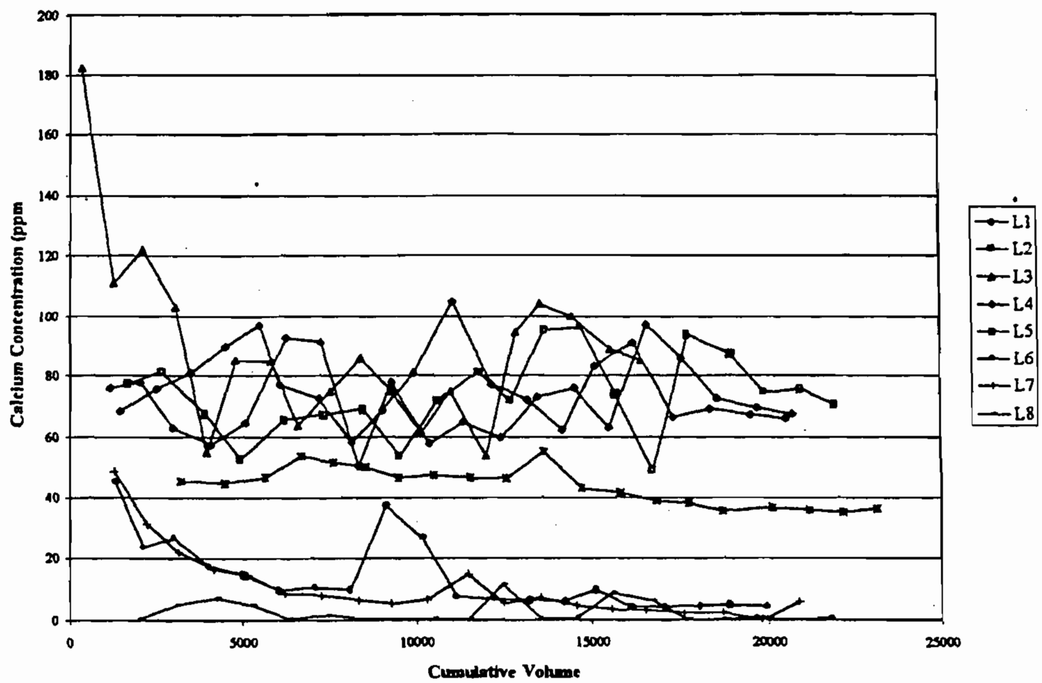


Figure B-6. Calcium Leaching Curves.

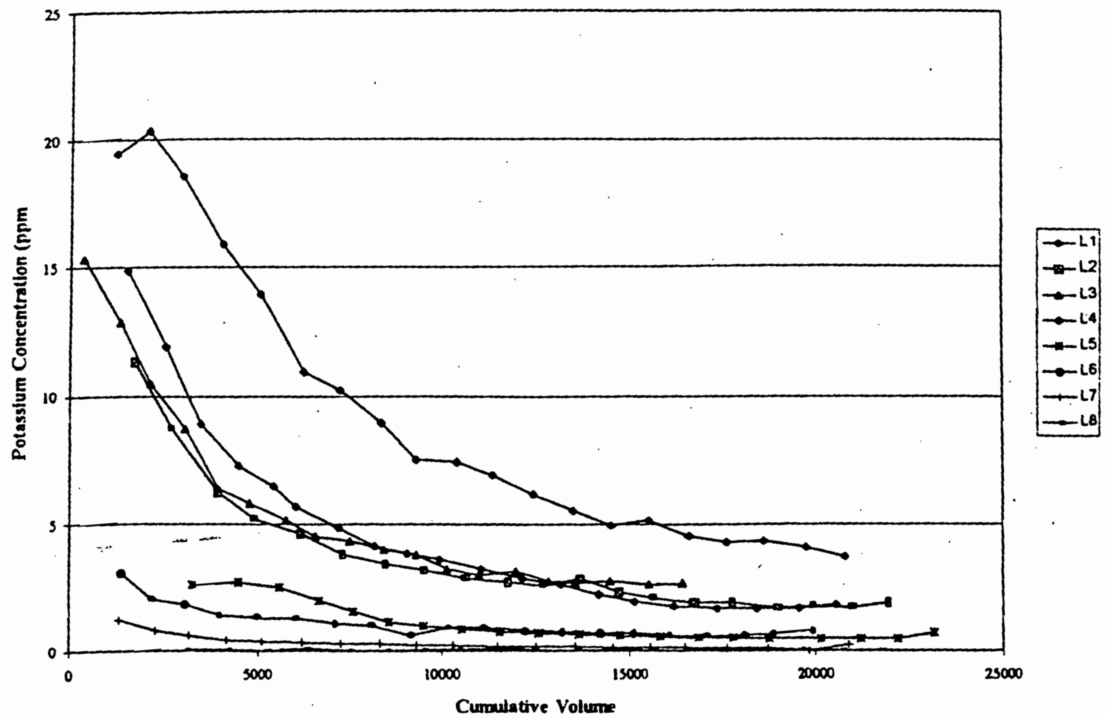


Figure B-7. Potassium Leaching Curves.

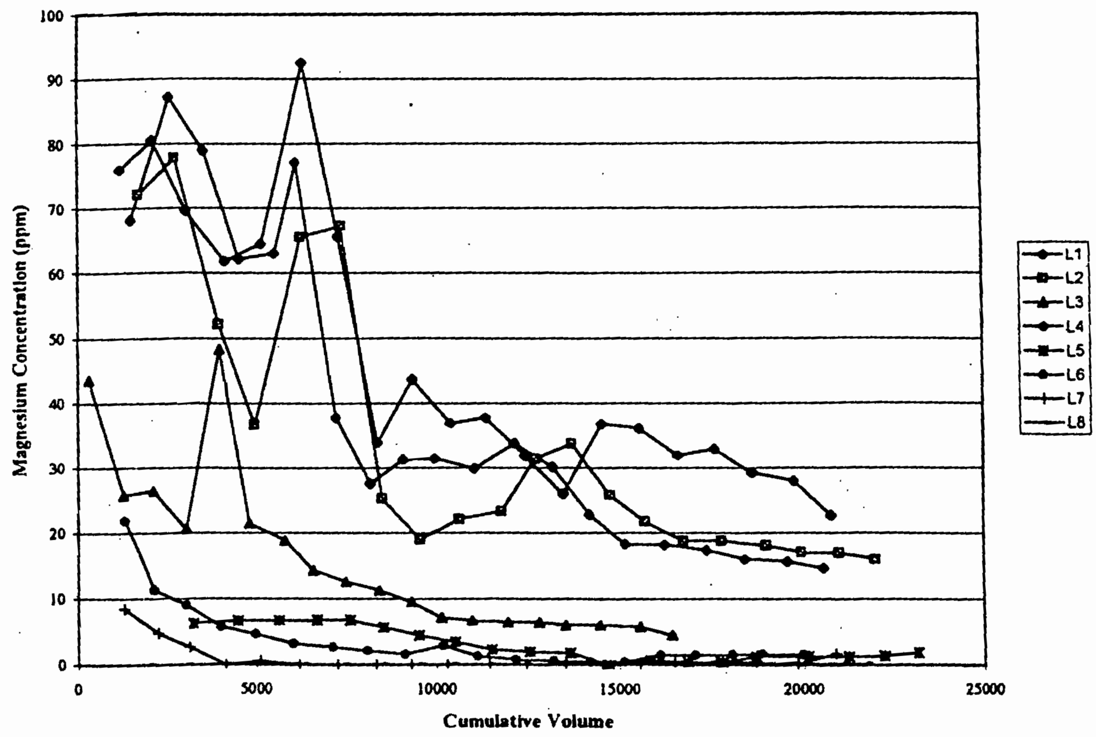


Figure B-8. Magnesium Leaching Curves.

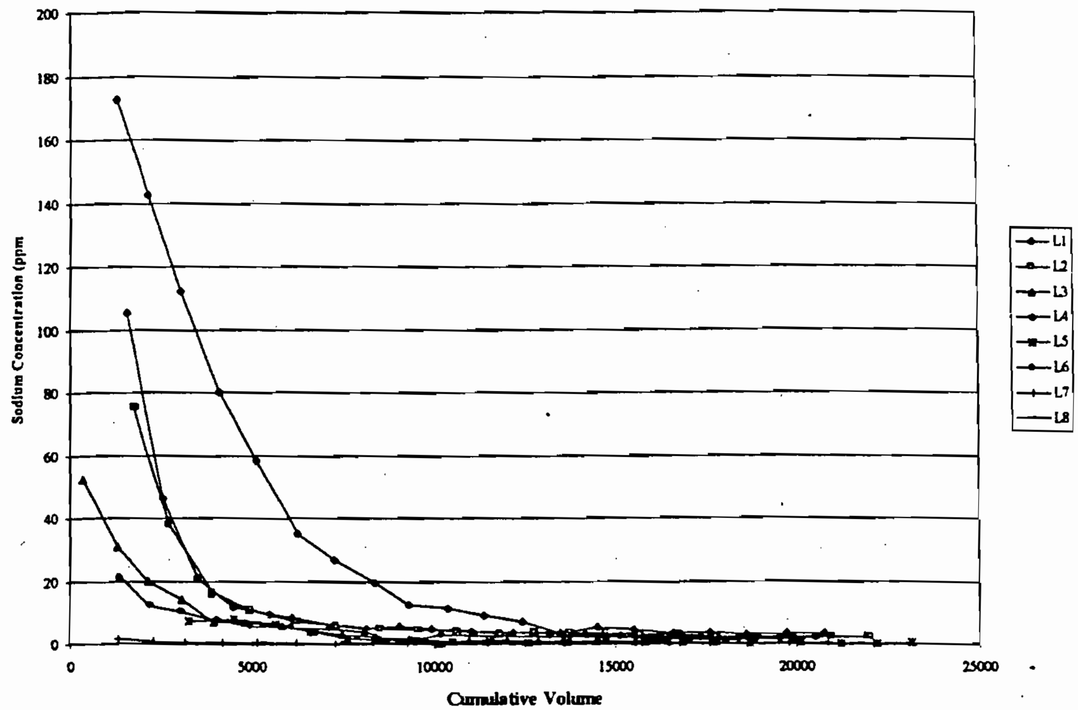


Figure B-9. Sodium Leaching Curves.

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BIOGRAPHICAL SKETCH

Jenna Romness Jambeck Carlson was born on April 16, 1974 in Minneapolis, Minnesota. Her parents divorced when she was one year old, with her father and step mother moving to Florida soon after. Jenna grew up and went to school in the small town of Pine City, Minnesota. However, she visited Florida an average of four times a year and attended eighth grade at Cypress Lake Middle School in Fort Myers. Jenna graduated in May 1992 from Pine City High School as salutatorian and Vice President of her class, with a Tozer Scholarship. She also received a scholarship from the Pine City Masons for a paragraph she wrote about her aspirations to pursue a degree in Environmental Engineering.

She attended the University of Florida (where her brother was) and received her Bachelor of Sciences in Environmental Engineering with honors in 1996. Jenna began her graduate career with a grant in January of 1997 specializing in solid and hazardous waste management, in the Department of Environmental Engineering. On July 12, 1997 she married her long time beaux and best friend, Brian Carlson. Upon completing her Master's Degree, Jenna and Brian will be relocating to Minneapolis, Minnesota where Jenna is employed by Woodward-Clyde/URS Greiner.

240.00

ABM Report

Total Tonnage available in State- 23,000 tons estimated

Total Tonnage available for the Tampa Terminal – 15,000 tons estimated

Screen Rate/ hr to screen out unusable debris in one pass – 80 tons/hr.

Total screening time at the Tampa Terminal – 187.5 hr/year or 16 hours/month average.

Total screening time in rest of State- 100.0 hr/year

100
80
8000

Note: ABM tonnage comes into terminal at irregular rate. Usually comes in 200 – 500 tons at time during or after blasting jobs, so the hours in one month could be higher than the 16 hour average.

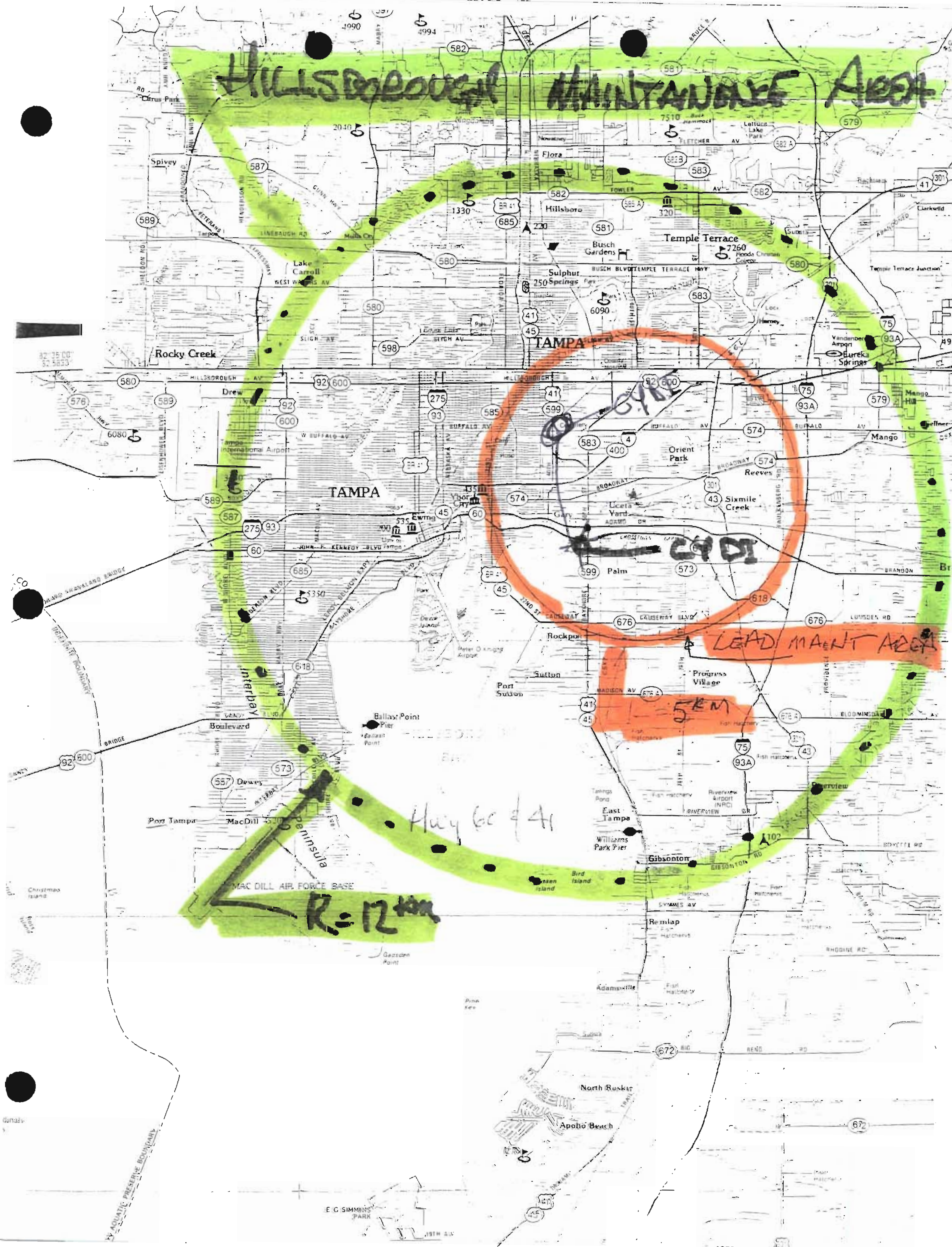
Note: ABM tonnage estimates are based on what is available in the State. Initial tonnages would be less.

Frank Milton 5/15/01

Just received from [illegible].

From: ALEX PADVA.

To: GEOFF SMITH.



HILLSBOROUGH MAINTANANCE AREA
CYBT
CYDI
LEAD MAINT AREA
5 KM
Hwy 60 & 41
R = 12 KM
TAMPA
Temple Terrace
Busch Gardens
Sulphur Springs
Hillsboro
Lake Carroll
Rocky Creek
Drew
Tampa International Airport
Orient Park
Reeves
Sixmile Creek
Uceta Yard
Palm
Rockport
Port Sutton
Progress Village
Ballast Point Pier
Interbay
Peninsula
MacDill
MAC DILL AIR FORCE BASE
Port Tampa
Dewey
Boulevard
East Tampa
Gibsonton
Riverview
Mango
Eureka Springs
Vandenberg Airport
Citrus Park
Spivey
Flora
Riverview Airport (NRC)
Williams Park Pier
Remlap
Adamsville
North Ruskin
Apollo Beach
E G SIMMONS PARK
Christmas Island
Gadsden Point
HILLSBOROUGH AV
BUFFALO AV
BROADWAY
CAUSEWAY BLVD
JOHN F KENNEDY BLVD
FOWLER AV
FLETCHER AV
BUSCH BLVD
TEMPLE TERRACE HWY
SLIGH AV
MADISON AV
BLOOMINGDALE AV
SYMMES AV
RIVERVIEW DR
GIBSONTON RD
BRANDON
Clarkwild
Temple Terrace Junction
Seffner

State of Florida
Department of Environmental Protection

Memo

TO:	Clair Fancy
THRU:	Bruce Mitchell
FROM:	William Leffler, P.E. WL
DATE:	7/13/2001 1:48 PM
SUBJECT:	Finding of No Reasonable Assurance Spent Abrasive Blasting Media Issue Draft Air Construction Permit No.: 7770473-005-AC Conrad Yelvington Distributors, Inc. (CYDI)

In April 2000 Conrad Yelvington CYDI applied for a statewide permit for a relocatable diesel engine powered Powerscreen "Chieftain 510" scalper/screener/classifier unit and associated conveyors. Shortly before the notice of intent was issued on August 11, 2000 CYDI sought approval of use of the Powerscreen to clean "nuts, bolts, cigarette butts and candy wrappers" from spent abrasive blast media. Because this use was not in the first application, the Intent to Issue the air construction permit limited the facility to sand gravel and crushed stone. The public notice, which is necessary for the Air construction Permit to be issued from the Intent has never been published.

On October 2, 2000 CYDI provided some limited analytical information on the ABM and a setter requesting the change. The abrasive blast media is largely coal boiler slag, but may consist of alumina, garnet, silica, or other abrasives. In some areas copper slag is commonly used for abrasive but it is not used in Florida for economic reasons. The spent abrasive is transported to portland cement manufacturing facilities where it is incorporated in the clinker feed material, High temperature fusion with the other cement ingredients disburses the waste elements into an insoluble portland cement matrix which is generally used in all forms of construction. Initially, (October 2000) there was no specification as to the amount of such materials to be processed. The department and the applicant have shared technical information of the nature of the abrasive blasting media and other re-use operations. In May 2001 CYDI suggested a limited throughput and annual cap on tonnage and operating hours.

The scalper/screener/classifier unit and associated conveyors, if operated with water spray dust suppression, would be a minor facility. Both the capacity of the screener and CYDI's intent to use the unit to clean spent abrasive blast media (ABM), a potentially toxic or hazardous material, renders the unit ineligible for the "generic exemption" provided by Rule 62-210.300(3)(a)(37), F.A.C.

The scalper/screener/classifier is to be used for sand, gravel, crushed stone and recycled asphalt pavement (RAP). The draft permit contemplated operation at 550 tons per hour, 16 hours per day, 300 days per year (2,640,000 tons per year). The applicant's consultant used emission factors from AP-42, Emission Factors. Table 11-19.2.2., , which presumed control of unconfined particulate emissions by water spray. Analysis of emissions by dry processing (uncontrolled) emission factors from EPA's FIRE Air Emissions Database indicates potential particulate emissions far in excess of 100 tons per year. If controlled by water sprayers, the potential process particulate emissions from the screening operation are approximately 27 tons per year from the screens and conveyor drop points(all materials). Significant additional dust may be expected from storage piles and work-yard traffic operations. The applicant estimated .27 tons (540 lbs) of lead lost each year from the storage piles plus the losses from the vibrating screens.

Other issues include the long term potential for surface and groundwater pollution, The site is already a RCRA designated cleanup site for other wastes. There are hazardous waste issues, should the applicant find itself in possession material that is hazardous. The applicants contingency plan to haul the material to a landfill is not adequate should the material be found to be hazardous waste. The accumulation and storage of ABM on the site has not been addressed either as a waste issue, leading to groundwater or surface water pollution or as an air issue dealing with best management practices for containing ABM and preventing wind erosion from storage piles and minimizing losses due to traffic in the work area.

There are public health issues, in addition to the air waste and water permitting disciplines, which are not within the Division's jurisdiction. There is concern that a relocatable facility that could create a nuisance through lead or other hazardous emissions next to a school, child care center, or other concentration of people.

There is evidence that Abrasive Blast Media has been screened on the site with no valid permit. A pile of the ABM was discovered on the Departments January 31, 2001 site visit in response to large dust clouds arising from the handling of power plant bottom ash.

This operation is presently initially contemplated at CYDI's Tampa yard, which is within one kilometer south-west of the center of the Hillsborough County particulate maintenance area. It is also within 2 kilometers of the center of the Hillsborough County Lead Air Quality Maintenance Area (Gulf Coast Recycling). CYDI contemplates remote operations near Tampa Shipyard, and steel fabrication shops in Jacksonville, Orlando Ft Lauderdale and Miami. CYDI maintains about 30 sand and gravel storage facilities throughout the state that are also potential operating sites both as a sand and gravel classifier and for spent abrasive blast media.

CYDI seeks permission to process potentially hazardous waste through a facility that will emit hazardous pollutants into the air. It says that it will sample each batch to demonstrate that the material is not a hazardous waste. Townsend and Carlson provide data indicating a significant portion of the materials from the Tampa area in 1989 would not have passed the TCLP clearance criteria for classification as non-hazardous. The overwhelming bulk of the spent abrasive material in the Tampa Bay Area is from shipyard sources and potentially hazardous. The applicants statement that it intends to provide a laboratory TCLP test on each lot is not sufficient to demonstrate continuous compliance with an agreement that the waste is not hazardous. There is no proffered plan to assure that the sampling is representative of the material processed, nor any laboratory quality assurance plan to demonstrate the statistical reliability of the acceptance testing

The TCLP test, which is the criteria for determining whether a batch of abrasive blasting media is non hazardous, is not a reliable surrogate for determining the quantity of air pollutants (PTE) emitted from processing that material on an open screen. The TCLP measures the solubility of the material in a laboratory simulation of an acidic landfill. The test is a simulation to estimate the portion of the pollutants that will be leached into groundwater. The TCLP does not represent the mass concentration of pollutants in the sample as a whole, nor in the fine portion of the sample (passing the 200 screen) Widely differing analytical results between the TCLP and Mass Analysis on the same sample have been demonstrated in Carlson's and Townsend's 1998 papers.

The applicant has provided laboratory results of three tests on the same sample (Southeastern Environmental Laboratories Submittal 10006422.) for comparison of SPLP (Synthetic Precipitation Leaching Procedure, a leaching test similar to TCLP), mass concentration and mass concentration in the portion passing the No 200 sieve). The relationship between SPLP and mass concentration is inconsistent and erratic. For some elements, especially those having generally soluble acidic salts, (particularly acetates) there is a fairly erratic relationship. For other elements, especially lead, cadmium and chromium the ratio of SPLP to the mass concentration is very poorly defined and subject to wide variability. The relationship between the lead level in the fine portion (229 mg/kg), and the gross sample (16.3 mg/kg) is nearly 14 times the concentration of lead in the gross sample; and all of this is in a sample where the lead was undetectable by leaching procedures. No direct comparison between TCLP, gross analysis or the sample and mass analysis of the fines was offered. The reported correlations are at Tables 4.17 and 4.18 of Carlson, Best Management Practices for ABM, 1998. Graphical representation of the variability for several pollutants is at Carlson, at Figures 4.21 through 4.23.

On June 7, 2001 the applicant responded to a second request for additional information (Brooks letter dated May 28, 2001) suggesting annual throughput limits on Spent ABM as follows:

> Spent abrasive blast media (ABM), not otherwise classified as hazardous waste, 23000 tons per year with the operation throughput limited to 80 tons per hour and the hours of operation limited to 200 hours per year in Hillsborough County and an additional 100 hours per year elsewhere throughout the state of Florida.

This proffer goes far to making the application intuitively acceptable. The gross unconfined emissions from the screening operation would be but a small fraction of the potential from unlimited operation. Closer examination indicates that the proffered operational limitations are based on the applicant's estimate of the available ABM rather than any analysis of the impact of such an operation on air quality.

The materials submitted in support of the request to modify the intent to issue failed to provide any assurance that the ambient air quality standards for lead and particulate will not be exceeded. Location of the facility within the Air Quality Maintenance Areas for Lead and Particulate gives cause for an even more extensive analysis than originally contemplated. Not only is the quantification of the potential to emit (PTE) for hazardous air pollutants important, it is now necessary to demonstrate that the ambient concentrations of lead and fine dust (PM10) are less than the ambient standards. A facility emitting a little as 100 lb of lead or lead compounds is required to procure a special lead permit, Rule 62-210-200, Definitions, Lead Processing Facility; and, Rule 62-296.601, F.A.C., Lead Processing Facility. Because of the proximity to Gulf Coast Recycling, Rule 62-296.600, F.A.C., Reasonably Available Control Technology (RACT) Lead, imposes stricter housekeeping standards.

The concept and requirement of reasonable assurance comes from Rule 62-070. F.A.C.,

Standards of Issuing or Denying Permits; Issuance; Denial.

(1) A permit shall be issued to the applicant upon such conditions as the Department may direct, only if the applicant affirmatively provides the Department with reasonable assurance based on plans, test results, installation of pollution control equipment, or other information, that the construction, expansion, modification, operation, or activity of the installation will not discharge, emit, or cause pollution in contravention of Department standards or rules. However, for discharges of wastes to water, the Department may issue temporary operation permits under the criteria set forth in Section 403.088(3), F.S.

(2) If, after review of the application and all the information, the Department determines that the applicant has not provided reasonable assurance that the construction, modification, expansion, or operation of the installation will be in accord with applicable laws or rules, including rules of approved local programs, the Department shall deny the permit.

(3) The Department may issue any permit with specific conditions necessary to provide reasonable assurance that Department rules can be met.

(4) No Department permits shall be issued for a term of more than five (5) years unless otherwise specified by statute, rule, or order of the Department. However, construction permits for air pollution sources may be issued for a period of time as necessary.

(5) The Department shall take into consideration a permit applicant's violation of any Department rules at any installation when determining whether the applicant has provided reasonable assurances that Department standards will be met.

(6) The applicant shall be promptly notified if the Department intends to deny the application, and shall be informed of the reasons for the intended denial, and of the right to request an administrative hearing.

(7) The issuance of permit does not relieve any person from complying with the requirements of Chapter 403, F.S., or Department rules.

Specific Authority: 403.021, 403.031, 403.061, 403.088, FS. Law Implemented: 403.021, 403.031, 403.061, 403.087, 403.088, FS. History: New 5-17-72, Amended 7-8-82, 2-1-83, 12-3-84, 8-31-88, 3-28-91. Previously numbered as 17-4.07, Formerly 17-4.070

The concept of reasonable assurance does not require the applicant to negate all possibilities of failure, or to provide an absolute guarantee that a proposed project will comply with all applicable standards. Rather, the concept requires a reason or rationale to be provided for assurance or for rejection. <u>Campbell v. Southern Hy-Power Corporation and Florida DEP</u>, and cases cited pages 38 and 39 thereof.

Emotional reaction against potentially hazardous substances is not a criteria for denial of air permits, but neither is intuition a "reasonable assurance based on engineering calculation and science". The lack of logical or statistical correlation between the quantification of pollutants in the ABM by the TCLP test and the estimation of Potential to Emit (PTE) various hazardous air pollutants, based on absolute or mass analysis, and the failure to address the issues of the Hillsborough county Air Quality Maintenance Area and the Hillsborough County Lead Air Quality Maintenance Areas are such a reasons for the Department's refusal to disallow processing of ABM under this permit. Waste and water pollution issues will ultimately be dealt with by separate permitting systems, but to process an air permit with disregard of these issues would be irresponsible engineering judgment.

I do not find the amendments to application and other supporting documents provide reasonable assurance that the facility will operate within applicable law and regulations.

W. Leffler

William Leffler, P. E.

Permitting Engineer - July 13, 2001

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

Department of Environmental Protection

Marjory Stoneman Douglas Building
3900 Commonwealth Boulevard
Tallahassee, Florida 32399-3000

Jeb Bush
Governor

David B. Struhs
Secretary

July 13, 2001

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. William C. Thomas III
Vice President of Industrial Development and Operations
Conrad Yelvington Distributors, Inc.
2326 Belleview Road (P. O. Box 1686)
Daytona Beach, Florida 32114

Re: Powerscreen "Chieftain 510" Scalper/Screener/Classifier Unit
Requested Modification to Intent to Issue Air Construction Permit No.: 7770473-004 AC, August 11, 2000

Dear Mr. Thomas:

You requested us to consider revising the our August 11, 2000 draft construction permit to allow CYDI to process spent abrasive blast media in the Powerscreen unit. I am of the opinion that the supplemental information provided by your consultants fails to provide the Department with reasonable assurance that such an operation can be conducted within the regulations of the Division of Air Resources Management.

Rule 62-6.070, F.A.C. provides that it is the applicant's burden to demonstrate compliance with all of the Department's standards. While I have expressed many concerns for waste, surface water, groundwater and RCRA issues, my determination is based on the rules affecting sources of Air Pollution only. The deficiencies are three fold:

- There is no reliable demonstration or calculation of the air emissions of toxic heavy metals from of this facility, its stockpiles and work areas;
- The analytical methods for determining the toxic constituents (TCLP) and classifying the spent ABM are not suitable for estimating air emissions; and,
- No consideration has been given to the RACT requirements of the Hillsborough County Air Quality Maintenance Areas for Lead and Particulate Matter.

The Public Notice of Intent to Issue the Air Construction Permit, furnished to you August 11, 2000, has not yet been advertised. CYDI does not yet hold any permit authorizing the use of this equipment. Because the capacity of this screener exceeds 25 tons per hour, this unit is not eligible for any exemption from permitting. Please advise us when you will be publishing the public notice, or whether you intend to abandon it.

Should you have any further questions please call me at 850-921-9522.

Sincerely,

W. Leffler

William Leffler P.E.

Permitting Engineer

cc:
Eugene D. Schaltenbrand, P.E. and Stephanie Brooks, PE, 5068 NW 85th Place, Coral Springs, FL 33067
Alex Pavda, PhD, 7581 Anderra Place, Boca Raton, FL 33433
Geoffery Smith, Blank Meenan and Smith, P.A., Post Office Box 11068, Tallahassee, FL 32302

Len Kozlov, DEP, Central District
Chris Kirts, DEP, Northeast District
Sandra Veasey, DEP, Northwest District
Bill Thomas, DEP, Southwest District
Ron Blackburn, DEP, South District
Isidore Goldman, DEP, Southeast District
Daniela Banu, Broward County Department of Natural Resource Protection
H. Patrick Wong, Dade County Department of Environmental Resources Management
Richard Robinson, Regulatory and Environmental Services Department
Jerry Campbell, Hillsborough County Environmental Protection Commission
James E. Stormer, Palm Beach County Health Department
Peter Hessling, Pinellas County Department of Environmental Management
Kent Kimes, Sarasota County Natural Resources Department
Marie Driscoll, Orange County Environmental Protection Department
William Kutash, DEP Waste Southwest District
Robert Butera, DEPWaste, Southwest District
Richard Tedder DEP Waste, Tallahassee

State of Florida
Department of Environmental Protection

Memo

TO:	Clair Fancy
THRU:	Bruce Mitchell
FROM:	William Leffler, P.E.
DATE:	August 16, 2001
SUBJECT:	Revised Intent to Issue Package Draft Air Construction Permit No.: 7770473-005-AC Conrad Yelvington Distributors, Inc. (CYDI)

This draft permit is for the construction of a relocatable diesel engine powered Powerscreen "Chieftain 510" scalper/screener/classifier unit and associated conveyors. It includes provisions for processing spent abrasive blast media with a limited throughput and annual cap on tonnage and operating hours. The construction permit will allow the permittee to advertise in counties for purposes of construction and testing.

The application history is as follows:

- Application for air construction permit received on April 19, 2000.
- Notice of intent with Draft permit issued August 11, 2000
- Information supplied to support revision of notice of intent
- Information supplied in response to request for additional information
- Information supplied in response to second request for additional information

The scalper/screener/classifier unit and associated conveyors, if operated with water spray dust suppression, will be a minor facility. The throughput capacity and the applicant's declared intent to use the unit to clean spent abrasive blast media (ABM), a potentially toxic material, renders the unit ineligible for the exemption provided by Rule 62-210.300(3)(a)(37), F.A.C. For the initial application applicant's consultant used emission factors from AP-42, Emission Factors. Table 11-19.2.2., , which presumed control of unconfined particulate emissions by water spray. If controlled by water sprayers, the potential process particulate emissions are approximately 27 tons per year from the screens and conveyor drop points(all materials). Analysis of emissions by dry processing (uncontrolled) emission factors from EPA's FIRE data base indicates potential particulate emissions in excess of 100 tons per year. The permit will contain the requirement for water spray control for particulate.

The limitation on throughput, processing rate, and operation hours, for spent abrasive media, together with CYDI's commitment to process only material passing TCLP analysis (rejecting any material classified as hazardous waste by the TCLP analysis) provide sufficient assurance that the operation of this machine will not violate any existing air emission standards or create a public health hazard as a result of air emissions. Other issues including the long term potential for surface and groundwater pollution, hazardous waste issues, should the applicant find itself in possession of non complying material and personal exposure / industrial hygiene issues are noted in the Technical evaluation but are not within the Division's permitting jurisdiction. These issues will presumably be addressed by solid waste permitting authorities

In addition to the Cone Road site, CYDI contemplates relocatable operations near Tampa Shipyard, and steel fabrication shops in Jacksonville, Orlando Ft Lauderdale and Miami. CYDI maintains about 30 sand and gravel distribution facilities throughout the state that are also potential operating sites both as a sand and gravel classifier and for spent abrasive blast media. The General Visible Emissions Standard applies statewide, and more restrictive visible emission standards apply in the Air Quality Maintenance Areas, including the Cone Road site in Tampa Both The Cone Road site and the Tampa Shipyard are also within the Hillsborough County Air Quality Maintenance Area for lead.

The Powerscreen unit is designed for sand and gravel classification. It is subject to general visible emission standards when classifying previously crushed construction aggregates (restricted to 'no visible emissions' within the particulate maintenance area) . Operation of this unit in series with a crusher may subject it to a more restrictive NSPS visible emission standard provided in 40 CFR 60, Subpart OOO.

Best management practices for handling abrasive blast media have been suggested in Best Management Practices for Waste Abrasive Blast Media, Florida Center for Solid and Hazardous Waste Management, Tim Townsend and, Jenna Jambeck Carlson (1998).

Recent complaints regarding the processing of coal bottom ash on the Tampa site have been partially resolved by Southwest District Solid Waste Section with an agreement that such material is exempt from solid waste rules as industrial material for reuse. No power plant bottom ash is to be screened in this unit.

I recommend withdrawing the unadvertised intent to issue and draft permit of August 11, 2000 and signing the attached Intent to Issue an Air Construction

In the Matter of an
Application for Permit by:
Conrad Yelvington Distributors, Inc.
2326 Bellevue Road

Daytona Beach, Florida 32114

Draft Air Construction Permit No.: 7770473-004-AC
Relocatable Powerscreen "Chieftain 510" Scalper/Screener/Classifier Unit and Associated Conveyors

NOTICE WITHDRAWING INTENT TO ISSUE AIR CONSTRUCTION PERMIT

On August 11, 2000 the department gave notice of intent to issue an air Construction permit to the above permitee for the facility above described. The Public Notice required by that notice of Intent to Issue an Air Construction permit has never been published as required pursuant to Section 403.815, F.S., and Rule 62-110.106(7)(a)1., F.A.C. The permittee has made a supplemental application which the Department has considered, Permit Project No.: 7770473-005-AC. Accordingly, the Notice of Intent to Issue an Air Construction Permit No.: 7770473-004-AC, dated August 11, 2000 is vacated and withdrawn

Executed in Tallahassee, Florida.

____
C. H. Fancy, P.E.,
Chief
Bureau of Air Regulation

CERTIFICATE OF SERVICE

The undersigned duly designated deputy agency clerk hereby certifies that this INTENT TO ISSUE AIR CONSTRUCTION PERMIT (including the PUBLIC NOTICE, Technical Evaluation and Preliminary Determination, and the Draft permit) was sent by certified mail (*) and copies were mailed by U.S. Mail, or electronic mail (as noted) before the close of business on ____________ to the person(s) listed:

William C. Thomas III*, V.P., CYDI, Post Office Box 1686, Daytona Beach, Florida 32115
Eugene D. Schaltenbrand, P.E. and Stephanie Brooks, PE, 5068 NW 85th Place, Coral Springs 33067
Alex Pavda, PhD, 7581 Anderra Place, Boca Raton, FL 33433
Geoffery Smith, Blank Meenan and Smith, P.A., Post office Box 11068 Tallahassee, Florida 32302
Len Kozlov, DEP, Central District
Chris Kirts, DEP, Northeast District
Sandra Veasey, DEP, Northwest District
Bill Thomas, DEP, Southwest District
Ron Blackburn, DEP, South District
Isidore Goldman, DEP, Southeast District
Daniela Banu, Broward County Department of Natural Resource Protection
H. Patrick Wong, Dade County Department of Environmental Resources Management
Richard Robinson, Regulatory and Environmental Services Department
Jerry Campbell, Hillsborough County Environmental Protection Commission
James E. Stormer, Palm Beach County Health Department
Peter Hessling, Pinellas County Department of Environmental Management
Kent Kimes, Sarasota County Natural Resources Department
Marie Driscoll, Orange County Environmental Protection Department
William Kutash, PE, DEP Southwest District
Robert Butera, DEP, Southwest District

Clerk Stamp

FILING AND ACKNOWLEDGMENT FILED, on this date, pursuant to §120.52, Florida Statutes, with the designated Department Clerk, receipt of which is hereby acknowledged.

____________________ ______________
(Clerk) (date)

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION	3804 Coconut Palm Drive Tampa, FL 33619-8318

FAX

Date: 6-15-01

Number of pages including cover sheet: ~~4~~ 5

To: Bill Leffler

Phone:

Fax phone: 850-921-6979

CC:

From: Bob Butera

Phone: (813) 744-6100 x45

Fax phone: (813) 744-6125

REMARKS: ☐ Urgent ☒ For your review ☐ Reply ASAP ☐ Please comment

FYI

Department of Environmental Protection

Lawton Chiles
Governor

Southwest District
3804 Coconut Palm Drive
Tampa, Florida 33619

Virginia B. Wetherell
Secretary

NOV - 6 1996

Mr. Tom Mountain
Environmental Manager
Florida Crushed Stone Company
P.O. Box 1508
Brooksville, Florida 34605-1508

Subject: Management of Nonhazardous, Used Sandblast Grit

Dear Mr. Mountain:

The Solid Waste Section of the Florida Department of Environmental Protection (FDEP) has received your August 30, 1996 letter (attached) concerning Florida Crushed Stone's (FCS) proposed use and management of used, nonhazardous sandblast grit. Used sandblast grit is considered to be a solid waste, and must be managed as a waste unless it is managed as an industrial byproduct, as described in Florida Statute 403.7045(1)(g), attached. Industrial byproducts must be non-hazardous wastes, must be stored in a manner such that it is not a potential environmental problem, and must be reused within one year. Reuse of sandblast grit must treat the waste properties of the grit in a manner that does not present potential environmental or health risks.

Your management practices proposed in this letter are acceptable for reuse of grit in portland cement only. The grit may be used up to 11% of the total cement mix. The FDEP has additional health risk concerns with reuse of industrial byproducts in soil cement. If you wish to pursue reuse of sandblast grit in soil cement, please contact Ms. Kathy Anderson, FDEP - Tallahassee at 904/488-0300.

As stated in paragraph No. 2 of your August 30, 1996 letter, the sandblast grit should be proven to be nonhazardous prior to your acceptance of the sandblast grit. Please be aware that the testing parameters for the grit will depend on what the grit was used to clean. All grit should be tested for the RCRA metals, but grit which may have come in contact with organic materials would also need to be tested for the RCRA organics. If there are any questions on applicable tests, please contact me at 813/744-6100, ext. 336.

During the FDEP's August 8, 1996 site visit, spent sandblast grit was observed stored in unlined, uncovered areas. You stated that this grit would be removed within a year for processing in the cement plant. This timeframe is within the acceptable range for industrial byproducts, but the storage of the waste directly on the ground is not acceptable. The FDEP requests this waste be removed by May 1, 1997, to prevent

Tom Mountain
Page 2

leaching from the grit pile during the next rainy season. FCS should not accept additional grit until the existing grit piles are used at the cement plant, or have been stored as described in the management plan.

If you have any questions, please contact Allison Amram at 813/744-6100, ext. 336.

Sincerely,

William Kutash
Waste Program Administrator

Attachments

cc: Mike Flynn, Quicksilver Environmental, PO Box 25178, Tampa, FL 33622-5178
Bob Butera, PE, FDEP - Solid Waste Section
Allison Amram, PG, FDEP - Solid Waste Section
Cindy Cathey, FDEP - Industrial Waste Section
Kathy Anderson, FDEP - Tallahassee, MS 4565
Richard Tedder, FDEP - Tallahassee, MS 4565

FCS

FLORIDA CRUSHED STONE COMPANY
CEMENT PLANT

RECEIVED SEP 17 1996 SOUTHWEST DISTRICT

August 30, 1996

Ms. Allison Amram
Solid Waste Section
Florida Department of
Environmental Protection
3804 Coconut Palm Dr.
Tampa, Fl. 33619-8318

Re: Sandblast grit storage and use- FCS Gregg Mine and FCS Cement Plant, Brooksville, Florida.

Ms. Amram:

FCS proposes to utilize outside sources of non-hazardous sandblast grit as raw materials in its durabase and cement manufacturing processes. Sandblast grit is a suitable material for use as an aggregate in the manufacturing of soil cement and clinker. FCS intends to accept non-hazardous sandblast grit from suppliers of outside sources. Spent sandblast grit will be evaluated, received, stored and used by FCS under the following conditions:

1.) A written contract will be required for each outside source of sandblast grit specifying that the material shall be used in a manner that complies with all federal, state and local laws and confirming the best management practices for the management of the material will be followed.

2) A waste determination analysis will be performed on each source of spent grit. Composite samples will be tested to be demonstrably "non hazardous," as defined by Resource conservation and Recovery Act (RCRA) in the title 40 CFR, Part 261, subpart C prior to shipment.

3) Each shipment of spent grit will be manifested and contain the date of shipment, the name of the generator and transporter, and tons of spent grit received.

4) Sandblast grit shall be stored on an impermeable base and covered to prevent storm water runoff.

5) Sandblast grit shall be used as a substitute raw material ingredient in the manufacturing of portland cement and in the manufacturing soil cement only.

6) Any debris containing sandblast grit, which is received by FCS and not recycled, shall be returned to the supplier.

352

P.O. BOX 1508 / 10311 CEMENT PLANT ROAD / BROOKSVILLE, FL 34605-1508 / PHONE (904) 799-7881 / FAX (904) 796-6281

7) Records on the receipt and use of sandblast grit shall be kept for a minimum of three years and shall include the following:

a) All shipment manifests (i.e., received and returned).
b) Total number of tons delivered to each plant (durarock and cement) on a monthly and annual basis.
c) Total number of tons used in production by each plant, (durarock and cement) on a monthly and annual basis.
d) Copy of the product Material Safety Data Sheet (MSDS) for each source.
e) A copy of the hazardous waste analysis on each source.
f) Certification by the supplier and/or generator for each source that the material is non-hazardous in accordance with RCRA standards.
g) A copy of the written contract of agreement between FCS and each source supplier and/or generator.

If you have any questions or comments please do not hesitate to call.

Sincerely,

Tom Mountain

Tom Mountain
Environmental Manager

State of Florida
Department of Environmental Protection

Memo

TO:	Clair Fancy
THRU:	Bruce Mitchell
FROM:	William Leffler, P.E.
DATE:	7/13/2001 10:37 AM
SUBJECT:	Finding of No Reasonable Assurance Spent Abrasive Blasting Media Issue Draft Air Construction Permit No.: 7770473-005-AC Conrad Yelvington Distributors, Inc. (CYDI)

In April 2000 Conrad Yelvington CYDI applied for a statewide permit for a relocatable diesel engine powered Powerscreen "Chieftain 510" scalper/screener/classifier unit and associated conveyors. Shortly before the notice of intent was issued on August 11, 2000 CYDI sought approval of use of the Powerscreen to clean "nuts, bolts, cigarette butts and candy wrappers" from spent abrasive blast media. Because this use was not in the first application, the Intent to Issue the air construction permit limited the facility to sand gravel and crushed stone. The public notice, which is necessary for the Air construction Permit to be issued from the Intent has never been published.

On October 2, 2000 CYDI provided some limited analytical information on the ABM and a setter requesting the change. The abrasive blast media is largely coal boiler slag, but may consist of alumina, garnet, silica, or other abrasives. In some areas copper slag is commonly used for abrasive but it is not used in Florida for economic reasons. The spent abrasive is transported to portland cement manufacturing facilities where it is incorporated in the clinker feed material, High temperature fusion with the other cement ingredients disburses the waste elements into an insoluble portland cement matrix which is generally used in all forms of construction. Initially, (October 2000) there was no specification as to the amount of such materials to be processed. The department and the applicant have shared technical information of the nature of the abrasive blasting media and other re-use operations. In May 2001 CYDI suggested a limited throughput and annual cap on tonnage and operating hours.

The scalper/screener/classifier unit and associated conveyors, if operated with water spray dust suppression, would be a minor facility. Both the capacity of the screener and CYDI's intent to use the unit to clean spent abrasive blast media (ABM), a potentially toxic or hazardous material, renders the unit ineligible for the "generic exemption" provided by Rule 62-210.300(3)(a)(37), F.A.C.

The scalper/screener/classifier is to be used for sand, gravel, crushed stone and recycled asphalt pavement (RAP). The draft permit contemplated operation at 550 tons per hour, 16 hours per day, 300 days per year (2,640,000 tons per year). The applicant's consultant used emission factors from AP-42, Emission Factors. Table 11-19.2.2., , which presumed control of unconfined particulate emissions by water spray. Analysis of emissions by dry processing (uncontrolled) emission factors from EPA's FIRE Air Emissions Database indicates potential particulate emissions far in excess of 100 tons per year. If controlled by water sprayers, the potential process particulate emissions from the screening operation are approximately 27 tons per year from the screens and conveyor drop points(all materials). Significant additional dust may be expected from storage piles and work-yard traffic operations. The applicant estimated .27 tons (540 lbs) of lead lost each year from the storage piles plus the losses from the vibrating screens.

Other issues include the long term potential for surface and groundwater pollution, The site is already a RCRA designated cleanup site for other wastes. There are hazardous waste issues, should the applicant find itself in possession material that is hazardous. The applicants contingency plan to haul the material to a landfill is not adequate should the material be found to be hazardous waste. The accumulation and storage of ABM on the site has not been addressed either as a waste issue, leading to groundwater or surface water pollution or as an air issue dealing with best management practices for containing ABM and preventing wind erosion from storage piles and minimizing losses due to traffic in the work area.

There are public health issues, in addition to the air waste and water permitting disciplines, which are not within the Division's jurisdiction. There is concern that a relocatable facility that could create a nuisance through lead or other hazardous emissions next to a school, child care center, or other concentration of people.

There is evidence that Abrasive Blast Media has been screened on the site with no valid permit. A pile of the ABM was discovered on the Departments January 31, 2001 site visit in response to large dust clouds arising from the handling of power plant bottom ash.

This operation is presently initially contemplated at CYDI's Tampa yard, which is within one kilometer south-west of the center of the Hillsborough County particulate maintenance area. It is also within 2 kilometers of the center of the Hillsborough County Lead Air Quality Maintenance Area (Gulf Coast Recycling). CYDI contemplates remote operations near Tampa Shipyard, and steel fabrication shops in Jacksonville, Orlando Ft Lauderdale and Miami. CYDI maintains about 30 sand and gravel storage facilities throughout the state that are also potential operating sites both as a sand and gravel classifier and for spent abrasive blast media.

CYDI seeks permission to process potentially hazardous waste through a facility that will emit hazardous pollutants into the air. It says that it will sample each batch to demonstrate that the material is not a hazardous waste. Townsend and Carlson provide data indicating a significant portion of the materials from the Tampa area in 1989 would not have passed the TCLP clearance criteria for classification as non-hazardous. The overwhelming bulk of the spent abrasive material in the Tampa Bay Area is from shipyard sources and potentially hazardous. The applicants statement that it intends to provide a laboratory TCLP test on each lot is not sufficient to demonstrate continuous compliance with an agreement that the waste is not hazardous. There is no proffered plan to assure that the sampling is representative of the material processed, nor any laboratory quality assurance plan to demonstrate the statistical reliability of the acceptance testing

The TCLP test, which is the criteria for determining whether a batch of abrasive blasting media is non hazardous, is not a reliable surrogate for determining the quantity of air pollutants (PTE) emitted from processing that material on an open screen. The TCLP measures the solubility of the material in a laboratory simulation of an acidic landfill. The test is a simulation to estimate the portion of the pollutants that will be leached into groundwater. The TCLP does not represent the mass concentration of pollutants in the sample as a whole, nor in the fine portion of the sample (passing the 200 screen) Widely differing analytical results between the TCLP and Mass Analysis on the same sample have been demonstrated in Carlson's and Townsend's 1998 papers.

The applicant has provided laboratory results of three tests on the same sample (Southeastern Environmental Laboratories Submittal 10006422.) for comparison of SPLP (a leaching test similar to TCLP), mass concentration and mass concentration in the portion passing the No 200 sieve). The relationship between SPLP and mass concentration is inconsistent and erratic. For some elements, especially those having generally soluble acidic salts, (particularly acetates) there is a fairly erratic relationship. For other elements, especially lead, cadmium and chromium the ratio of SPLP to the mass concentration is very poorly defined and subject to wide variability. The relationship between the lead level in the fine portion (229 mg/kg), and the gross sample (16.3 mg/kg) is nearly 14 times the concentration of lead in the gross sample; and all of this is in a sample where the lead was undetectable by leaching procedures. No direct comparison between TCLP, gross analysis or the sample and mass analysis of the fines was offered.

In May 2001 the applicant responded to a second request for additional information suggesting annual throughput limits on Spent ABM as follows:

> Spent abrasive blast media (ABM), not otherwise classified as hazardous waste, 23000 tons per year with the operation throughput limited to 80 tons per hour and the hours of operation limited to 200 hours per year in Hillsborough County and an additional 100 hours per year elsewhere throughout the state of Florida.

This proffer goes far to making the application intuitively acceptable. The gross unconfined emissions from the screening operation would be but a small fraction of the potential from unlimited operation. Closer examination indicates that the proffered operational limitations are based on the applicant's estimate of the available ABM rather than any analysis of the impact of such an operation on air quality.

The materials submitted in support of the request to modify the intent to issue failed to provide any assurance that the ambient air quality standards for lead and particulate will not be exceeded. Location of the facility within the Air Quality Maintenance Areas for Lead and Particulate gives cause for an even more extensive analysis than originally contemplated. Not only is the quantification of the potential to emit (PTE) for hazardous air pollutants important, it is now necessary to demonstrate that the ambient concentrations of lead and fine dust (PM10) are less than the ambient standards. A facility emitting a little as 100 lb of lead or lead compounds is required to procure a special lead permit, Rule 62-210-200, Definitions, Lead Processing Facility; and, Rule 62-296.601, F.A.C., Lead Processing Facility. Because of the proximity to Gulf Coast Recycling, Rule 62-296.600, F.A.C., Reasonably Available Control Technology (RACT) Lead, imposes stricter housekeeping standards.

The concept and requirement of reasonable assurance comes from Rule 62-070. F.A.C.,

> **Standards of Issuing or Denying Permits; Issuance; Denial.**
>
> (1) A permit shall be issued to the applicant upon such conditions as the Department may direct, only if the applicant affirmatively provides the Department with reasonable assurance based on plans, test results, installation of pollution control equipment, or other information, that the construction, expansion, modification, operation, or activity of the installation will not discharge, emit, or cause pollution in contravention of Department standards or rules. However, for discharges of wastes to water, the Department may issue temporary operation permits under the criteria set forth in Section 403.088(3), F.S.
>
> (2) If, after review of the application and all the information, the Department determines that the applicant has not provided reasonable assurance that the construction, modification, expansion, or operation of the installation will be in accord with applicable laws or rules, including rules of approved local programs, the Department shall deny the permit.
>
> (3) The Department may issue any permit with specific conditions necessary to provide reasonable assurance that Department rules can be met.
>
> (4) No Department permits shall be issued for a term of more than five (5) years unless otherwise specified by statute, rule, or order of the Department. However, construction permits for air pollution sources may be issued for a period of time as necessary.
>
> (5) The Department shall take into consideration a permit applicant's violation of any Department rules at any installation when determining whether the applicant has provided reasonable assurances that Department standards will be met.
>
> (6) The applicant shall be promptly notified if the Department intends to deny the application, and shall be informed of the reasons for the intended denial, and of the right to request an administrative hearing.
>
> (7) The issuance of permit does not relieve any person from complying with the requirements of Chapter 403, F.S., or Department rules.
>
> Specific Authority: 403.021, 403.031, 403.061, 403.088, FS. Law Implemented: 403.021, 403.031, 403.061, 403.087, 403.088, FS. History: New 5-17-72, Amended 7-8-82, 2-1-83, 12-3-84, 8-31-88, 3-28-91. Previously numbered as 17-4.07, Formerly 17-4.070

The concept of reasonable assurance does not require the applicant to negate all possibilities of failure, or to provide an absolute guarantee that a proposed project will comply with all applicable standards. Rather, the concept requires a reason or rationale to be provided for assurance or for rejection. Campbell v. Southern Hy-Power Corporation and Florida DEP, and cases cited pages 38 and 39 thereof.

Emotional reaction against potentially hazardous substances is not a criteria for denial of air permits, but neither is intuition a "reasonable assurance based on engineering calculation and science". The lack of logical or statistical correlation between the quantification of pollutants in the ABM by the TCLP test and the estimation of Potential to Emit (PTE) various hazardous air pollutants, based on absolute or mass analysis, and the failure to address the issues of the Hillsborough county Air Quality Maintenance Area and the Hillsborough County Lead Air Quality Maintenance Areas are such a reasons for the Department's refusal to disallow processing of ABM under this permit. Waste and water pollution issues will ultimately be dealt with by separate permitting systems, but to process an air permit with disregard of these issues would be irresponsible engineering judgment.

I do not find the amendments to application and other supporting documents provide reasonable assurance that the facility will operate within applicable law and regulations.

William Leffler, P. E.

Permitting Engineer - July 13, 2001

The applicant has the burden of providing reasonable assurance that the proposed project will not violate DEP Rules. Rule 62-4.070(1), Florida Administrative Code; Florida Department of Transportation v. J.W.C. Company, 396 So. 2d 778 (Fla. 1st DCA 1981).

112. The applicant's burden is "one of reasonable assurances, not absolute guarantees." Manasota-88, Inc., v. Agrico Chemical, 12 FALR 1319, 1325 (DER 1990). In assessing the risk to resources, DEP is not required to assume a "worst case scenario" unless such a scenario is "reasonably foreseeable." Rudloe v. Gulf Specimen Co., Inc. v. Dickerson Bayshore, Inc. and DER, 10 FALR 3426 (DER 1988). Reasonable assurances must deal with reasonably foreseeable contingencies. The necessary reasonable assurance in a particular case that a proposed project will comply with applicable air or water quality standards is a mixed question of fact and law that must be made, in the final analysis, by DEP. See, e.g., Sierra Club, et al. v. Department of Env. Protection, et al., 18 F.A.L.R. 2257, 2260 (Fla. DEP 1996); Save Our Suwannee, Inc. vs. Piechocki and Dept. of Env. Protection, 18 F.A.L.R. 1467, 1471 (Fla. DEP 1996); VQH Development, Inc. v. Dept. of Environmental Protection, et al., 15 F.A.L.R. 3407, 3438 (Fla. DEP 1993); Barringer, et al v. E. Speer and Associates, Inc., and Department of Environmental Regulation, 14 F.A.L.R. 3660, 3667 n. 8 (Fla. DER 1992).

113. Simply raising "concerns" or speculation about what "might occur" is not enough to carry a petitioner's burden. See Chipola Basin Protective Group, Inc. v. Florida Department of Environmental Protection, 11 F.A.L.R. 467, 480-81 (DER 1988). Once the applicant has presented its evidence and made a preliminary showing of reasonable assurances, the challenger must present "contrary evidence of equivalent quality" to that presented by the permit applicant. J.W.C. supra, 396 So. 2d at 789.

114. Thus, a permit applicant is not required by Florida law to provide an "absolute guarantee" that a proposed project will comply with all applicable air or water quality standards. Piechocki, supra, 18 F.A.L.R. at 1472 (Fla. DEP 1996); Powell v. U.S. Navy and Dept. of Env. Protection, 15 F.A.L.R. 3386, 3394 (Fla. DEP 1993).

115. No third party, merely by filing petition seeking administrative hearing, should be permitted to require an applicant to completely prove anew all items in application "down to [the] last detail." J.W.C., supra, 396 So. 2d at 789. "The Petitioner must identify the areas of controversy and allege a factual basis for contention that the facts relied upon by the applicant fall short of carrying the 'reasonable assurances' burden cast upon the applicant." Id.

116. Under the system of regulation applicable to projects of this type, the applicant obtains several permits from more

62-150-300 Nonsignificant Lead Release

(25) Non Attainment for Lead

12 km = 3
5 km =

62-200

62.240 (c) Ambient Air Quality Standard for Lead

Gulf Coast
1901 N 66th
St

62-204.340 Lead Non Attainment (Reserved)

62.204.340 (4)(c) all of the state is designated "unclassifiable" for Lead

62-204.340 Air Quality Maint Zone for Lead [17] 364.0N 3093.5W
radius 5 km

40 CFR 50 Appendix G Lab Methods Lead

62.210.200 (140) Define Lead Processing Operation 100 tt lead or Alloys

62.210.200 (157) Major Facility 5 tpy lead

232 Significant impact ~~.05 mg/m~~^{3} .03 μ/cubic meter

62-210.300 (4)
(6) 1, a, b. Generic Exemption amt emit less than 500 tt/yr
lead

Rule 212.710(3) Bubble Rule

62-213 (2) (a) 1 a. Tethered Thunderbird

BACT 296.600 - 200 ft lead/gun

296.601 — Lead Pressure Generator

Department of Environmental Protection

Jeb Bush
Governor

Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

David B. Struhs
Secretary

DARM-PER-28

SUBJECT: Revised Guidance on the Permitting of Sources Emitting Hazardous Air Pollutants

DATE: March 1, 2000

This memo provides general guidance for the permitting of sources emitting hazardous air pollutants (HAPS).

In 1996, when the Legislature adopted the amendments to the Administrative Procedures Act, Chapter 120 F.S., it adopted a statement in s. 120.536, F.S. saying "nor shall an agency have the authority to implement statutory provisions setting forth general legislative intent or policy." We recognize that we cannot adopt any rule that implements only s. 403.021, F.S. and we have been removing the citation of s. 403.021, F.S. from the Laws Implemented section of our rule history notes. As a result of this, we no longer have the authority that we had before.

Effective immediately, the professional engineer shall not use the Legislation Intent in deciding whether or not to approve (seal) the Intent to Issue. The professional engineer seal provides reasonable assurance of compliance with applicable provisions of Chapter 403, F.S., and Florida Administrative Code Rules 62-204 through 62-297. General Legislative Intent is not legal authority and does not preclude the professional engineer from certifying the permit.

Our air toxics program is based upon the application of NESHAP and MACT that we adopt by reference. The Air Reference Concentrations are not rules, nor do they implement any statutory authority. Therefore, they should no longer be used in the evaluation of air permits.

Howard L. Rhodes

Howard L. Rhodes, Director
Division of Air Resources Management

Conrad Yelvington Distributors, Inc Characteristics of Abrasive Blasting Materials

Element	Asrsenic As	Barium Ba	CadmiumCd	Chromium Cr	Copper Cu	Iron Fe	Lead Pb	Nickel Ni	Mercury Hg	Selinium Se	Silver Ag	Zinc Zn
CAS Number	7740-36-0	7740-39-3	7740-43-9	1856-20-9	7740-48-4	7439-89-6	7439-92-1	0	7439-38-2	7782-49-2	7740-22-4	7740-66-6
TCLP Limit Toxcity characteristic leaching procedure per 40 CFR 261 (measures solubility of target metals to percolating water, not concentration) mg solute / kg ABM	5	100	1	5			5		0.2	1	5	
Detectable Limit	0.001	10	0.001	0.1	0.2	0.1	0.01	0.1	0.001	0.01	1	0.1
Florida Industrial Soil Cleanup Target limits mg/kg mass concentration	3.7	87000	1300	430	76000	480000	920	110				23000
Florida Residential Soil Cleanup Target limits mg/kg mass concentration	0.8		75	210	110	23000	400	28000				560000
US EPA soil screening guidance SSL mg/kg mass concentration	0.4	5500	78	390			400	23	1600	5	34	12000
Direct Exposure Limits Residential per 62-777, table II, F.A.C. mg/kg mass concentration	0.8	110	75	210	110	23000	400	110	3.4	390	390	23000
direct Exposure limits Commercial per 62-777, table II, F.A.C.	3.7	87000	1300	420	7600	480000	920	28000	26	10000	9100	560000
Target organ/ body system	Carcinogen cardio-vascular	cardio-vascular	carcnogen kidney	carcinogen respiratory	gastro-intestinal	blood gastro-intestinal	neurological	body weight	neurological	hair loss neurological skin	skin	blood

Typical Analysis Shipyard waste TCLP characteristics mg/kg — Carlson Thesis University of Florida. And Townsend, Best management Practices (same Data)	Asrsenic As	Barium Ba	CadmiumCd	Chromium Cr	Copper Cu	Iron Fe	Lead Pb	Nickel Ni	Mercury Hg	Selinium Se	Silver Ag	Zinc Zn
Number of samples	23	23	23	23	23	23	23	23	23	23	23	23
Detection limit	0.05	2.5		5	25	5	25	5		0.5		5
Minimum	0.23			39.7	62.19	42881	25.6	41.7				119.7
Maximum	4.46			135.3	4131	109479	446	100.8				8885
Geometric Mean	1.07			76.6	607.7	53084	77.3	58.2				1262
Geometric Std Deviation	0.68			1.5	2.887	1.28	2.06	1.21				3.04
Arithmetic Mean	1.72			82.6	1007	54909	102	59.3				2054
Arithmetic Standard Deviation	1.29			31	1100	17008	94	12.3				2006

Typical Analysis Shipyard Waste Mass concentration mg/kg — Carlson Thesis University and Townsend Best Management Practices (same data)	Asrsenic As	Barium Ba	CadmiumCd	Chromium Cr	Copper Cu	Iron Fe	Lead Pb	Nickel Ni	Mercury Hg	Selinium Se	Silver Ag	Zinc Zn
Number of samples	15		15	15	15	15	15	15		15		15
Detection limit	0.05		2.5	5	25	5	2.5	5		0.5		5
Minimum	<.05			12.6		826.8	<2.5	4.78				24.3
Maximum	0.08			59.1		2801	99.5	53.1				4328
Geometric Mean	0.05			32.8		1300	36.6	13.2				211.1
Geometric Std Deviation	0.04			1.56		1.42	2.26	2.21				5.83
Arithmetic Mean	0.06			35.6		1380	47.3	18.1				759.6
Arithmetic Standard Deviation	0.04			13.3		523	29.4	16.1				1173
	28.66667			**2.28934**		**39.08568**	**4.482412**	**1.898305**				**2.052911**

Contractor Waste(inland sandblasting) TCLP Characteristics mg/kg	Asrsenic As	Barium Ba	CadmiumCd	Chromium Cr	Copper Cu	Iron Fe	Lead Pb	Nickel Ni	Mercury Hg	Selinium Se	Silver Ag	Zinc Zn
number of samples	15		15	15	15	15	15	15		15		15
minimum	<.05		0	12.6	0	826.8	<25	4.78		0		24.3
maximum	**0.08**		**0**	**59.1**	**0**	**2801**	**99.5**	**53.1**		**0**		**4328**
average calculated with undetectable samples valued at 1/2 the detection limit	0.06			35.6	0	1380	47.3	18.1		0		759.6
No detects	4		0	15	0	15	10	15		0		15
std deviation of detects	0.04			13.3	0	523	29.4	16.1		0		1173

ratio of

Contractor Waste(inland sandblasting) Mass concentration mg/kg	Asrsenic As	Barium Ba	CadmiumCd	Chromium Cr	Copper Cu	Iron Fe	Lead Pb	Nickel Ni	Mercury Hg	Selinium Se	Silver Ag	Zinc Zn
Number of samples	15		15	15	15	15	15	15		15		15
Detection limit	0.05		2.5	5	5	5	25	5		0.5		5
Minimum	**bdl**			**12.6**		**826.8**	**bdl**	**4.78**				**24.3**
Maximum	0.08			59.1		2801	99.5	53.1		0		4328
Geometric Mean	0.05			32.8		1300	36.6	13.2				211
Geometric Std Deviation	0.04			1.56		1.42	2.76	2.21				5.83
Arithmetic Mean	0.06			1.38		1380	47.3	18.1				759.6
Arithmetic Standard Deviation	0.04			13.3		523	29.4	29.4				1173
ratio of mass concentration to TCLP (based on arithmatic mean)	1			42.82609		3.38776	1	1				1

Testing provided by Conrad Yelvington		Asrsenic As	Barium Ba	CadmiumCd	Chromium Cr	Copper Cu	Iron Fe	Lead Pb	Nickel Ni	Mercury Hg	Selinium Se	Silver Ag	Zinc Zn
Gulf Marine Repair	TCLP	0.05	0.025	0.025	0.005			5		0.002	0.05	0.05	
HIS Titusville	TCLP	0.25	0.13	0.1	0.1			0.1		0.005	0.2	0.2	
Worth Contracting	TCLP	0.04	1.19	0.02	0.05			0.2		0.005	0.05	0.02	
Rinker 8920 2/29/96	(mass conc)	0.06	379	0.05	35.4	14.5		7		BDL	0.5	BDL	43
Rinker 8921 2.4.89		1.1	580	0.12	49.7	2850		29.5		bdl	bdl	bdl	865
Rinker 8922 2/4/98		1.3	170	0.23	32.8	39.1		7.5		bdl	bdl	bdl	76.5
Rinker 8923 2/4/98		*bdl*	*1030*	*0.05*	*49.2*	*46*		*13*		*bdl*	*bdl*	*bdl*	*21.2*
Rinker 8924 2/4/98		bdl	215	0.02	24	68		6		bdl	bdl	bdl	18.8

62.701 Haz Waste Mgmt Form

62-722 Reg Resource Mgmt

62-777 Contam Cleanup Levels

62.630 Waste water Facility & Activity Planning

62.522 Ground water Permit & Monitoring

Res & Stormwater

62-25 Director

Department of
Environmental Protection

Jeb Bush
Governor

Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

David B. Struhs
Secretary

DARM-PER-06

SUBJECT: Guidance on Division of Responsibilities of the Air Toxics Program Among OPAPM, BAR, BAMMS, OAPCO Districts and Counties

DATE: March 1, 2000

DUTIES OF THE OPAPM AIR TOXICS PROGRAM DEVELOPMENT UNIT

The OPAPM Air Toxics Program Development Unit is responsible for conducting the activities necessary to adopt all rules needed to implement the Department's air toxics program. These rule projects include the adoption-by-reference of EPA-promulgated MACT standards for Title III major sources, general permit rules for Title III area (minor) sources, and rules submitted to EPA through the 112(l) state delegation procedure. The unit collects comments on proposed Title III rules from the headquarters and district offices and submits them directly to EPA or through STAPPA/ALAPCO. The unit works with EPA to identify any additional source categories or pollutants which may need to be added or deleted from the list promulgated by EPA under Title III. All air toxics rules are tracked through the rulemaking process by the OPAPM unit.

The OPAPM unit manages the Division's screening inventory for potential Title III sources. Information contained in relevant electronic databases such as ARMS, the Toxics Release Inventory, EPA files, and commercially available databases such as the Directory of Florida Business are used to create a working inventory of potential major and area sources which may become subject to Title III standards. A copy of the listing of sources potentially subject to a new rule is provided to the Small Business Section. The OPAPM unit, at least thirty days before the federally required initial notification due date, provides all sources that are potentially subject to the rule with a letter describing the initial notification requirements imposed by the federal rule (i.e., the NESHAP subpart). The letter informs the sources that the initial notifications for affected sources must be mailed to the appropriate district or local program and provides the address to which it must be sent.

The OPAPM unit works with DCA to implement the Section 112(r)(7), Accidental Release Prevention Program of the Clean Air Act. Likewise, the unit will coordinate the Department's anticipated action to establish a formal understanding with HRS delegating responsibility for sources subject to the Radionuclides NESHAP. The OPAPM unit manages the outreach activities of the Early Reductions Program. The OPAPM unit conducts or reviews special studies of air toxics in the environment, including risk assessments; and provides technical support to the air bureaus, the district offices, local programs and outside agencies on air toxics matters.

DUTIES OF THE BAR ASSOCIATED WITH AIR TOXICS

The Bureau of Air Regulation's Air Toxics Permitting Unit in the Title V Section manages the Department's implementation of promulgated MACT standards for Title III major sources. This unit provides guidance and assistance to the districts and local programs on permitting questions and ensures that an organized and consistent process is used. The BAR unit coordinates with EPA on permitting procedures and is the liaison with EPA on permitting sources which are Title V only because of their HAP emissions.

The BAR unit performs case-by-case MACT determinations for sources subject to the modifications and hammer provisions under Title III (Sections 112(g) and (j)) and inputs the determinations to EPA's MACT database. The unit formulates draft standard permit conditions for regulated Title III major sources and develops guidance documents for implementing the permitting requirements of promulgated Title III rules. The Division Director will be advised if any action on 112(g) or (j) prior to action being taken.

The BAR unit coordinates with compliance staff in Tallahassee and the district/local program offices to ensure that all Title III major sources are brought into the permitting program. The unit also provides technical support to the compliance staff on matters related to verification of compliance with MACT standards.

DUTIES OF THE OAPCO ASSOCIATED WITH AIR TOXICS

When a new rule is proposed by the Division, the Small Business unit within OAPCO notifies all small business sources, that can be identified, of the requirements pursuant to Chapter 62-202, F.A.C. A letter explaining the new rule requirements is sent to all those sources on the listing provided by OPAPM and to any other small business sources that can be readily identified as being subject to the rule. Letters explaining the rule requirements are coordinated closely with OPAPM to ensure that they clearly represent the rule requirements.

DUTIES OF THE BAMMS ASSOCIATED WITH AIR TOXICS

The Bureau of Air Monitoring and Mobile Sources' Mobile Source Control Section oversees the general permitting of Title V regulated sources. This Section assists with the development of operational procedures and then assumes responsibility for the implementation of the Title V General Permit program.

The Mobile Source Control Section is responsible for coordination of all program issues between the Bureau of Information Systems, the Bureau of Finance and Accounting, and the BAMMS. This Section handles such duties as maintaining the database, mailing out the Title V general permit notification forms and facility semiannual monitoring report forms, reviewing all Title V general permit notifications, and issuing denial letters when appropriate. The Section posts receipt of fees as received and assigns the appropriate codes in the ARMS database, tracks those facilities who have not paid their fee and sends out reminder letters. In order to ensure statewide consistency with implementation of the program the Section coordinates compliance training and provides assistance to the districts and local programs on Title V general permitting questions.

The Bureau of Air Monitoring and Mobile Sources' Emissions Monitoring Section manages the emissions measurement requirements for Title III sources. In order to ensure statewide consistency the section provides guidance concerning the emissions monitoring and compliance testing requirements. The section witnesses selected compliance tests and certification attempts, and reviews selected test reports. This section also provides district and local program staff with training to ensure uniformity in the witnessing of test and monitor certification attempts. The section periodically audits the monitoring systems installed on the affected Title III sources. The audits vary in scope from records audits to full system audits.

Request for approval of alternate sampling procedures and alternate monitoring protocols are reviewed by the Emissions Monitoring Section. For sources subject to the hammer provisions, the Section reviews and recommends final agency action on the proposed protocol.

Additionally, the Emissions Monitoring Section acts as liaison between EPA and the Department on issues related to compliance testing and emission testing requirements for sources subject to Title III and 40 CFR 63. The section shares information with the BAR.

DUTIES OF DISTRICT AND LOCAL AIR PROGRAM OFFICES

Except for the five categories of area sources that are eligible for Title V general permits, the district and local programs, upon receipt of the initial notification data required by federal rule, input the data into the Toxics Inventory Network System (TINS) of the ARMS data base. The data from the sources that are eligible for Title V general permits are handled by the Division.

After the Title V facilities begin operating under the general permits, the districts and appropriate local air programs are responsible for compliance activities associated with these facilities. Districts and local programs also have the ultimate responsibility for ensuring that all applicable sources within their geographical boundaries are identified and properly permitted. This needs to be accomplished through ongoing compliance efforts. Additionally, the districts and local air programs are responsible for tracking compliance and enforcement activities in the database as directed by the Division, and handling all technical assistance and public outreach requests within their area.

The BAMMS, BAR, OPAPM, district and local air programs participate in the meetings and teleconferences of the Florida Air Toxics Working Group (FLATWG) and will assist the working group with developing and implementing a statewide Title III air toxics program.

Howard L. Rhodes

Howard L. Rhodes, Director
Division of Air Resources Management

Conrad Yelvington Distributors, Inc — Characteristics of Abrasive Blasting Materials

Element	Arsenic As	Barium Ba	CadmiumCd	Chromium C	Copper Cu	Iron Fe	Lead Pb	Nickel Ni	Mercury Hg	Selenium Se	Silver Ag	Zinc Zn
CAS Number	7740-36-0	7740-39-3	7740-43-9	1856-20-9	7740-48-4	7439-89-6	7439-92-1	0	7439-38-2	7782-49-2	7740-22-4	7740-66-6
TCLP Limit Toxcity characteristic leaching procedure per 40 CFR 261 (measures solubility of target metals to percolating water, not concentration) mg solute / kg ABM	5	100	1	5			5		0.2	1	5	
Detectable Limit	0.001	10	0.001	0.1	0.2	0.1	0.01	0.1	0.001	0.01	1	0.1
Florida Industrial Soil Cleanup Target limits mg/kg mass concentration	3.7	87000	1300	430	76000	480000	920	110				23000
Florida Residential Soil Cleanup Target limits mg/kg mass concentration	0.8		75	210	110	23000	400	28000				560000
US EPA soil screening guidance SSL mg/kg mass concentration	0.4	5500	78	390			400	23	1600	5	34	12000
Direct Exposure Limits Residential per 62-777, table II, F.A.C. mg/kg mass concentration	0.8	110	75	210	110	23000	400	110	3.4	390	390	23000
direct Exposure limits Commercial per 62-777, table II, F.A.C.	3.7	87000	1300	420	7600	480000	920	28000	26	10000	9100	560000
Target organ/ body system	Carcinogen cardio-vascular	cardio-vascular	carcnogen kidney	carcinogen respiratory	gastro-intestinal	blood gastro-intestinal	neurological	body weight	neurological	hair loss neurological skin	skin	blood

Typical Analysis Shipyard waste TCLP characteristics mg/kg (Carlson Thesis University of Florida, And Townsend, Best management Practices (same Data))	Arsenic As	Barium Ba	CadmiumCd	Chromium C	Copper Cu	Iron Fe	Lead Pb	Nickel Ni	Mercury Hg	Selenium Se	Silver Ag	Zinc Zn
Number of samples	23	23	23	23	23	23	23	23	23	23	23	23
Detection limit	0.05	2.5		5	25	5	25	5		0.5		5
Minimum	0.23			39.7	82.19	42881	25.6	41.7				119.7
Maximum	4.46			135.3	4131	109479	446	100.6				8885
Geometric Mean	1.07			76.6	607.7	53084	77.3	58.2				1262
Geometric Std Deviation	0.68			1.5	2.887	1.28	2.06	1.21				3.04
Arithmetic Mean	1.72			82.6	1007	54909	102	59.3				2054
Arithmetic Standard Deviation	1.29			31	1100	17008	94	12.3				2006

Typical Analysis Shipyard Waste Mass concentration mg/kg (Carlson Thesis University and Townsend Best Management Practices (same data))	Arsenic As	Barium Ba	CadmiumCd	Chromium C	Copper Cu	Iron Fe	Lead Pb	Nickel Ni	Mercury Hg	Selenium Se	Silver Ag	Zinc Zn
Number of samples	15		15	15	15	15	15	15		15		15
Detection limit	0.05		2.5	5	25	5	2.5	5		0.5		5
Minimum	<.05			12.6		826.8	<2.5	4.78				24.3
Maximum	0.08			59.1		2801	99.5	53.1				4328
Geometric Mean	0.05			32.8		1300	36.6	13.2				211.1
Geometric Std Deviation	0.04			1.56		1.42	2.26	2.21				5.83
Arithmetic Mean	0.06			35.6		1380	47.3	18.1				759.6
Arithmetic Standard Deviation	0.04			13.3		523	29.4	16.1				1173
	28.66667			**2.28934**		**39.08568**	**4.482412**	**1.898306**				**2.052911**

Contractor Waste(inland sandblasting) TCLP Characteristics mg/kg	Arsenic As	Barium Ba	CadmiumCd	Chromium C	Copper Cu	Iron Fe	Lead Pb	Nickel Ni	Mercury Hg	Selenium Se	Silver Ag	Zinc Zn
number of samples	15		15	15	15	15	15	15		15		15
minimum	<.05		0	12.6	0	826.8	<25	4.78		0		24.3
maximum	**0.08**		**0**	**59.1**	**0**	**2801**	**99.5**	**53.1**		**0**		**4328**
average calculated with undetectable samples valued at 1/2 the detection limit	0.06			35.6	0	1380	47.3	18.1		0		759.6
No detects	4		0	15	0	15	10	15		0		15
std deviation of detects	0.04			13.3	0	523	29.4	18.1				1173

ratio of

Contractor Waste(inland sandblasting) Mass concentration mg/kg	Arsenic As	Barium Ba	CadmiumCd	Chromium C	Copper Cu	Iron Fe	Lead Pb	Nickel Ni	Mercury Hg	Selenium Se	Silver Ag	Zinc Zn
Number of samples	15		15	15	15	15	15	15		15		15
Detection limit	0.05		2.5	5	5	5	25	5		0.5		5
Minimum	bdl			**12.6**		**826.8**	bdl	**4.78**				**24.3**
Maximum	0.08			59.1		2801	99.5	53.1		0		4328
Geometric Mean	0.05			32.6		1300	36.6	13.2				211
Geometric Std Deviation	0.04			1.56		1.42	2.76	2.21				5.83
Arithmetic Mean	0.08			1.38		1380	47.3	16.1				759.6
Arithmetic Standard Deviation	0.04			13.3		523	29.4	29.4				1173
ratio of mass concentration to TCLP (based on arithmatic mean)	1			42.82609		3.38776	1	1				1

Testing provided by Conrad Yelvington	Arsenic As	Barium Ba	CadmiumCd	Chromium C	Copper Cu	Iron Fe	Lead Pb	Nickel Ni	Mercury Hg	Selenium Se	Silver Ag	Zinc Zn
Gulf Marine Repair TCLP	0.05	0.025	0.025	0.005			5		0.002	0.05	0.05	
HIS Titusville TCLP	0.25	0.13	0.1	0.1			0.1		0.005	0.2	0.2	
Worth Contracting TCLP	0.04	1.19	0.02	0.05			0.2		0.005	0.05	0.02	
Rinker 8920 2/29/98 (mass conc)	0.06	379	0.05	35.4	14.5		7		BDL	0.5	BDL	43
Rinker 8921 2.4.89	1.1	580	0.12	49.7	2850		29.5		bdl	bdl	bdl	865
Rinker 8922 2/4/98	1.3	170	0.23	32.6	39.1		7.5		bdl	bdl	bdl	76.5
Rinker 8923 2/4/98	bdl	1030	0.05	49.2	46		13		bdl	bdl	bdl	21.2
Rinker 8924 2/4/98	bdl	215	0.02	24	68		6		bdl	bdl	bdl	18.6

	Arsenic As	Barium Ba	CadmiumCd	Chromium C	Copper Cu	Iron Fe	Lead Pb	Nickel Ni	Mercury Hg	Selenium Se	Silver Ag	Zinc Zn
average or "most restructive number" per Stephanie Brooks undated letter with sealed attachment dated 10/22/2000 refers to TCLP mg/kg	0.04	0.599	0.025	0.05			0.05		0.002	0.05	0.02	

NOTE: TCLP is a toxic leaching potential test and does not reflect concentrations in the solid abrasive blast material.

	Arsenic As	Barium Ba	CadmiumCd	Chromium C	Copper Cu	Iron Fe	Lead Pb	Nickel Ni	Mercury Hg	Selenium Se	Silver Ag	Zinc Zn
Stephanie Brooks calculated air emissions based on most severe of above three pounds per hour	0.044	0.659	0.028	0.055			0.055		0.002	0.055	0.055	
tons per year	0.019	2.89	0.12	0.24			0.24		0.01	0.24	0.1	
Probable 95% envelope maximum masa concentration based on Townsend and Carlesn Studies above mg/ kg mass concentration (ppm, weight)	#VALUE!		insufficent data	11.97	3924.45	785.46	423.7	95.76	insufficent data	insufficent data	insufficent data	23.085

	Arsenic As	Barium Ba	CadmiumCd	Chromium C	Copper Cu	Iron Fe	Lead Pb	Nickel Ni	Mercury Hg	Selenium Se	Silver Ag	Zinc Zn		
quantity of metals peocessed at 550 TPH ABM 8760 hrs/year pounds / hour	#VALUE!	insufficent data	insufficent data	13.167	4316.695	864.006	466.07	105.336	insufficent data	insufficent data	insufficent data	25.3935	#VALUE!	
tons per year	#VALUE!	insufficent data	insufficent data	57.456	18837.36	3770.208	2033.76	459.648	insufficent data	insufficent data	insufficent data	110.808	#VALUE!	

Estimated toxic air pollution by applying AP 42 screen and conveyor emission factors to lines 69 and 70 this is an an extrapolation far

	Arsenic As	Barium Ba	CadmiumCd	Chromium C	Copper Cu	Iron Fe	Lead Pb	Nickel Ni	Mercury Hg	Selenium Se	Silver Ag	Zinc Zn		
pounds per hour as PM10	0.002			0.1	0.02	7	0.2	0.05				8		13.372
tons per year agrees roughly with gross particulate emission for powerscreen unit processing totally inert materials.	*0.004*			*2*	*0.04*	*14*	*0.4*	*0.1*				12		*28.544*
Note: We need to derive an emission factor for winnowed fines from screening ABM. This would probably have to ba														56

ttown@eng.ufl.edu

Florida Department of Environmental Protection

Memorandum

TO: Directors of District Management
Waste Program Administrators

FROM: John M. Ruddell, Director JMR
Division of Waste Management

DATE: September 29, 2000

SUBJECT: Applicability of Soil Cleanup Target Levels at Contaminated Sites

The Applicability section of Chapter 62-777, F.A.C., (which became effective on August 5, 1999) states that "This chapter provides criteria in tables and figures that apply only to the cleanup of contamination at sites that are governed by the terms of a brownfield site rehabilitation agreement pursuant to Chapter 62-785, F.A.C., and to the program specific contaminants of concern for sites being addressed under Chapter 62-770, F.A.C., Petroleum Contamination Site Cleanup Criteria, and Chapter 62-782, F.A.C., Drycleaning Solvent Cleanup Criteria; and to the treatment of soil at facilities permitted pursuant to Chapter 62-713, F.A.C., Soil Treatment Facilities." Therefore, except for sites addressed under these chapters, the Chapter 62-777, F.A.C., Soil Cleanup Target Levels (SCTLs) <u>may not be imposed</u> by the agency as rule, standards or to deny permits. This guidance supersedes previous guidance memos dated September 29, 1995, January 19, 1996, and September 22, 1999.

JMR/tjb

cc: Mike Sole
Doug Jones
Bill Hinkley
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Mr. William C. Thomas III

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Mr. William C. Thomas III
Street, Apt. No.; or PO Box No.
2326 Bellevue Road
City, State, ZIP+4
Daytona Beach, FL 32114

PS Form 3800, July 1999 — See Reverse for Instructions

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1. Article Addressed to:

Mr. William C. Thomas III
Vice President
Conrad Yelvington Distributors,
Inc.
2326 Bellevue Road
Daytona Beach, Florida 32114

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☐ Agent
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DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF AIR RESOURCES MANAGEMENT
BUREAU OF AIR REGULATION - TITLE V
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32399-2400
MS 5505

RECEIVED
SEP 04 2001
BUREAU OF AIR REGULATION

01

Department of Environmental Protection

Jeb Bush
Governor

Marjory Stoneman Douglas Building
3900 Commonwealth Boulevard
Tallahassee, Florida 32399-3000

David B. Struhs
Secretary

August 27, 2001

CERTIFIED MAIL - Return Receipt Requested

Mr. William C. Thomas III
Vice President
Conrad Yelvington Distributors, Inc.
2326 Bellevue Road
Daytona Beach, Florida 32114

Dear Mr. Thomas:

Re: Draft Air Construction Permit No.: 7770473-004-AC
Relocatable Powerscreen "Chieftain 510" Scalper/Screener/Classifier Unit and Associated Conveyors

Enclosed is one copy of the Draft Air Construction Permit for a diesel engine powered relocatable Powerscreen "Chieftain 510" scalper/screener/classifier unit and associated conveyors, which will be based at 4800 Cone Road, Tampa, Hillsborough County, Florida. The Draft Air Construction Permit and Intent to Issue an Air Construction Permit for this facility issued August 11, 2000, is withdrawn.

The "Public Notice of Intent to Issue Air Construction Permit" must be published one time only, as soon as possible, in the legal advertisement section of a newspaper of general circulation in the area in which you propose to set up or operate this facility. The publication must meet the requirements of Chapter 50, Florida Statutes. Proof of publication, i.e., newspaper affidavit, must be provided to the Department's Bureau of Air Regulation office within seven (7) days of publication. Failure to publish the notice and provide proof of publication may result in the denial of the permit. After publication, a Final Air Construction Permit will be issued authorizing construction and testing. After testing, an Air Operation Permit is required before commencing commercial operation.

Please note the addition of a specific condition prohibiting the processing of asbestos containing material. Crushing, grinding, or abrading of asbestos materials is already prohibited by state and federal law.

Please submit any written comments you wish to have considered concerning the Department's proposed action to William Leffler, P.E., at the above letterhead address. If you have any other questions, please contact him at 850/921-9522.

Sincerely,

A. Bruce Nilsta

C. H. Fancy, P.E.
Chief,
Bureau of Air Regulation

CHF/wl

Enclosures

In the Matter of an
Application for Permit by:

Conrad Yelvington Distributors, Inc.
2326 Bellevue Road
Daytona Beach, Florida 32114

Draft Air Construction Permit No.: 7770473-004-AC
Relocatable Powerscreen "Chieftain 510" Scalper/Screener/Classifier Unit and Associated Conveyors

INTENT TO ISSUE AIR CONSTRUCTION PERMIT

STATEWIDE RELOCATABLE FACILITY

The Department of Environmental Protection (Department) gives notice of its intent to issue an air construction permit (copy of Draft Permit attached) for the proposed project, as detailed in the application specified above and the attached Technical Evaluation and Preliminary Determination, for the reasons stated below.

The applicant, Conrad Yelvington Distributors, Inc. (CYDI), applied to the Department on April 19, 2000, for an air construction permit authorizing statewide operation of its relocatable diesel engine powered Powerscreen "Chieftain 510" scalper/screener/classifier unit and associated conveyors. Supplementary information was provided to the Department on October 6, 2000, April 23, 2001, and June 7, 2001.

CYDI maintains its primary Florida office at 2326 Bellevue Road, Daytona Beach, Florida 32114.

The relocatable facility will begin initial operation under this construction permit for testing purposes at 4800 Cone Road, Tampa, Hillsborough County, Florida, with UTM coordinates: Zone 17; 364.68 km E; and, 3318.42 km North.

The Department has permitting jurisdiction under the provisions of Chapter 403, Florida Statutes (F.S.), and Florida Administrative Code (F.A.C.) Chapters 62-4, 62-210 and 62-212. The above action is not exempt from permitting procedures. The Department has determined that an air construction permit is required in order for the relocatable scalper/screening/classifier unit and associated conveyors to relocate to sites throughout the state.

The relocatable scalper/screener/classifier is to be used for processing sand, gravel, crushed stone, concrete, recycled asphalt pavement (RAP) and spent abrasive blast media (ABM). The maximum allowed processing of spent ABM is 23,000 tons per calendar year. The maximum throughput is limited to 80 tons per hour, and the hours of operation is limited to 200 hours per calendar year in Hillsborough County; and, an additional 100 hours per calendar year of operation is allowed to process spent ABM elsewhere throughout the state in counties authorized in Appendix PC. Consideration of additional materials to process requires an air construction permitting action.

The Department intends to issue this air construction permit based on the belief that reasonable assurances have been provided to indicate that operation of this facility will not adversely impact air quality, and the facility will comply with all appropriate provisions of Chapters 62-4, 62-204, 62-210, 62-212, 62-296 and 62-297, F.A.C. The potential particulate emissions from processing authorized material with water spray dust suppression will be less than 100 tons per year.

Pursuant to Section 403.815, F.S., and Rule 62-110.106(7)(a)1., F.A.C., you (the applicant) are required to publish at your own expense the enclosed "Public Notice of Intent to Issue Air Construction Permit." The notice shall be published one time only in the legal advertisement section of a newspaper of general circulation in the area affected. Rule 62-110.106(7)(b), F.A.C., requires that the applicant cause the notice to be published as soon as possible after notification by the Department of its intended action. For the purpose of these rules, "publication in a newspaper of general circulation in the area affected" means publication in a newspaper meeting the requirements of Sections 50.011 and 50.031, F.S., in the county where the activity is to take place. If you are uncertain that a newspaper meets these requirements, please contact the Department at the address or telephone number listed below. The applicant shall provide proof of publication to the Department's Bureau of Air Regulation, at 2600 Blair Stone Road, Mail Station #5505, Tallahassee, Florida 32399-2400 (Telephone: 850/488-0114; Fax 850/ 922-6979). You must provide proof of publication within seven days of publication, pursuant to Rule 62-110.106(5), F.A.C. No permitting action for which published notice is required shall be granted until proof of publication of notice is made by furnishing a uniform affidavit in substantially the form prescribed in Section 50.051, F.S., to the office of the

Department issuing the permit. Failure to publish the notice and provide proof of publication may result in the denial of the permit pursuant to Rules 62-110.106(9) & (11), F.A.C.

The Department will issue the final permit with the attached conditions unless a response received in accordance with the following procedures results in a different decision or significant change of terms or conditions.

The Department will accept written comments concerning the proposed permit issuance action for a period of fourteen days from the date of publication of "Public Notice of Intent to Issue Air Construction Permit." Written comments should be provided to the Department's Bureau of Air Regulation at 2600 Blair Stone Road, Mail Station #5505, Tallahassee, FL 32399-2400. Any written comments filed shall be made available for public inspection. If written comments received result in a significant change in the proposed agency action, the Department shall revise the proposed permit and require, if applicable, another Public Notice.

The Department will issue the permit with the attached conditions unless a timely petition for an administrative hearing is filed pursuant to Sections 120.569 and 120.57, F.S., before the deadline for filing a petition. The procedures for petitioning for a hearing are set forth below.

A person whose substantial interests are affected by the proposed permitting decision may petition for an administrative proceeding (hearing) under Sections 120.569 and 120.57, F.S. The petition must contain the information set forth below and must be filed (received) in the Office of General Counsel of the Department at 3900 Commonwealth Boulevard, Mail Station #35, Tallahassee, Florida 32399-3000. Petitions filed by the permit applicant or any of the parties listed below must be filed within fourteen days of receipt of this notice of intent. Petitions filed by any persons other than those entitled to written notice under Section 120.60(3), F.S., must be filed within fourteen days of publication of the public notice or within fourteen days of receipt of this notice of intent, whichever occurs first. Under Section 120.60(3), F.S., however, any person who asked the Department for notice of agency action may file a petition within fourteen days of receipt of that notice, regardless of the date of publication. A petitioner shall mail a copy of the petition to the applicant at the address indicated above at the time of filing. The failure of any person to file a petition within the appropriate time period shall constitute a waiver of that person's right to request an administrative determination (hearing) under Sections 120.569 and 120.57, F.S., or to intervene in this proceeding and participate as a party to it. Any subsequent intervention will be only at the approval of the presiding officer upon the filing of a motion in compliance with Rule 28-106.205, F.A.C.

A petition that disputes the material facts on which the Department's action is based must contain the following information: (a) The name and address of each agency affected and each agency's file or identification number, if known; (b) The name, address, and telephone number of the petitioner, the name, address, and telephone number of the petitioner's representative, if any, which shall be the address for service purposes during the course of the proceeding; and an explanation of how the petitioner's substantial interests will be affected by the agency determination; (c) A statement of how and when petitioner received notice of the agency action or proposed action; (d) A statement of all disputed issues of material fact. If there are none, the petition must so indicate; (e) A concise statement of the ultimate facts alleged, as well as the rules and statutes which entitle the petitioner to relief; and, (f) A demand for relief.

A petition that does not dispute the material facts upon which the Department's action is based shall state that no such facts are in dispute and otherwise shall contain the same information as set forth above, as required by Rule 28-106.301, F.A.C.

Because the administrative hearing process is designed to formulate final agency action, the filing of a petition means that the Department's final action may be different from the position taken by it in this notice. Persons whose substantial interests will be affected by any such final decision of the Department on the application have the right to petition to become a party to the proceeding, in accordance with the requirements set forth above.

Mediation is not available in this proceeding.

In addition to the above, a person subject to regulation has a right to apply for a variance from or waiver of the requirements of particular rules, on certain conditions, under Section 120.542, F.S. The relief provided by this state statute applies only to state rules, not statutes, and not to any federal regulatory requirements. Applying for a variance or waiver does not substitute or extend the time for filing a petition for an administrative hearing or exercising any other right that a person may have in relation to the action proposed in this notice of intent.

The application for a variance or waiver is made by filing a petition with the Office of General Counsel of the Department, 3900 Commonwealth Boulevard, Mail Station #35, Tallahassee, Florida 32399-3000. The petition must specify the following information: (a) The name, address, and telephone number of the petitioner; (b) The name, address, and telephone number of the attorney or qualified representative of the petitioner, if any; (c) Each rule or portion of a rule from which a variance or waiver is requested; (d) The citation to the statute underlying (implemented by) the rule identified in (c) above; (e) The type of action requested; (f) The specific facts that would justify a variance or waiver for the petitioner; (g) The reason why the variance or waiver would serve the purposes of the underlying statute (implemented by the rule); and, (h) A statement whether the variance or waiver is permanent or temporary and, if temporary, a statement of the dates showing the duration of the variance or waiver requested.

The Department will grant a variance or waiver when the petition demonstrates both that the application of the rule would create a substantial hardship or violate principles of fairness, as each of those terms is defined in Section 120.542(2), F.S., and that the purpose of the underlying statute will be or has been achieved by other means by the petitioner.

Persons subject to regulation pursuant to any federally delegated or approved air program should be aware that Florida is specifically not authorized to issue variances or waivers from any requirements of any such federally delegated or approved program. The requirements of the program remain fully enforceable by the Administrator of the EPA and by any person under the Clean Air Act unless and until the Administrator separately approves any variance or waiver in accordance with the procedures of the federal program.

Executed in Tallahassee, Florida.

C. H. Fancy, P.E.
Chief
Bureau of Air Regulation

CERTIFICATE OF SERVICE

The undersigned duly designated deputy agency clerk hereby certifies that this INTENT TO ISSUE AIR CONSTRUCTION PERMIT (including the PUBLIC NOTICE, Technical Evaluation and Preliminary Determination, and the Draft permit) was sent by certified mail (*) and copies were mailed by U.S. Mail or electronic mail (as noted) before the close of business on 8/27/01 to the person(s) listed:

William C. Thomas III*, V.P., CYDI, Post Office Box 1686, Daytona Beach, FL 32115
Eugene D. Schaltenbrand, P.E., and Stephanie Brooks, P.E., 5068 NW 85th Place, Coral Springs, FL 33067
Alex Pavda, PhD, 7581 Anderra Place, Boca Raton, FL 33433
Geoffery Smith, Blank Meenan and Smith, P.A., Post Office Box 11068, Tallahassee, FL 32302
Len Kozlov, DEP, Central District
Chris Kirts, DEP, Northeast District
Sandra Veazey, DEP, Northwest District
Bill Thomas, DEP, Southwest District
Ron Blackburn, DEP, South District
Isidore Goldman, DEP, Southeast District
Daniela Banu, Broward County Department of Natural Resource Protection
H. Patrick Wong, Dade County Department of Environmental Resources Management
Richard Robinson, Regulatory and Environmental Services Department
Jerry Campbell, Hillsborough County Environmental Protection Commission
James E. Stormer, Palm Beach County Health Department
Peter Hessling, Pinellas County Department of Environmental Management
Kent Kimes, Sarasota County Natural Resources Department
Marie Driscoll, Orange County Environmental Protection Department
William Kutash, P.E., DEP, Southwest District
Robert Butera, DEP, Southwest District

Clerk Stamp

FILING AND ACKNOWLEDGMENT FILED, on this date, pursuant to §120.52, Florida Statutes, with the designated Department Clerk, receipt of which is hereby acknowledged.

Barbara J. Friday 8/27/01
(Clerk) (Date)

State of Florida, Department of Environmental Protection
Public Notice of Intent to Issue Air Construction Permit

Conrad Yelvington Distributors, Inc.
Draft Air Construction Permit No.: 7770473-004-AC
Statewide Relocatable Facility

The Department of Environmental Protection (Department) gives notice of its intent to issue an air construction permit to Conrad Yelvington Distributors, Inc., for a relocatable diesel engine powered Powerscreen "Chieftain 510" scalper/screener/classifier unit and associated conveyors that will be operated at construction and industrial sites throughout Florida. The facility is a minor source of air pollution and not subject to the Prevention of Significant Deterioration (PSD) regulations at Rule 62-212.400, Florida Administrative Code (F.A.C). A Best Available Control Technology determination was not required for this operation. The applicant's name and address are: Conrad Yelvington Distributors, Inc., 2326 Bellevue Road, Daytona Beach, Florida 32114.

The facility has been reviewed for potential operation in all counties of Florida. The facility will emit fugitive particulate matter emissions; and, the diesel fuel firing will generate small amounts of the products of combustion.

The scalper/screener/classifier is allowed to process sand, gravel, crushed stone, and recycled asphalt pavement at a maximum rate of 550 tons per hour, for 16 hours per day and 300 days per calendar year. The total material that can be processed is 2,640,000 tons per calendar year.

The processing of spent abrasive blast media (ABM), not otherwise classified as hazardous waste, is authorized up to 23,000 tons per calendar year. The operation throughput is limited to 80 tons per hour, and the hours of operation are limited to 200 hours per calendar year in Hillsborough County. An additional 100 hours per calendar year is allowed for the processing of spent ABM elsewhere throughout the state in counties authorized in Appendix PC. No additional materials are authorized. Consideration of additional materials for processing requires an air construction permit.

Control of process particulate matter will be accomplished by wetting the material as needed at unloading and conveyor transfer points, as well as the haul roads and stockpiles. Because of the low emissions and limited time of operation at any one site, the facility will not cause or contribute to any violation of an ambient air quality standard.

The Department will issue the Final permit, in accordance with the conditions of the Draft permit, unless a response received in accordance with the following procedures results in a different decision or significant change of terms or conditions.

The Department will accept written comments concerning the proposed Draft permit issuance action for a period of 14 (fourteen) days from the date of publication of this Notice. Written comments should be provided to the Department's Bureau of Air Regulation, 2600 Blair Stone Road, Mail Station #5505, Tallahassee, Florida 32399-2400. Any written comments filed shall be made available for public inspection. If written comments received result in a significant change in this Draft permit, the Department shall issue a Revised Draft permit and require, if applicable, another Public Notice.

The Department will issue the Final permit with the conditions of the Draft permit unless a timely petition for an administrative hearing is filed pursuant to Sections 120.569 and 120.57, Florida Statutes (F.S.). Mediation is not available for this action. The procedures for petitioning for a hearing are set forth below.

A person whose substantial interests are affected by the Department's proposed permitting decision may petition for an administrative hearing in accordance with Sections 120.569 and 120.57, F.S. The petition must contain the information set forth below and must be filed (received) in the Office of General Counsel of the Department, 3900 Commonwealth Boulevard, Mail Station #35, Tallahassee, Florida 32399-3000 (telephone: 850/488-9370; fax: 850/487-4938). Petitions must be filed within fourteen days of publication of the public notice or within fourteen days of receipt of this notice of intent, whichever occurs first. A petitioner must mail a copy of the petition to the applicant at the address indicated above, at the time of filing. The failure of any person to file a petition within the appropriate time period shall constitute a waiver of that person's right to request an administrative determination (hearing) under Sections 120.569 and 120.57, F.S., or to intervene in this proceeding and participate as a party to it. Any subsequent intervention will be only at the approval of the presiding officer upon the filing of a motion in compliance with Rule 28-5.207, F.A.C.

A petition must contain the following information: (a) The name, address, and telephone number of each petitioner, the applicant's name and address, the Permit File Numbers and the county in which the project is proposed; (b) A statement of how and when each petitioner received notice of the Department's action or proposed action; (c) A statement of how each petitioner's substantial interests are affected by the Department's action or proposed action; (d) A statement of the material facts disputed by petitioner, if any; (e) A statement of the facts that the petitioner contends warrant reversal or modification of the Department's action or proposed action; (f) A statement identifying the rules or statutes that the petitioner contends require reversal or modification of the Department's action or proposed action; and, (g) A statement of the relief sought by the petitioner, stating precisely the action that the petitioner wants the Department to take with respect to the Department's action or proposed action addressed in this notice of intent.

Because the administrative hearing process is designed to formulate final agency action, the filing of a petition means that the Department's final action may be different from the position taken by it in this notice of intent. Persons whose substantial interests will be affected by any such final decision of the Department on the application have the right to petition to become a party to the proceeding, in accordance with the requirements set forth above.

Copies of the proposed construction permit and the technical evaluation are available for public inspection during normal business hours, 8:00 a.m. to 5:00 p.m., Monday through Friday, except legal holidays, at:

Florida Dept. of Environmental Protection
Bureau of Air Regulation
111 S. Magnolia Drive, Suite 4
Tallahassee, Florida 32301
Telephone: 850/488-0114

Florida Dept. of Environmental Protection
Central District Office
3319 Maguire Boulevard, Suite 232
Orlando, Florida 32803
Telephone: 407/894-7555

Orange County Environmental Protection
Department – Air Program Section
800 Mercy Drive
Orlando, Florida 32808
Telephone: 407/836-1400

Florida Dept. of Environmental Protection
Northwest District Office
160 Governmental Center
Pensacola, Florida 32501
Telephone: 850/595-8300

Florida Dept. of Environmental Protection
Northeast District Office
7825 Baymeadows Way, Suite 200B
Jacksonville, Florida 32256
Telephone: 904/807-3300

Florida Dept. of Environmental Protection
Southwest District Office
3804 Coconut Palm Drive
Tampa, Florida 33619
Telephone: 813/744-6100

Florida Dept. of Environmental Protection
Southeast District Office
400 North Congress Avenue
West Palm Beach, Florida 33416
Telephone: 561/681-6755

Florida Dept. of Environmental Protection
South District Office
2295 Victoria Avenue, Suite 364
Fort Myers, Florida 33902
Telephone: 941/332-6975

Broward County Department of Natural Resource Protection
218 Southwest First Avenue
Fort Lauderdale, Florida 33301
Telephone: 954/519-1202

Dade County Department of Environmental Resources Mangement
33 Southwest Second Avenue, Suite 900
Miami, Florida 33130
Telephone: 305/372-6925

Regulatory and Environmental Services Department
117 West Duval Street, Suite 225
Jacksonville, Florida 32202
Telephone: 904/630-3484

Hillsborough County Environmental Protection Commission
1410 North 21 Street
Tampa, Florida 33605
Telephone: 813/272-5530

Palm Beach County Health Department
901 Evernia Street
Post Office Box 29
West Palm Beach, Florida 33401
Telephone: 561/355-3070

Pinellas County Department of Environmental Management
300 South Garden Avenue
Clearwater, Florida 33756
Telephone: 727/464-4422

Sarasota County Natural Resources Department
1301 Cattleman Road, Building A
Sarasota, Florida 34232
Telephone: 941/378-6128

The complete project file, which includes the application, technical evaluation, Draft construction permit, and information submitted by the applicant, exclusive of confidential records under Section 403.111, F.S., is available in the office of the permitting authority in Tallahassee. Interested persons may contact William Leffler, P.E., project engineer, at 111 South Magnolia Drive, Suite 4, Tallahassee, Florida 32301, or call 850/921-9522, for additional information.

TECHNICAL EVALUATION

AND

PRELIMINARY DETERMINATION

Conrad Yelvington Distributors, Inc.

Relocatable Powerscreen "Chieftain 510" Scalper/Screener/Classifier Unit and Associated Conveyors

Potential Statewide Operation

Draft Air Construction Permit No.: 7770473-004-AC
Facility ID No.: 7770473
Relocatable Facility

Department of Environmental Protection
Division of Air Resources Management
Bureau of Air Regulation

1. APPLICATION INFORMATION

1.1. Applicant's Name and Address

Conrad Yelvington Distributors, Inc.
2326 Belleview Road
Daytona Beach, Florida 32114

1.2. Reviewing and Processing Schedule
Application received April 19, 2000
Agreement extending day 90 to August 13, 2000, received (faxed) July 12, 2000
Notice of intent to issue construction permit clerked on August 12, 2000
Request to modify Draft Permit (Intent to Issue not published) received October 3, 2000
Response to the Department's October 6, 2000 Request for Additional Information received March 6, 2001
P.E. certification received April 23, 2001
Response to the Department's May 14, 2001 incompleteness letter received June 7, 2001

2. FACILITY INFORMATION

2.1. Description
This permit addresses the following emissions unit/activity:

EMISSION UNIT/ACTIVITY NO.	DESCRIPTION
001	550 tons per hour relocatable Powerscreen "Chieftain 510" scalper/screener/classifier unit and associated conveyors
002	Cummins 4B 3.9 diesel engine directly driving the screen shaker and hydraulically driving the radial conveyors

2.2. The Scalper/Screener/Classifier Process

The facility is a relocatable scalper/screener/classifier unit and associated conveyors manufactured by Powerscreen World Distributors. Model "Chieftain 510" is a double vibratory screen classifier with interchangeable screens mounted on frames that are 5 feet by 10 feet. The screen gradation may vary from 2 inches for heavy concrete aggregate down to 3/8 inch for sand and fine gravel. The applicant intends to operate throughout Florida, in conjunction with its business of sales and distribution of stone products, especially crushed rock for concrete and asphaltic concrete aggregate.

The relocatable scalper/screener/classifier unit and associated conveyors will emit particulate matter from the handling and screening of the crushed gravel, stone and sand, which are used primarily for concrete and asphalt aggregates. The applicant maintains several rail and truck sidings throughout the state where crushed rock is received from hopper cars, gondola cars or open trucks. The aggregate is unloaded by gravity hoppers or dumping from trucks. The aggregate is subject to abrasion during the unloading and conveyor operations, and while passing through the classifier screen. There may be additional fine particulate that adheres to the crushed rock product, which is entrained in the air by the screening and conveying operations.

The relocatable scalper/screener/classifier unit has a large receiving hopper with a gravity discharge to a conveyor, which lifts the crushed stone to the top of a double vibrating screen. The screen divides the product into three fractions, one retained on the upper screen (oversize or reject); one retained on the finer screen (graded aggregate); and, one passing both screens (the "fines"). These fractions are lifted from the foot of the screen and dropped onto the appropriate storage pile by the stacking belt conveyors.

2.3. Internal Combustion Engine

The scalper/screener/classifier is powered by a diesel engine, which is a source of air pollution and emits small quantities of particulate, CO, SO_2, NOx, and VOC. The engine is a small 76 hp unit (nameplate) and there are no specific emission limiting standards for its operation and emissions. The engine will be limited to the use of new No. 2 fuel oil or better. Power for the auxiliary units (radial conveyors and stackers) comes from two hydraulic pumps driven by the diesel engine and several hydraulic motors that power the screen shaker and the conveyors.

2.4 Specialty Materials

CYDI has requested authorization to screen spent abrasive blasting media (ABM) as a secondary industrial product, which will be reused in other industrial products. By letter dated May 25, 2001, CYDI proposed limits on the spent ABM as follows:

Annual volume not to exceed 23,000 tons;
Throughput rate not to exceed 80 tons per hour;
Annual operation limited to 200 hours per calendar year in Hillsborough County: and,
An additional 100 hours per calendar year of processing elsewhere in the state.

The spent ABM must pass RCRA hazardous waste screening based on a TCLP analysis using acceptable laboratory methodology.

2.5. Standard Industrial Classification Code (SIC)

Major Group No.	17	Construction – Special Trade Contractors

2.6. Facility Classification

The relocatable scalper/screener/classifier unit and associated conveyors will be subject to process limits and water spray dust suppression controls. The facility is classified as a minor air pollutant emitting facility. All air pollutant potential emissions are less than 100 TPY of any single criteria air pollutant. This facility is not on the list of the 28 Major Facility Categories, Table 62-212.400-1, F.A.C.

2.7. Emission Estimates

Emission factors from AP-42, 5th edition, are appropriate for estimating particulate emissions from this process. Table 11.19.2.2. yields emission factors for crushed stone operations in terms of pounds per ton of through-put. The applicant has suggested the factor of 0.0206 lb/ton, based on four conveyor transfer points (@ 0.0014 lb/ton each) and one screening at 0.015 lb/ton. A foot note in the table indicates that the emission factors are for wet controlled conditions (footnotes a. and b. to Table 11.19.2.2., referenced above). These factors used in the application ignore incidental dust from truck and railcar loading and unloading, as well as particulate matter entrained in the air by wind erosion from storage piles, which will be controlled by housekeeping practices imposed in the permit.

The applicant's estimate of potential particulate emissions presumes a maximum through-put of material of 8,800 tons per day and an operation of 300 days per calendar year (2,640,000 tons per calendar year), for a total potential particulate emissions related to this facility of 27.19 tons per calendar year as PM_{10} from the classifier, screens and conveyors.

The maximum throughput of approved material of 8,800 tons per day and the operation of 300 days per calendar year will become federally enforceable permit conditions. Water spray dust controls on the receiving hopper, conveyor drop points and classifier screens will be imposed as a federally enforceable permit condition.

Applying these same emission factors used to estimate the emissions from the sand and gravel operation to the non-hazardous spent ABM, the potential particulate emissions attributable to the 23,000 tons per calendar year allowed throughput is 0.3 tons per year from the classifier, screens and conveyors. Additional wind losses from covered storage bins may total an additional quarter ton per year. Even considering a grossly contaminated lot of spent ABM, and presuming the total heavy metal content to be less than 0.25 percent, by weight, the probable unconfined emission of heavy metals beyond the boundaries of the site will be less than a few pounds. Such dust will be unconfined, disbursed by local winds, but due to its density, the greater portion of it will settle quickly in the vicinity of the screener. Best management practices and good housekeeping practices should be followed. Limiting the throughput of the spent ABM (23,000 tons per calendar year), coupled with dust suppression requirements and a testing protocol to screen and reject materials containing high levels of lead, cadmium and other potentially hazardous metals and paint chemicals, provides reasonable assurance that the operation will not constitute a public health problem, and the operation will be in conformance with applicable state and federal regulations pertaining to air pollution.

2.8. Potential particulate emissions if operated without controls

Calculations of emissions from uncontrolled operation using emission factors from the EPA FIRE data base yielded estimates ranging from 134 to 1,600 tons per year, which would make the facility major for particulate and subject to preconstruction new source review permitting requirements pursuant to Rule 62-212.400(5), F.A.C.

2.9. Unconfined particulate emissions

Dust from truck and tractor traffic, wind erosion on stock piles, and incidental loading and unloading are more difficult to quantify, but simple housekeeping practices, such as wetting stockpiles, roadways and workyard, will minimize these emissions so that the potential emissions can be presumed to remain well below the 100 tons per year limit for the minor facility classification. Such housekeeping provisions are presently imposed on the Tampa facility by other permits. Reasonable housekeeping practices to minimize unconfined particulate matter emissions, such as water spray dust suppression, will be imposed.

2.10. Operation in quarries or in tandem with a crusher

This scalper/screener/classifier unit, when not directly connected with any crusher, is not subject to NSPS regulations pursuant to 40 CFR 60, Subpart OOO. The scalper/screener/classifier unit and associated conveyors are physically capable of accommodating the direct connection to a crusher or they may work indirectly from the stockpiled product of a regulated crusher. Should this operation be operated in tandem with any crusher, the emission limits for the scalper/screener/classifier unit and associated conveyors will be limited by the NSPS - 40 CFR 60, Subpart OOO, for nonmetallic mineral processing. If the scalper/screener/classifier unit and associated conveyors are deployed in a "wet mining" or sand screening, very low particulate emissions would be expected.

2.11. Co-location on-site with other permitted air emissions units

Any notice of relocation of the scalper/screener/classifier unit and associated conveyors to any site should include the identification any other operation subject to air pollution regulations on such site. The Department may disallow relocation or co-location at any quarry or other site where the potential emissions of the scalper/screener/classifier unit and associated conveyors, together with the potential emissions of the operations at the proposed site, will exceed the 100 tons per year threshold requirement implicating applicability of other permitting program requirements.

3. RULE APPLICABILITY

3.1. The operations are subject to preconstruction review pursuant to Rule 62-212.400, F.A.C. The operations are subject to the regulations contained in Chapter 62-4 and Rules 62-204.800, 62-210.350, and 62-296.320(4)(b)1. & (c), F.A.C.

3.2. TCLP Selection Criteria for Spent ABM

Spent ABM is a potentially hazardous waste material because of the presence of heavy metals and toxic chemicals, which are incorporated in the material through its intended use to remove paint, coatings and mill scale from iron and steel structures and fabrications. Much of the heavy metal appears in paint pigments and anti-corrosive additives to paint. Lead is of particular concern because of its widespread use in the past, especially in marine paints. Lead is now largely replaced by titanium dioxide, but there is much lead paint removed as older work is rehabilitated, especially in ships and highway bridge work. Chromium and cadmium paint additives are found in much smaller quantities in aircraft and machine paints. Many marine paints contain anti-corrosive agents and biocides in addition to pigments incorporating heavy metals. Anti-corrosive agents help extend the life of paint in the harsh marine environment by making the paint film particularly insoluble. Biocides minimize the growth of algae and barnacles. Controversial biocide additives include mercury and tributyltin. These chemicals have been found to bio-accumulate in marine animals, but their use has been restricted since the enactment of the Organotin Antifouling Paint Act of 1988. Should these materials be encountered, it is likely that they be in the adhered residue of previous blasting and covered by layers of more recent paint.

CYDI acknowledges that the threshold TCLP levels provided in 40 CFR 261.24, beyond which the material will be considered inherently wastelike, are:

Heavy Metal	Regulatory TCLP Level
Arsenic	5.0 mg/ kg
Barium	100 mg/ kg
Cadmium	1.0 mg/ kg
Chromium	5.0 mg/ kg
Lead	5.0 mg/ kg
Mercury	0.2 mg/ kg
Selenium	1.0 mg/ kg
Silver	5.0 mg/ kg

There is no consistent statistical relationship between TCLP levels and mass concentrations of metallic elements in spent ABM. Mass concentrations have been demonstrated at more than 40 times the TCLP characteristic, with low levels of relatively insoluble arsenic, antimony, chromium and lead contaminants, and correlation factors as little as 1.0, reflect solubility of the contaminant involving other arsenic, nickel, and zinc contaminants. The source of the spent ABM appears to be a factor. Marine and bridge paint products tend to be less soluble than inland coatings, and, therefore, have a higher mass concentration to TCLP ratio. Townsend and Carlson, Best Management Practices for Abrasive Blasting Media, 1989; and, Carlson, Leaching Characteristics and Assessment of Abrasive Blasting media from ship maintenance Facilities and Sandblasting Contractor Sites, 1989.

There is also no relationship demonstrated between the gross analysis of a sample and the concentration of heavy metals in the fine portion of that sample that passes the No. 200 sieve. CYDI seeks permission to process potentially hazardous waste through a facility that will emit hazardous pollutants into the air. CYDI agrees to sample each batch to demonstrate that the material is not a hazardous waste. The overwhelming bulk of the spent ABM in the Tampa Bay Area is from shipyard sources and is potentially hazardous. Townsend and Carlson provide data indicating a significant portion (5 percent) of the materials from the Tampa area in 1989 would not have passed the TCLP clearance criteria for classification as non-hazardous because of high TCLP results for lead and cadmium. The applicant states that it intends to provide a laboratory TCLP test on each lot to demonstrate continuous compliance with a representation that the spent ABM is not hazardous. Standards have been included in the permit to assure that the sampling is representative of the material processed, and that any laboratory conducting the chemical analysis will have a quality assurance plan to demonstrate the statistical reliability of the acceptance testing.

3.3. Compliance with Standards for Air Quality Maintenance Area for Lead

The applicant wishes to avoid classification as a Lead Processing Operation under Chapter 62-210, Definitions, Lead Processing Facilities, F.A.C., which would make it subject to Rules 62-296.600 and 62-296.601, F.A.C. A lead processing facility is defined as "a facility that emits of has the potential to emit greater than 100 pounds of lead per year as lead or lead compounds." The rule goes further to give a list or operations that may be included under the rule, and a list of facilities to which the rule does not apply. The list does not exclude the classification of other operations as "Lead Processing Facilities." The operations listed and excluded are examples rather than facilities that are *per se* included in the rule. The Lead Processing Facility rule includes lead containing slag handling operations, and all other lead containing slag processing or handling operations where the lead content is greater than 0.25 percent, by weight. ABM is a slag product derived from coal combustion. While the classification as a lead processing facility can be avoided, some of the management practices, including water spray dust suppression, will be required to keep the facility's overall potential particulate emissions below 100 tons per year.

3.4. The maximum allowable visible emissions under various operating conditions are as follows:

Emission Point/Activity	VE Limit (% Opacity) under General VE Standard	VE Limit (% Opacity) all operations within the particulate maintenance areas (whether or not associated with a crusher)	VE Limit (% Opacity) if operated in conjunction with a crusher subject to 40CFR60, Subpart OOO, and outside of the maintenance areas
Receiving Hopper/Vibrating Feeder	<20	5	10
Portable Belt Conveyor(s)	<20	5	10 *
Screen(s)	<20	5	15
Truck Loading/Unloading	<20	5	<20

* This limit applies to transfer points onto conveyor belts only.

3.5. More Restrictive Standards for Air Quality Maintenance Areas

Hillsborough County Air Quality Maintenance Area for Particulate

That portion of Hillsborough County which falls within the area of the circle having a centerpoint at the intersection of U. S. 41 South and State Road 60 and a radius of 12 kilometers.

Note: When operating in the Hillsborough County Air Quality Maintenance Area for Particulate Matter,, the permittee shall not cause, permit, or allow any visible emissions (five percent opacity). This includes, but is not limited to, the receiving hopper, crushers, belt conveyors, screens, and truck loading/unloading.
[40 CFR 60.672; and, Rule 1-3.61, Rules of the Environmental Protection Commission of Hillsborough County]

Hillsborough County Air Quality Maintenance Area for Lead

The area encompassed within a radius of five kilometers centered at UTM coordinates: 364.0 kilometers East, 3093.5 kilometers North, Zone 17, in Hillsborough County, is designated as an air quality maintenance area for the air pollutant lead.

Note: To avoid classification as a lead processing facility, when operating within the Hillsborough County Air Quality Area for Lead, the permittee shall not handle or process any spent ABM containing greater than 0.25 percent lead (as Pb), by weight, based on mass concentration.

[Rules 62-210.200, Definitions - Lead Processing Facility, and 62-296.601, F.A.C.]

4. SOURCE IMPACT ANALYSIS

The screening unit and diesel engine operations are insignificant sources of air pollution and do not require a source impact analysis.

4.1. Control Technology Review

The material handling unit and associated conveyors are potential sources of fugitive particulate matter emissions and will be controlled by water spray application. Also, non-process fugitive emissions will be controlled by wetting the material storage piles, yard, and roadways.

The use of new No. 2 highway grade fuel oil, or better, will be used to minimize SO_2 emissions from the diesel engine powering the unit operation.

4.2 Air Quality Analysis

An air quality analysis was not required for this project. The operation should not have any significant impact on ambient air quality.

CONCLUSION

Based on the technical evaluation of the application and supplemental information, the Department has made a preliminary determination that the proposed project will comply with all applicable state and federal air pollution regulations provided the Department's requirements described in the Specific Conditions of the proposed permit are met. The General and Specific Conditions are listed in the attached permit. This analysis proffers no conclusion as to compliance with solid or hazardous waste, water or groundwater, industrial hygiene, safety, or personal exposure.

W. Leffler

William Leffler, P.E.
Permit Engineer
August 27, 2001

Department of
Environmental Protection

Jeb Bush
Governor

Marjory Stoneman Douglas Building
3900 Commonwealth Boulevard
Tallahassee, Florida 32399-3000

David B. Struhs
Secretary

P.E. Certification Statement

In re application for air construction permit by:

Conrad Yelvington Distributors, Inc.
2326 Bellevue Road
Daytona Beach, Florida 32114

DEP File No.: 7770473-004-AC
Facility ID No.: 7770473

Project: Relocatable Source Air Construction Permit for Powerscreen Model Chieftain 510

I HEREBY CERTIFY that the engineering features described in the above referenced application and related additional information submittals, if any, and subject to the proposed permit conditions, including:

- Enforceable operational limits are 8,800 tons per day throughput, 16 hours per day, and 300 days per calendar year for scalping/screening/classifying sand, gravel, crushed stone and recycled asphalt pavement.
- The processing of spent abrasive blast media (ABM) is authorized up to 23,000 tons per calendar year, with the throughput limited to 80 tons per hour and the hours of operation limited to 200 hours per calendar year in Hillsborough County; and, an additional 100 hours per calendar year is allowed for processing spent ABM elsewhere throughout the state in counties authorized in Appendix PC. All spent ABM product shall be tested and meet the classification criteria as non-hazardous as provided in 40 CFR 261. The spent ABM processed within Hillsborough County, shall not exceed 0.25 percent lead, by weight, as Pb. Testing for TCLP and lead shall be performed on a representative portion of each batch of materials.
- Water spray dust control on the receiving hopper, conveyor drop points and classifier screens is required as a federally enforceable condition arising from the emission estimation factors chosen by the applicant.
- The possible use of this unit in tandem with a nonmetallic mineral crusher may make all of its emissions subject to the limitations of 40CFR60, Subpart OOO, during such tandem operation. Any crusher or quarry operations should be a wet process dealing with saturated rock or employ water spray dust suppression.
- The co-location of this scalper/screening unit on site with any operation that causes air pollution may cause potential pollutant emissions from the site to exceed the 100 tons per year threshold of Title V applicability. It will be incumbent upon the permittee to coordinate with permitting authorities to avoid excessive emission contributions on a site otherwise classified as a minor facility.
- Water spray dust suppression or tarpaulin cover is required for all storage piles.

The information within the application and as noted in the Technical Evaluation and Preliminary Determination provides reasonable assurance of compliance with applicable provisions of Chapter 403, Florida Statutes, and Florida Administrative Code Chapters 62-4, 62-204, 62-210, 62-212, 62-296 and 62-297, and analogous federal regulations. This analysis proffers no conclusion as to compliance regulations concerning solid or hazardous waste, water or groundwater, industrial hygiene, safety, or personal exposure. The scope of review is further limited by Revised Guidance on the Permitting of Sources Emitting Hazardous Air Pollutants DARM_PER-28, March 1, 2000.

I have not evaluated, nor do I certify the compliance of this facility regarding, any application beyond the scope of my discipline and training in air quality engineering (expressly excluding, but not limited to the electrical, mechanical, structural, personnel safety, hydrological, and geological features).

W. Leffler

William Leffler, P.E. FLPE 41972
Telephone: 850/921-9522

8/22/2001
Date

Department of Environmental Protection

Jeb Bush
Governor

Marjory Stoneman Douglas Building
3900 Commonwealth Boulevard
Tallahassee, Florida 32399-3000

David B. Struhs
Secretary

PERMITTEE:

Conrad Yelvington Distributors, Inc.
2326 Belleview Road (P. O. Box 1686)
Daytona Beach, Florida 32114

Permit No.: 7770473-004-AC
Facility ID No.: 7770473
SIC No.: 17
Expiration Date: September 27, 2006
Project: Diesel engine powered relocatable Powerscreen "Chieftain 510" scalper/screener/classifier unit and associated conveyors

AUTHORIZED REPRESENTATIVE

Mr. William C. Thomas, III
Vice President of Industrial Development and Operations
Conrad Yelvington Distributors, Inc.
2326 Belleview Road (P. O. Box 1686)
Daytona Beach, Florida 32114

PROJECT

This permit allows the applicant to construct a diesel engine powered relocatable scalper/screener/classifier unit and associated conveyors, which will be designated as the Relocatable Powerscreen "Chieftain 510". The scalper/screener/classifier unit is allowed to process sand, gravel, and crushed stone, including crushed concrete and recycled asphalt pavement, in those counties specified in Appendix PC. This facility may be also process a limited quantity of spent ABM.

STATEMENT OF BASIS

This air construction permit is issued under the provisions of Chapter 403, Florida Statutes (F.S.), and the Florida Administrative Code (F.A.C.) Chapters 62-4, 62-204, 62-210, 62-212, 62-296 and 62-297. The above named permittee is authorized to construct the facility in accordance with the conditions of this permit and as described in the application, approved drawings, plans, and other documents on file with the Department of Environmental Protection (Department).

APPENDICES

The attached appendices are a part of this permit:

Appendix GC - General Permit Conditions
Appendix PC - Permitted Counties

Howard L. Rhodes, Director
Division of Air Resources
Management

FACILITY DESCRIPTION

This facility consists of a 550 tons per hour (TPH) sand, gravel, and crushed stone, including crushed concrete and recycled asphalt pavement (RAP), scalping/screening/classifying unit, powered by a 76 hp Cummins 4b 3.9 (4 cylinder) diesel engine, mounted on a transportable chassis; and, various feeders, classifier screens and conveyors are powered by hydraulic pumps and motors driven by the diesel engine. Fugitive particulate matter emissions throughout the crushing units, classifier and conveyor transfer points will be controlled by a water spray suppression system.

REGULATORY CLASSIFICATION

This facility is subject to the General Visible Emission Standard and to the particulate RACT standards of Hillsborough County. As long as this facility is not operated in conjunction with a NSPS crusher, it is exempt from the NSPS standards. If this facility is operated in conjunction with a crusher regulated by 40 CFR 60, Subpart OOO, then its emissions are also limited by 40 CFR 60, Subpart OOO. These conditions are tabulated in Section III., Emission Unit Specific Conditions.

The diesel engine power unit is subject to permitting pursuant to Rule 62-210.300(1), F.A.C., Permits Required.

RELEVANT DOCUMENTS

The documents listed below are the basis of the permit. They are specifically related to this permitting action. These documents are on file with the Department.

- Application received April 19, 2000.
- Notice of intent to issue permit with associated documents and draft air construction permit clerked August 20, 2000. The public notice associated with this package has never been published.
- Letter from Stephanie Brooks requesting an amendment of the draft permit received October 2, 2000.
- Response to the Department's October 6, 2000, request for additional information received from Stephanie Brooks, P.E., on March 6, 2001, with the P.E. certification received April 23, 2001, and documents transmitted therewith.
- Response to the Department's May 14, 2001 incompleteness letter received from Stephanie Brooks, P.E., received June 7, 2001, and documents transmitted therewith.

PERMITTED COUNTIES

Please see Appendix PC - Permitted Counties, which will list the counties for which the facility will be permitted to operate. As proof of publication is received by the Department, an expiration date shall be determined and inserted into Appendix PC. As additional counties are authorized under the air construction permit from the publishing of the Public Notice, the permittee shall apply for an operation permit amendment to include the new county(ies) for potential operation.

OPERATING LOCATION

The facility will begin initial operation at 4800 Cone Road, Tampa, Hillsborough County, Florida.

The following conditions apply to all emissions units/activities at this facility.

ADMINISTRATIVE

1. Regulating Agencies: All documents relating to the initial application for a permit to operate and all initial compliance tests shall be submitted to the Department's Bureau of Air Regulation in Tallahassee. Subsequent applications for permit renewals, reports, tests, minor modifications, and notifications shall be submitted to the district office or local program that has permitting/compliance jurisdiction over the current or proposed operating location.

2. General Conditions: In addition to the specific conditions of this permit, the owner and operator are subject to and shall operate under the General Permit Conditions G.1 through G.15, contained in the attached Appendix GC - General Permit Conditions of this permit. The General Permit Conditions are binding and enforceable pursuant to Chapter 403, F.S.
[Rule 62-4.160, F.A.C.]

3. Terminology: The terms used in this permit have specific meanings as defined in the corresponding chapters of the Florida Administrative Code.

4. Forms and Application Procedures: The permittee shall use the applicable forms listed in Rule 62-210.900, F.A.C., and follow the application procedures in Chapter 62-4, F.A.C.
[Rule 62-210.900, F.A.C.]

5. Extension of Expiration Date: The permittee may, for good cause, request that this construction permit be extended. Such a request shall be submitted to the Department's Bureau of Air Regulation prior to 60 days before the expiration of the permit.
[Rules 62-210.300(1), 62-4.070(4) and 62-4.210, F.A.C.]

6. Relocation Notification: An air permit for a relocatable facility shall be amended upon each change of location of the facility. The owner or operator of the facility must submit a Notification of Intent to Relocate Air Pollutant Emitting Facility (DEP Form 62-210.900(6)) to the Department's District office and/or, if applicable, appropriate local program at least 7 days prior to the change, if the facility would be relocated to a county in which public notice of the proposed operation of the facility had been given within the last five (5) years pursuant to Rule 62-210.350(1), F.A.C., or otherwise thirty (30) days prior to the change. The notification shall include the appropriate processing fee. All potential operation sites shall be shown on a USGS topographical map. A county license, a discretionary public notice, or additional restrictions for the operation at a specific site may be imposed by the Department's District office and/or local program. Each time that the permittee submits a Notice of Intent to Relocate, the operation permit shall be revised/amended to reflect the new location.
[Rules 62-4.050 and 62-210.370(1), F.A.C.]

7. Operation Permit Required: This permit authorizes construction and/or installation of the permitted emissions unit and initial operation for testing purposes in order to determine compliance with the applicable rules and standards. An operation permit is required for continued commercial operation of the permitted emissions unit. The owner or operator shall apply for and receive an operation permit prior to expiration of this permit. To apply for an operation permit, the applicant shall submit the appropriate application fee and, in quadruplicate, the appropriate application form, a certification that construction was completed with a notation of any deviations from the conditions in the construction permit, compliance test results, and such additional information as the Department may, by law, require. A copy of the compliance test results must be submitted to the Department's Tallahassee office as well as the District office or local program that has compliance jurisdiction over the location where the test took place.
[Rules 62-4.030, 62-4.050, 62-4.220 and 62-210.300(2), F.A.C.]

8. Applicable Regulations: Unless otherwise indicated in this permit, the construction and operation of the subject emissions units shall be in accordance with the capacities (through-put and materials to be processed), specifications and control measures stated in the application. The facility is subject to all applicable provisions of Chapter 403, F.S.; Chapters 62-4, 62-204, 62-210, 62-296 and 62-297, F.A.C.; and, the Code of Federal Regulations Title 40, Parts 60 and 61, adopted by reference in Chapter 62-204, F.A.C. Issuance of this permit does not relieve the facility owner or operator from compliance with any applicable federal, state, or local

permitting or regulations. This permit does not purport to authorize any operations covered by rules promulgated by the Department's Divisions of Water Resources, Waste, or Hazardous Waste.
[Rules 62-204.800 and 62-210.300, F.A.C.]

EMISSION LIMITING STANDARDS

9. General Visible Emissions Standard: Except for emissions units that are subject to a particulate matter or opacity limit set forth or established by rule and reflected by conditions elsewhere in this permit, no person shall cause, let, permit, suffer, or allow to be discharged into the atmosphere the emissions of air pollutants from any activity, the density of which is equal to or greater than that designated as Number 1 on the Ringelmann Chart (20% opacity). More stringent requirements may apply in certain Air Quality Maintenance Areas. If a special compliance test is required, the test method for visible emissions shall be EPA Method 9, incorporated and adopted by reference in Chapter 62-297, F.A.C.
[Rules 62-296.320(4)(b)1. & 4., F.A.C.]

10. Unconfined Emissions of Particulate Matter:
    (a) No person shall cause, let, permit, suffer or allow the emissions of unconfined particulate matter from any activity, including vehicular movement; transportation of materials; construction, alteration, demolition or wrecking; or industrially related activities such as loading, unloading, storing or handling; without taking reasonable precautions to prevent such emissions.
    (b) Any permit issued to a facility with emissions of unconfined particulate matter shall specify the reasonable precautions to be taken by that facility to control the emissions of unconfined particulate matter.
    (c) Reasonable precautions committed to by the permittee:
    - Emissions that might be generated from various emission points throughout the relocatable scalper/screener/classifier unit and associated conveyors shall be controlled by a water suppression system with spray bars located at the various emissions points located throughout the facility.
    - All stockpiles and roadways, where the relocatable scalper/screener/classifier unit and associated conveyors are located, shall be watered on a regular basis by water trucks equipped with spray bars to control any fugitive emissions that may be generated by vehicular traffic or prevailing winds.
    - Stockpiled materials may be maintained in roll-off containers covered by a substantial tarpaulin or other containment to prevent wind erosion.
    - Spent ABM shall be promptly processed and removed from the facility to eliminate long standing stockpiles.
    - Commercially available dust suppressants may be used to supplement water for long term dust control on roadways and stockpiles.

    (d) In determining what constitutes reasonable precautions for a particular source, the Department shall consider the cost of the control technique or work practice, the environmental impacts of the technique or practice, and the degree of reduction of emissions expected from a particular technique or practice.

    [Rules 62-4.070(3) and 62-296.320(4)(c), F.A.C.; and, application received April 19, 2000, and *supplemental materials provided by applicant*]

11. General Pollutant Emission Limiting Standards:
    (a) No person shall store, pump, handle, process, load, unload or use in any process or installation, volatile organic compounds or organic solvents without applying known and existing vapor emission control devices or systems deemed necessary and ordered by the Department.
    {Note: Nothing has been deemed necessary at the time of issuance of this permit.}
    (b) No person shall cause, suffer, allow or permit the discharge of air pollutants, which cause or contribute to an objectionable odor.

    [Note: An objectionable odor is defined in Rule 62-210.200, Definitions, F.A.C., as any odor present in the outdoor atmosphere which by itself or in combination with other odors, is or may be harmful or injurious to human health or welfare, which unreasonably interferes with the comfortable use and enjoyment of life or property, or which creates a nuisance.]
    [Rules 62-296.320(1)(a) and 62-296.320(2), F.A.C.]

OPERATIONAL REQUIREMENTS

12. Modifications: No emissions unit or facility subject to this rule shall be constructed or modified without obtaining an air construction permit from the Department. Such permit must be obtained prior to the beginning of construction or modification.
[Rules 62-210.300(1) and 62-212.300(1)(a), F.A.C.]

13. Plant Operation - Problems: If temporarily unable to comply with any of the conditions of the permit due to breakdown of equipment or destruction by hazard of fire, wind or by other cause, the permittee shall immediately notify the Department's District office and, if applicable, appropriate local program. The notification shall include pertinent information as to the cause of the problem, and what steps are being taken to correct the problem and to prevent its recurrence, and where applicable, the owner's intent toward reconstruction of destroyed facilities. Such notification does not release the permittee from any liability for failure to comply with Department rules.
[Rule 62-4.130, F.A.C.]

14. Circumvention: No person shall circumvent any air pollution control device or allow the emission of air pollutants without the applicable air pollution control device operating properly.
[Rule 62-210.650, F.A.C.]

15. This facility may operate with any other facility at any given permitted site provided the total emissions from the facility do not exceed:
    (i) 100 tons per year or more of carbon monoxide, nitrogen oxides, particulate matter, sulfur dioxide, or volatile organic compounds;
    (ii) 100 pounds per year or more of lead and lead compounds expressed as lead;
    (iii) 10 tons per year or more of any hazardous air pollutant;
    (iv) 25 tons per year or more of total hazardous air pollutants; or,
    (v) 100 tons per year or more of any other regulated pollutant.
[Rules 62-4.070(3) and 62-210.200 Definitions, Lead Processing Facility, and Chapter 62-213, F.A.C.]

16. This facility shall not operate at any Title V facility unless it is a part of the Title V Operation Permit.
[Rule 62-4.070(3) and Chapter 62-213, F.A.C.]

SUBSECTION A.

1. The following emissions units/activities and their description are addressed in this Subsection:

EMISSIONS UNIT/ACTIVITY NO.	DESCRIPTION
001	550 tons per hour relocatable Powerscreen "Chieftain 510" scalper/screener/classifier unit and associated conveyors
002	Cummins 4B 3.9 diesel fired engine directly driving the screen shaker and hydraulically driving the radial conveyors

The following specific conditions apply to the emissions units/activities referenced above:

ESSENTIAL POTENTIAL TO EMIT (PTE) PARAMETERS

2. The nature and quantities of material to be processed and hours of operation are as follows:

NATURE OF MATERIAL	MAXIMUM ALLOWABLE THROUGH-PUT	ALLOWED HOURS PER DAY	ALLOWED OPERATING LIMITS
Sand, gravel, crushed stone, crushed concrete, and recycled asphalt pavement	550 tons per hour (2,640,000 tons per calendar year)	16	300 days per calendar year
Spent ABM in Hillsborough County, Florida	80 tons per hour (Not to exceed 16,000 tons per calendar year) *	16	Not to exceed 200 hours per calendar year
Spent ABM elsewhere in Florida as authorized	80 tons per hour (Not to exceed 8,000 tons per calendar year) *	16	Not to exceed 100 hours per calendar year

* There is a statewide limit of 23,000 tons per calendar year on spent ABM

[Rules 62-4.070(3) and 62-210.200, F.A.C., Definitions - PTE; and, applicant requested June 7, 2001]

EMISSION LIMITATIONS AND PERFORMANCE STANDARDS

3. Visible Emissions: The following emission points/activities are subject to the indicated visible emission limits:

Emission Points/Activities	VE Limit (% Opacity) under the General VE Standard	VE Limit (% Opacity) all operations within Air Quality Maintenance Areas for Particulate	VE Limit (% Opacity) if operated in conjunction with a crusher subject to 40CFR60, Subpart OOO, and outside of the maintenance area
Receiving Hopper/Vibrating Feeder	<20	5	10
Portable Belt Conveyor(s)	<20	5	10 *
Screen(s)	<20	5	15
Truck Loading/Unloading	<20	5	<20

* This limit applies to transfer points onto conveyor belts only.

4. Visible Emissions: Air Quality Maintenance Area for Particulate Matter:

More stringent regulations apply in areas designated as Air Quality Maintenance Areas for Particulate, as well as parts of the "areas of influence" related to those areas that are not exempted by rule. When subject to both limits, the more stringent limit takes precedence. The description of the maintenance area and applicable visible emission limits are listed below:

<u>Hillsborough County</u>

That portion of Hillsborough County which falls within the area of the circle having a centerpoint at the intersection of U. S. 41 South and State Road 60 and a radius of 12 kilometers.

The permittee shall not cause, permit, or allow any visible emissions (five percent opacity).
[Rule 62-204.340, F.A.C.; and, Rule 1-3.61, Rules of the Environmental Protection Commission of Hillsborough County]

COMPLIANCE MONITORING AND TESTING REQUIREMENTS

5. <u>Test Frequency</u>:
   (a) Prior to obtaining an operation permit for this facility, the owner or operator shall conduct a visible emissions compliance test to demonstrate compliance with the standards of this permit, in accordance with the conditions listed below.
   [Rule 62-297.310(7)(a)1., F.A.C.]

   (b) The owner or operator of the facility shall conduct visible emissions tests annually, in accordance with the conditions listed below.
   [Rule 62-297.310(7)(a)4.a., F.A.C.]

6. <u>Operating Rate During Testing</u>: Unless otherwise stated in the applicable emission limiting standard rule, testing of emissions shall be conducted with the emissions unit operating at permitted capacity. Permitted capacity is defined as 90 to 100 percent of the maximum operation rate allowed by the permit. If it is impractical to test at permitted capacity, an emissions unit may be tested at less than the minimum permitted capacity (i.e., at less than 90 percent of the maximum operation rate allowed by the permit); in this case, subsequent emissions unit operation is limited to 110 percent of the test load until a new test is conducted provided however, operations do not exceed 100 percent of the maximum operation rate allowed by the permit. Once the unit is so limited, operation at higher capacities is allowed for no more than 15 consecutive days for the purpose of additional compliance testing to regain the authority to operate at the permitted capacity.
   [Rule 62-297.310(2), F.A.C.]

7. <u>Test Procedures</u> shall meet all applicable requirements of Rule 62-297.310(4), F.A.C.
   [Rule 62-297.310(4), F.A.C.]

8. <u>Determination of Process Variables</u>:

   (a) Required Equipment. The owner or operator of an emissions unit for which compliance tests are required shall install, operate, and maintain equipment or instruments necessary to determine process variables, such as process weight input or heat input, when such data are needed in conjunction with emissions data to determine the compliance of the emissions unit with applicable emission limiting standards.
   (b) Accuracy of Equipment. Equipment or instruments used to directly or indirectly determine process variables, including devices such as belt scales, weight hoppers, flow meters, and tank scales, shall be calibrated and adjusted to indicate the true value of the parameter being measured with sufficient accuracy to allow the applicable process variable to be determined within 10% of its true value.
   [Rule 62-297.310(5), F.A.C.]

9. <u>Test Notification</u>: The owner or operator shall notify the Department's District office and, if applicable, appropriate local program, at least 15 days prior to the date on which each formal compliance test is to begin. Notification shall include the date, time, and place of each such test, and the test contact person who will be responsible for coordinating and having such test conducted for the owner or operator.
   [Note: The federal requirements of 40 CFR 60.8 require 30 days notice of the initial test and any tests required under section 114 of the Clean Air Act, but the Department rules require 15 days notice for the annual compliance tests. Unless otherwise advised by the Department, provide 15 days notice prior to conducting annual tests, except for the initial test when 30 days notice is required.]
   [Rule 62-297.310(7)(a)9., F.A.C.; and, 40 CFR 60.8]

10. Visible Emissions Test Method: In determining compliance with the standards in 40 CFR 60.672 (b) and (c), the owner or operator shall use Method 9 and the procedures in 40 CFR 60.11, with the following additions:
    (a) The minimum distance between the observer and the emissions source shall be 4.57 meters (15 feet).
    (b) The observer shall, when possible, select a position that minimizes interference from other fugitive emissions units (e.g., road dust). The required observer position relative to the sun (Method 9, Section 2.1) must be followed.
    (c) For affected emissions units using wet dust suppression for particulate matter control, a visible mist is sometimes generated by the spray. The water mist must not be confused with particulate matter emissions and is not to be considered a visible emission. When a water mist of this nature is present, the observation of emissions is to be made at a point in the plume where the mist is no longer visible.
    [40 CFR 60.675(c)(1)(i), (ii) & (iii)]

11. When determining compliance with the fugitive emissions standard for any affected facility described under 40 CFR 60.672(b), the duration of the EPA Method 9 observations may be reduced from 3 hours (thirty 6-minute averages) to 1 hour (ten 6-minute averages) only if the following conditions apply:
    (a) There are no individual readings greater than 10 percent opacity; and,
    (b) There are no more than 3 readings of 10 percent for the 1-hour period.
    [40 CFR 60.675(c)(3)(i) & (ii)]

12. When determining compliance with the fugitive emissions standard for any crusher at which a capture system is not used as described under 40 CFR 60.672(c), the duration of the Method 9 observations may be reduced from 3 hours (thirty 6-minute averages) to 1 hour (ten 6-minute averages) only if the following conditions apply:
    (a) There are no individual readings greater than 15 percent opacity; and,
    (b) There are no more than 3 readings of 15 percent for the 1-hour period.
    [40 CFR 60.675(c)(4)(i) & (ii)]

13. Visible Emissions Test - Emissions Interference: For the method and procedure of 40 CFR 60.675(c), if emissions from two or more emissions units continuously interfere so that the opacity of fugitive emissions from an individual affected emissions unit cannot be read, either of the following procedures may be used:
    (a) Use for the combined emission stream the highest fugitive opacity standard applicable to any of the individual affected emissions units contributing to the emissions stream.
    (b) Separate the emissions so that the opacity of emissions from each affected emissions unit can be read.
    [40 CFR 60.675(e)(1)(i) & (ii)]

14. No Tests Required - Saturated Materials: EPA Method 9 performance tests under 40 CFR 60.11 and 40 CFR 60.675 are not required for:
    (a) Wet screening operations and subsequent screening operations, bucket elevators, and belt conveyors that process saturated material in the production line up to, but not including the next crusher, grinding mill or storage bin.
    (b) Screening operations, bucket elevators, and belt conveyors in the production line downstream of wet mining operations, that process saturated materials up to the first crusher, grinding mill, or storage bin in the production line.
    [40 CFR 60.675(h)(1) & (2)]

15. Special Compliance Tests: When the Department, after investigation, has good reason (such as complaints, increased visible emissions or questionable maintenance of control equipment) to believe that any applicable emission standard contained in a Department rule or in a permit issued pursuant to those rules is being violated, it shall require the owner or operator of the facility to conduct compliance tests which identify the nature and quantity of pollutant emissions from the emissions units and to provide a report on the results of said tests to the Department.
    [Rule 62-297.310(7)(b), F.A.C.]

REPORTING AND RECORDKEEPING REQUIREMENTS

16. Log: The permittee or operator shall maintain a daily log showing, at a minimum, the following:
    (a) The hours of operation of the facility or any component of it;
    (b) The fuel consumption;
    (c) The location of the operation if other than the Cone Road facility in Tampa;
    (d) The daily throughput and hourly production rate;
    (e) The maintenance and repair logs for any work performed on the facility; including the list of the parameters being monitored, the frequency of the check/maintenance, observations, and comments
    (f) The time of application and amounts of wetting agents to control fugitive dust, both on the machinery and on stockpiles and roadways;
    (g) Any moisture testing on the materials before and after processing; and,
    (h) The nature of the product being processed, whether, natural sand, gravel, stone aggregate, or spent ABM;
    (i) If the product is spent ABM: the lot number, laboratory reference reports, and size of the lot; sampling details; when the material was received on the site; the producer of the material; and, when and to where it was shipped after processing.

    This data shall be recorded in a bound logbook, which shall be signed each day by the operator and made available to the Department or local program upon request.
    [Rule 62-4.070(3), F.A.C.]

17. No Visible Emissions - Saturated Materials: No owner or operator shall cause to be discharged into the atmosphere any visible emissions from:
    (a) Wet screening operations and subsequent screening operations, bucket elevators, and belt conveyors that process saturated material in the production line up to the next crusher, grinding mill or storage bin.
    (b) Screening operations, bucket elevators, and belt conveyors in the production line downstream of wet mining operations, where such screening operations, bucket elevators, and belt conveyors process saturated materials up to the first crusher, grinding mill, or storage bin in the production line.

    [40 CFR 60.672(h)(1) & (2)]

18. Excess Emissions: The following excess emissions provisions can not be used to vary any NSPS requirements (from any subpart of 40 CFR 60).

    (a) Excess emissions resulting from start-up, shutdown or malfunction of any emissions units shall be permitted providing (1) best operational practices to minimize emissions are adhered to and (2) the duration of excess emissions shall be minimized, but in no case exceed two hours in any 24 hour period unless specifically authorized by the Department for longer duration.

    [Rule 62-210.700(1), F.A.C.]

    (b) Excess emissions which are caused entirely or in part by poor maintenance, poor operation, or any other equipment or process failure which may reasonably be prevented during start-up, shutdown, or malfunction shall be prohibited.

    [Rule 62-210.700(4), F.A.C.]

COMPLIANCE MONITORING AND TESTING REQUIREMENTS

19. Acceptance Criteria and Reports of analysis for Spent ABM:

a. Each lot (not exceeding 50 tons) of spent ABM shall be tested for compliance with the standards set forth in 40 CFR 261.24, Toxicity Leaching Characteristic Procedure (TCLP), according to the methods set forth in EPA Publication SW-846, which are Method 3050 for digestion and Methods 3010 and 3020 for atomic absorption spectrophotometry (see EPA 1311/6010 TCLP, RCRA 8 Metals). Care shall be taken to assure that each sample is representative of the entire lot. Levels of leachable heavy metals shall not exceed:

Heavy Metal	Regulatory TCLP Level
Arsenic	5.0 mg/ kg
Barium	100 mg/ kg
Cadmium	1.0 mg/ kg
Chromium	5.0 mg/ kg
Lead	5.0 mg/ kg
Mercury	0.2 mg/ kg
Selenium	1.0 mg/ kg
Silver	5.0 mg/ kg

b. Each lot of spent ABM shall be tested for lead according to Method 3050. The total lead and lead compounds shall not exceed 0.25 percent (2500 mg/kg), by weight, as metallic lead (Pb).

c. Each sample representing a lot of spent ABM shall be representative of the lot, and shall be a composite of a tube samples extending the full depth of the pile or container, not less than one tube drawn for each 10 tons or portion thereof, and not less than three sampling points per lot. Any proposed material consisting of more than 50 tons shall be divided into multiple lots, each less than 50 tons, for sampling and laboratory testing.

d. Any laboratory conducting TCLP or Atomic Absorption Spectroscopy testing shall comply and maintain a quality assurance program conforming to Chapter 62-160, F.A.C.

e. Dilution, blending or mixing shall not be used to "qualify" any material not conforming to the above standards.

f. Testing ordered by a supplier of spent ABM, which meets the above sampling and analytical procedures, may be relied upon for compliance with this section.

[40 CFR 261.24; and, Chapter 62-160, F.A.C.]

20. Laboratory Test Reports: The owner or operator shall submit written reports of the results of all laboratory reports indicating the TCLP Characteristics and lead content of each lot of spent ABM processed through the unit and the amount of material contained in each lot to the Department, or its agent, as soon as practical, but no later than 15 days after the last sampling run of each test is completed. The laboratory test report shall provide sufficient detail on the emissions unit tested and the test procedures used to allow the Department, or its agent, to determine if the test was properly conducted and the test results properly computed.
[Rule 62-4.070(3), F.A.C.; and, applicant's agreement]

21. Test Reports - Visible Emissions: The owner or operator shall submit written reports of the results of all performance tests conducted to demonstrate compliance with the standards set forth in Rules 62-296.300(4)b. and c., F.A.C.; Rule 62-204.340, F.A.C.; Rule 1-3.61, Rules of the EPCHC; and, 40 CFR 60.672(b) and 60.672(c), as applicable, including reports of opacity observations made using EPA Method 9 to demonstrate compliance.

(b) The required test report shall be filed with the Department or its agent as soon as practical but no later than 45 days after the last sampling run of each test is completed.

(c) The test report shall provide sufficient detail on the emissions unit tested and the test procedures used to allow the Department or its agent to determine if the test was properly conducted and the test results properly computed. As a minimum, the test report, other than for an EPA Method 9 test, shall provide the following information:

1. The type, location, and designation of the emissions unit tested.
2. The facility at which the emissions unit is located.
3. The owner or operator of the emissions unit.

4. The normal type and amount of fuels used and materials processed, and the types and amounts of fuels used and material processed during each test run.
5. The method, raw data and computations used to determine the amount of fuels used and materials processed, if necessary to determine compliance with an applicable emission limiting standard.
6. The type of air pollution control devices installed on the emissions unit, its general condition, their normal operating parameters (pressure drops, total operating current and GPM scrubber water), and their operating parameters during each test run.

[40 CFR 60.676(f); and, Rules 62-297.310(8)(b) and (c)1. - 6., F.A.C.]

22. Change from Saturated to Unsaturated Material: The owner or operator of any screening operation, bucket elevator, or belt conveyor that processes saturated material and is subject to 40 CFR 60.672(h) and subsequently processes unsaturated materials, shall submit a report of this change within 30 days following such change. This screening operation, bucket elevator, or belt conveyor is then subject to the 10 percent opacity limit in 40 CFR 60.672(b) and the emission test requirements of 40 CFR 60.11. Likewise a screening operation, bucket elevator, or belt conveyor that processes unsaturated material but subsequently processes saturated material shall submit a report of this change within 30 days following such change. This screening operation, bucket elevator, or belt conveyor is then subject to the no visible emission limit in 40 CFR 60.672(h).
[40 CFR 60.676(g)]

23. Records Retention: This facility shall maintain a central file containing all measurements, records, and other data that are required to be collected pursuant to the various specific conditions of this permit.
[Rule 62-4.160(14)(a), F.A.C.]

24. Duration of Recordkeeping: Upon request, the permittee shall furnish all records and plans required under Department rules. During enforcement actions, the retention period for all records will be extended automatically unless otherwise stipulated by the Department. The permittee shall hold at the facility or other location designated by this permit records of all monitoring information (including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation) required by the permit, copies of all reports required by this permit, and records of all data used to complete the application for this permit. These records shall be retained at least three years from the date of the sample, measurement, report, or application unless otherwise specified by Department rule.
[Rule 62-4.160(14)(b), F.A.C.]

25. Excess Emissions Report: If excess emissions occur, the owner or operator shall notify the Department within one working day of: the nature, extent, and duration of the excess emissions; the cause of the excess emissions; and, the actions taken to correct the problem. In addition, the Department may request a written summary report of the incident. Pursuant to the Standards of Performance for New Stationary Sources, excess emissions shall also be reported in accordance with 40 CFR 60.7, Subpart A.
[Rule 62-4.130, F.A.C.]

26. Excess Emissions Report - Malfunctions: In case of excess emissions resulting from malfunctions, each owner or operator shall notify the Department or the appropriate local program in accordance with Rule 62-4.130, F.A.C. A full written report on the malfunctions shall be submitted in a quarterly report if requested by the Department.
[Rule 62-210.700(6), F.A.C.]

NSPS GENERAL PROVISIONS

[Note: The numbering of the original rules in the following conditions has been preserved for ease of reference. In cases where the state requirements are more restrictive than the NSPS general requirements, the state requirements shall prevail.]

27. Notification and Recordkeeping:

(a) Any owner or operator subject to the provisions of 40 CFR 60 shall furnish the Administrator written notification as follows:
(4) A notification of any physical or operational change to an existing facility which may increase the emission rate of any air pollutant to which a standard applies, unless that change is specifically exempted under an

applicable subpart or in 40 CFR 60.14(e). This notice shall be postmarked 60 days or as soon as practicable before the change is commenced and shall include information describing the precise nature of the change, present and proposed emission control systems, productive capacity of the facility before and after the change, and the expected completion date of the change. The Administrator may request additional relevant information subsequent to this notice.

(b) The owner or operator subject to the provisions of 40 CFR 60 shall maintain records of the occurrence and duration of any startup, shutdown, or malfunction in the operation of an affected facility; any malfunction of the air pollution control equipment; or any periods during which a continuous monitoring system or monitoring device is inoperative.

(f) The owner or operator subject to the provisions of 40 CFR 60 shall maintain a file of all measurements, including continuous monitoring system, monitoring device, and performance testing measurements; all continuous monitoring system performance evaluations; all continuous monitoring system or monitoring device calibration checks; adjustments and maintenance performed on these systems or devices; and all other information required by 40 CFR 60 recorded in a permanent form suitable for inspection. The file shall be retained for at least three years following the date of such measurements, maintenance, reports, and records.

[40 CFR 60.7]

28. Performance Tests:

(a) Within 60 days after achieving the maximum production rate at which the affected facility will be operated, but not later than 180 days after initial startup of such facility and at such other times as may be required by the Administrator under section 114 of the Act, the owner or operator of such facility shall conduct performance test(s) and furnish the Administrator a written report of the results of such performance test(s).

(b) Performance tests shall be conducted and data reduced in accordance with the test methods and procedures contained in each applicable subpart unless the Administrator (1) specifies or approves, in specific cases, the use of a reference method with minor changes in methodology, (2) approves the use of an equivalent method, (3) approves the use of an alternative method the results of which he has determined to be adequate for indicating whether a specific source is in compliance, (4) waives the requirement for performance tests because the owner or operator of a source has demonstrated by other means to the Administrator's satisfaction that the affected facility is in compliance with the standard, or (5) approves shorter sampling times and smaller sample volumes when necessitated by process variables or other factors. Nothing in this paragraph shall be construed to abrogate the Administrator's authority to require testing under section 114 of the Act.

(c) Performance tests shall be conducted under such conditions as the Administrator shall specify to the plant operator based on representative performance of the affected facility. The owner or operator shall make available to the Administrator such records as may be necessary to determine the conditions of the performance tests. Operations during periods of startup, shutdown, and malfunction shall not constitute representative conditions for the purpose of a performance test nor shall emissions in excess of the level of the applicable emission limit during periods of startup, shutdown, and malfunction be considered a violation of the applicable emission limit unless otherwise specified in the applicable standard.

(d) The owner or operator of an affected facility shall provide the Administrator at least 30 days prior notice of any performance test, except as specified under other subparts, to afford the Administrator the opportunity to have an observer present.

[40 CFR 60.8]

29. Compliance with Standards and Maintenance Requirements:

(a) Compliance with standards in 40 CFR 60, other than opacity standards, shall be determined only by performance tests established by 40 CFR 60.8, unless otherwise specified in the applicable standard.

(b) Compliance with opacity standards in 40 CFR 60.11 shall be determined by conducting observations in accordance with Reference Method 9 in appendix A of 40 CFR 60.11, any alternative method that is approved by the Administrator, or as provided in 40 CFR 60.11(e)(5). [Under certain conditions (40 CFR 60.675(c)(3)&(4)), Method 9 observation time may be reduced from 3 hours to 1 hour. Some affected facilities are exempted from Method 9 tests (40 CFR 60.675 (h)). See specific conditions 12 and 13, Section III, above for test duration requirements.]

(c) The opacity standards set forth in 40 CFR 60.11 shall apply at all times except during periods of startup, shutdown, malfunction, and as otherwise provided in the applicable standard.
(d) At all times, including periods of startup, shutdown, and malfunction, owners and operators shall, to the extent practicable, maintain and operate any affected facility including associated air pollution control equipment in a manner consistent with good air pollution control practice for minimizing emissions. Determination of whether acceptable operating and maintenance procedures are being used will be based on information available to the Administrator which may include, but is not limited to, monitoring results, opacity observations, review of operating and maintenance procedures, and inspection of the source.
(g) For the purpose of submitting compliance certifications or establishing whether or not a person has violated or is in violation of any standard in this part, nothing in this part shall preclude the use, including the exclusive use, of any credible evidence or information, relevant to whether a source would have been in compliance with applicable requirements if the appropriate performance or compliance test or procedure had been performed.

[40 CFR 60.11]

30. Circumvention: No owner or operator subject to the provisions of 40 CFR 60.12 shall build, erect, install, or use any article, machine, equipment or process, the use of which conceals an emission which would otherwise constitute a violation of an applicable standard. Such concealment includes, but is not limited to, the use of gaseous diluents to achieve compliance with an opacity standard or with a standard which is based on the concentration of a pollutant in the gases discharged to the atmosphere.

[40 CFR 60.12]

31. General Notification and Reporting Requirements:
(a) For the purposes of this part, time periods specified in days shall be measured in calendar days, even if the word "calendar" is absent, unless otherwise specified in an applicable requirement.
(b) For the purposes of this part, if an explicit postmark deadline is not specified in an applicable requirement for the submittal of a notification, application, report, or other written communication to the Administrator, the owner or operator shall postmark the submittal on or before the number of days specified in the applicable requirement. For example, if a notification must be submitted 15 days before a particular event is scheduled to take place, the notification shall be postmarked on or before 15 days preceding the event; likewise, if a notification must be submitted 15 days after a particular event takes place, the notification shall be delivered or postmarked on or before 15 days following the end of the event. The use of reliable non-Government mail carriers that provide indications of verifiable delivery of information required to be submitted to the Administrator, similar to the postmark provided by the U.S. Postal Service, or alternative means of delivery agreed to by the permitting authority, is acceptable.
(c) Notwithstanding time periods or postmark deadlines specified in this part for the submittal of information to the Administrator by an owner or operator, or the review of such information by the Administrator, such time periods or deadlines may be changed by mutual agreement between the owner or operator and the Administrator. Procedures governing the implementation of this provision are specified in paragraph (f) of this section.
(d) If an owner or operator of an affected facility in a State with delegated authority is required to submit periodic reports under this part to the State, and if the State has an established timeline for the submission of periodic reports that is consistent with the reporting frequency(ies) specified for such facility under this part, the owner or operator may change the dates by which periodic reports under this part shall be submitted (without changing the frequency of reporting) to be consistent with the State's schedule by mutual agreement between the owner or operator and the State. The allowance in the previous sentence applies in each State beginning one year after the affected facility is required to be in compliance with the applicable subpart in this part. Procedures governing the implementation of this provision are specified in paragraph (f) of this section.

(f)(1)(i) Until an adjustment of a time period or postmark deadline has been approved by the Administrator under paragraphs (f)(2) and (f)(3) of this section, the owner or operator of an affected facility remains strictly subject to the requirements of this part.

(ii) An owner or operator shall request the adjustment provided for in paragraphs (f)(2) and (f)(3) of this section each time he or she wishes to change an applicable time period or postmark deadline specified in this part.

(2) Notwithstanding time periods or postmark deadlines specified in this part for the submittal of information to the Administrator by an owner or operator, or the review of such information by the Administrator, such time periods or deadlines may be changed by mutual agreement between the owner or operator and the Administrator. An owner or operator who wishes to request a change in a time period or postmark deadline for a particular requirement shall request the adjustment in writing as soon as practicable before the subject activity is required to take place. The owner or operator shall include in the request whatever information he or she considers useful to convince the Administrator that an adjustment is warranted.

(3) If, in the Administrator's judgment, an owner or operator's request for an adjustment to a particular time period or postmark deadline is warranted, the Administrator will approve the adjustment. The Administrator will notify the owner or operator in writing of approval or disapproval of the request for an adjustment within 15 calendar days of receiving sufficient information to evaluate the request.

(4) If the Administrator is unable to meet a specified deadline, he or she will notify the owner or operator of any significant delay and inform the owner or operator of the amended schedule.

[40 CFR 60.19]

PROHIBITED OPERATIONS

32. Prohibited Operations: Asbestos Containing Materials, 40 CFR 61, Subpart M: This facility shall **not** process Asbestos Containing Materials (ACM), whether regulated asbestos containing material (RACM), category I or category II, and whether friable or nonfriable when received at the facility.

(1) "Asbestos" means the asbestiform varieties of serpentinite (chrysotile), riebeckite (crocidolite), cummingtonite-grunerite, anthophyllite, and actinolite-tremolite and includes trade acronyms products such as amosite.

(2) "Asbestos-containing materials", ACM, means any materials which contain more than one percent asbestos as determined by Polarized Light Microscopy. Based on a representative composite sample.

(3) "Asbestos removal project" means renovation or demolition operation in a facility that involves the removal of a threshold amount of regulated asbestos-containing material.

(4) "Category I Nonfriable Asbestos-Containing Material (ACM)" means asbestos-containing packings, gaskets, resilient floor covering, and asphalt roofing products containing more than 1 percent asbestos as determined using the method specified in Appendix A, Subpart F, 40 CFR Part 763, Section 1, Polarized Light Microscopy.

(5) "Category II Nonfriable ACM" means any material, excluding Category I Nonfriable ACM, containing more than 1 percent asbestos as determined using the methods specified in Appendix A, Subpart F, 40 CFR Part 763, Section 1, Polarized Light Microscopy, that, when dry, cannot be crumbled, pulverized, or reduced to powder by hand pressure.

[40 CFR 61, Subpart M; Chapter 62-257, F.A.C.; and, Rules 62-730.300 and 62-701.520, F.A.C.]

Miscellaneous

33. The diesel engine is allowed to fire new No. 2 fuel oil or better.
[Rules 62-4.070(3) and 62-210.200, Definitions - PTE, F.A.C.]

G.1 The terms, conditions, requirements, limitations, and restrictions set forth in this permit are "Permit Conditions" and are binding and enforceable pursuant to Sections 403.161, 403.727, or 403.859 through 403.861, F.S. The permittee is placed on notice that the Department will review this permit periodically and may initiate enforcement action for any violation of these conditions.

G.2 This permit is valid only for the specific processes and operations applied for and indicated in the approved drawings or exhibits. Any unauthorized deviation from the approved drawings or exhibits, specifications, or conditions of this permit may constitute grounds for revocation and enforcement action by the Department.

G.3 As provided in Subsections 403.087(6) and 403.722(5), F.S., the issuance of this permit does not convey any vested rights or any exclusive privileges. Neither does it authorize any injury to public or private property or any invasion of personal rights, nor any infringement of federal, state or local laws or regulations. This permit is not a waiver or approval of any other Department permit that may be required for other aspects of the total project which are not addressed in the permit.

G.4 This permit conveys no title to land or water, does not constitute State recognition or acknowledgment of title, and does not constitute authority for the use of submerged lands unless herein provided and the necessary title or leasehold interests have been obtained from the State. Only the Trustees of the Internal Improvement Trust Fund may express State opinion as to title.

G.5 This permit does not relieve the permittee from liability for harm or injury to human health or welfare, animal, or plant life, or property caused by the construction or operation of this permitted source, or from penalties therefore; nor does it allow the permittee to cause pollution in contravention of Florida Statutes and Department rules, unless specifically authorized by an order from the Department.

G.6 The permittee shall properly operate and maintain the facility and systems of treatment and control (and related appurtenances) that are installed or used by the permittee to achieve compliance with the conditions of this permit, as required by Department rules. This provision includes the operation of backup or auxiliary facilities or similar systems when necessary to achieve compliance with the conditions of the permit and when required by Department rules.

G.7 The permittee, by accepting this permit, specifically agrees to allow authorized Department personnel, upon presentation of credentials or other documents as may be required by law and at a reasonable time, access to the premises, where the permitted activity is located or conducted to:

(a) Have access to and copy and records that must be kept under the conditions of the permit;
(b) Inspect the facility, equipment, practices, or operations regulated or required under this permit, and,
(c) Sample or monitor any substances or parameters at any location reasonably necessary to assure compliance with this permit or Department rules.

Reasonable time may depend on the nature of the concern being investigated.

G.8 If, for any reason, the permittee does not comply with or will be unable to comply with any condition or limitation specified in this permit, the permittee shall immediately provide the Department with the following information:

(a) A description of and cause of non-compliance; and
(b) The period of noncompliance, including dates and times; or, if not corrected, the anticipated time the non-compliance is expected to continue, and steps being taken to reduce, eliminate, and prevent recurrence of the non-compliance.

The permittee shall be responsible for any and all damages which may result and may be subject to enforcement action by the Department for penalties or for revocation of this permit.

G.9 In accepting this permit, the permittee understands and agrees that all records, notes, monitoring data and other information relating to the construction or operation of this permitted source which are submitted to the Department may be used by the Department as evidence in any enforcement case involving the permitted source arising under the Florida Statutes or Department rules, except where such use is prescribed by Sections 403.73 and 403.111, F.S. Such evidence shall only be used to the extent it is consistent with the Florida Rules of Civil Procedure and appropriate evidentiary rules.

G.10 The permittee agrees to comply with changes in Department rules and Florida Statutes after a reasonable time for compliance, provided, however, the permittee does not waive any other rights granted by Florida Statutes or Department rules.

G.11 This permit is transferable only upon Department approval in accordance with Rules 62-4.120 and 62-730.300, F.A.C., as applicable. The permittee shall be liable for any non-compliance of the permitted activity until the transfer is approved by the Department.

G.12 This permit or a copy thereof shall be kept at the work site of the permitted activity.

G.13 This permit also constitutes:

(a) Determination of Best Available Control Technology *( )*
(b) Determination of Prevention of Significant Deterioration *( )*; and
(c) Compliance with New Source Performance Standards *(X)*.

G.14 The permittee shall comply with the following:

(a) Upon request, the permittee shall furnish all records and plans required under Department rules. During enforcement actions, the retention period for all records will be extended automatically unless otherwise stipulated by the Department.
(c) The permittee shall hold at the facility or other location designated by this permit records of all monitoring information (including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation) required by the permit, copies of all reports required by this permit, and records of all data used to complete the application or this permit. These materials shall be retained at least three years from the date of the sample, measurement, report, or application unless otherwise specified by Department rule.
(d) Records of monitoring information shall include:

1. The date, exact place, and time of sampling or measurements;
2. The person responsible for performing the sampling or measurements;
3. The dates analyses were performed;
4. The person responsible for performing the analyses;
5. The analytical techniques or methods used; and
6. The results of such analyses.

G.15 When requested by the Department, the permittee shall, within a reasonable time, furnish any information required by law, which is needed to determine compliance with the permit. If the permittee becomes aware that relevant facts were not submitted or were incorrect in the permit application or in any report to the Department, such facts or information shall be corrected promptly.

The permittee is authorized to operate in the following counties where Public Notice has been published:

Permitted Counties:	Public Notice Published On:	Permitted Counties:	Public Notice Published On:	Permitted Counties:	Public Notice Published On:
Alachua		Hamilton		Okeechobee	
Baker		Hardee		Orange	
Bay		Hendry		Osceola	
Bradford		Hernando		Palm Beach	
Brevard		Highlands		Pasco	
Broward		Hillsborough		Pinellas	
Calhoun		Holmes		Polk	
Charlotte		Indian River		Putnam	
Citrus		Jackson		St. Johns	
Clay		Jefferson		St. Lucie	
Collier		Lafayette		Santa Rosa	
Columbia		Lake		Sarasota	
Dade		Lee		Seminole	
DeSoto		Leon		Sumter	
Dixie		Levy		Suwannee	
Duval		Libery		Taylor	
Escambia		Madison		Union	
Flagler		Manatee		Volusia	
Franklin		Marion		Wakulla	
Gasden		Martin		Walton	
Gilchrist		Monroe		Washington	
Glades		Nassau			
Gulf		Okaloosa			

State of Florida
Department of Environmental Protection

Memo

TO:	Clair Fancy
THRU:	Bruce Mitchell
FROM:	William Leffler, P.E.
DATE:	August 27, 2001
SUBJECT:	Intent to Issue Package Draft Air Construction Permit No.: 7770473-004-AC Conrad Yelvington Distributors, Inc. (CYDI)

This draft permit is for the construction of a relocatable diesel engine powered Powerscreen "Chieftain 510" scalper/screener/classifier unit and associated conveyors. It includes provisions for processing spent abrasive blast media (ABM) with a limited throughput and an annual cap on tonnage and operating hours. The construction permit will allow the permittee to advertise in counties for purposes of construction and testing.

The application history is as follows:

- Application for air construction permit received April 19, 2000
- Notice of intent with Draft permit issued August 11, 2000
- Information supplied to support revision of notice of intent received October 6, 2000
- Information supplied in response to request for additional information received April 23, 2001
- Information supplied in response to second request for additional information received June 7, 2001

The scalper/screener/classifier unit and associated conveyors, if operated with water spray dust suppression, will be a minor facility. The throughput capacity and the applicant's declared intent to use the unit to clean spent ABM, a potentially hazardous (toxic) material, renders the unit ineligible for the exemption provided by Rule 62-210.300(3)(a)(37), F.A.C. For the initial application, the applicant's consultant used emission factors from AP-42, Emission Factors, Table 11-19.2.2., which presumed control of unconfined particulate emissions by water spray. If controlled by water sprayers, the potential particulate emissions are approximately 27 tons per year from the screens and conveyor drop points (all materials). Analysis of emissions by dry processing (uncontrolled) emission factors from EPA's FIRE data base indicates potential particulate emissions in excess of 100 tons per year. The permit will contain the requirement for water spray control for particulate.

The limitations on throughput, processing rate, and operation hours for spent ABM, along with CYDI's commitment to process only material passing TCLP analysis (rejecting any material classified as hazardous waste by the TCLP analysis), provide sufficient assurance that the proposed operation will not violate any air quality standards nor create a public health hazard as a result of air emissions.

In addition to the Cone Road site, CYDI contemplates relocatable operations near Tampa Shipyard and at steel fabrication shops in Jacksonville, Orlando, Ft. Lauderdale and Miami. CYDI maintains about 30 sand and gravel distribution facilities throughout the state that are also potential operating sites, both as a sand and gravel classifier and for spent ABM. The General Visible Emissions Standard applies statewide; and, more restrictive visible emission standards apply in the Air Quality Maintenance Area of Hillsborough County, including the Cone Road site in Tampa.

The Powerscreen unit is designed for sand and gravel classification. It is subject to the general visible emission standard when classifying previously crushed construction aggregates (restricted to 'no visible emissions' within the particulate maintenance area). Operation of this unit in series with a crusher may subject it to a more restrictive NSPS visible emission standard provided in 40 CFR 60, Subpart OOO.

Best management practices for handling spent ABM have been suggested in Best Management Practices for Waste Abrasive Blast Media, Florida Center for Solid and Hazardous Waste Management, Tim Townsend and Jenna Jambeck Carlson (1998).

Recent complaints regarding the processing of coal bottom ash on the Tampa site have been partially resolved by the Southwest District Solid Waste Section with an agreement that such material is exempt from solid waste rules as industrial material for reuse. No power plant bottom ash is permitted to be screened in this unit.

I recommend withdrawing the unadvertised intent to issue and draft permit of August 11, 2000, and signing the attached Intent to Issue an Air Construction Permit.

Leffler, William

From: Richard Robinson [ROBINSON@coj.net]
Sent: Wednesday, October 17, 2001 10:40 AM
To: Leffler, William
Cc: Mitchell, Bruce; Darrel Hall; Steve Pace; Ron Roberson; Wayne Walker; Jerry Woosley
Subject: Draft Construction Permit No.:7770473-004-AC

As a follow-up of our conversation on Monday, the following are AWQD's comments concerning the subject permit:

1. Public Notice, page 2 of 2 - For future reference, please use the following as our address and telephone number:

City of Jacksonville
Regulatory and Environmental Services Department
117 West Duval Street, Suite 225
Jacksonville, Florida 32202
Telephone: 904/630-4900

2. Section III. Emission Unit Specific Conditions, page 6 of 18, Specific Condition No. 4. Visible Emissions: Air Quality Maintenance Area for Particulate Matter: - Please add the following to the end of this condition:

Duval County

The downtown Jacksonville area in Duval County located within the following boundary lines: south and then west along the St. Johns River from its confluence with Long Branch Creek, to Main Street; north along Main Street to Eighth Street; east along Eighth Street to Evergreen Avenue; north along Evergreen Avenue to Long Branch Creek; and east along Long Branch Creek to the St. Johns River.

The permittee shall not cause, permit, or allow any visible emissions (five percent opacity).
[Rule 62-204.340, F.A.C.; and, Rule 2.201, Rules of the Jacksonville Environmental Protection Board]

If you have any questions concerning these comments, please contact me at 904-630-1212 ext. 3147.

From: Kissel, Gerald
Sent: Wednesday, September 05, 2001 10:55 AM
To: Leffler, William
Subject: yelvington powerscreen permit

started routing this, and already received a few more comments:

1) intent-to-issue format is different from ours - I thought ours was up to date, but I didn't check in detail, but one issue is that ours has a statement about requesting info from the Dept. except for confidential info pursuant to section 403.111 etc. and there were a few other differences like the phone no. of contact person and the petition requirements were different in the intent vs. the public notice.

2) Suggest op'g app'n be submitted with initial test reports. Permit now allows them to wait 4.9 years.

3) In III.2 there are max limits of xxx tons/hr. We've had a lot of trouble with permits where the averaging time is not specified. E.g., does this limit apply to each hour, or on a daily average basis, or does it correspond to the averaging time of the test method? We've gotten into enforcement cases over this issue, so it's always good to specify the averaging time in both the permit condition and in the recordkeeping condition III.16 in this case, so there's no ambiguity. (Another minor point on the recordkeeping is that when annual limits are included in the permit, it's better to have a requirement in the recordkeeping for the permittee to do those annual totals; otherwise the compliance inspector may have to deal with adding up a year's worth of daily logs).

From: Kissel, Gerald
Sent: Tuesday, September 04, 2001 9:23 AM
To: Leffler, William
Subject: Yelvington Powerscreen permit

Bill, I just read the draft, and just for the record, I think it was a really excellent job and I'm routing it to our permit engineers as an example (we probably do this less than once a year). A couple of comments:

I think we have discretion to require an annual test or a once-in-five years test. When there's a 20% standard, and the material is wetted, this is an easy test to pass; and certainly on the day of the test they'll make sure they're watering the material, so everyone always passes the test, usually with a 0% VE, so we're not accomplishing much by requiring an annual test. These situations are case-by-case, but those are some factors we consider when considering annual VE's in cases like this. Technically, it could be said that we can't require ANY test when there's only the general 20% standard (see permitting general policy 38), but in practice I believe our permits and those of the other districts generally require testing.

That condition about not operating at a Title V facility unless part of the Title V permit, looks too restrictive. I'm thinking of cases where a contractor works at a Title V facility on a frequent or year-round basis, and EPA would want them to be part of the Title V permit. But a one-time short-term use, for example, would be pretty insignificant and shouldn't be part of the Title V permit (I think that's consistent with EPA policy, last I knew). Somehow the permit could distinguish between these cases - e.g., the Dept. must be notified because use at a TV facility MAY require .....

M E M O R A N D U M

DATE: September 10, 2001

TO: Jerry R. Campbell, P.E.

FROM: Rob Kalch TRHU: Alice H. Harman, P.E.

SUBJECT: **Conrad Yelvington Distributors, Inc.**
Co-Review of Draft Air Construction Permit No.: 7770473-004-AC

The above referenced intent was issued August 27, 2001. Pursuant to state Rule, any third party comments are due, in writing, within 14 days of the date of publication. Since the date of publication is set by the permittee, our comments should be received by the permitting authority by September 10, 2001 in order be sure they will be considered prior to the issuance of the final permit.

This facility is a re-locatable screening operation, and is proposing to begin operations at 4800 Cone Road, Tampa. The draft permit authorizes the facility to process (screen) sand, gravel, crushed stone, crushed concrete, recycled asphalt pavement, and spent abrasive blasting materials (ABM). Although the request to process sand, gravel, crushed stone, crushed concrete, and recycled asphalt pavement is fairly routine, the request to process spent ABM is not. The draft permit authorizes Conrad Yelvington to process up to 16,000 tpy of spent ABM in the Tampa area and an additional 8,000 tpy of spent ABM throughout the state of Florida.

From an air permitting perspective, Hillsborough County does not have any issues with the processing of spent ABM which is non-hazardous. The emissions generated from the screening of spent ABM would be substantially similar to those generated from the screening of other materials. EPC staff would not allow the processing of spent ABM which failed the TCLP testing. Permitting the processing (screening) of spent ABM crosses over into the realms of solid waste and groundwater contamination. The appropriate departments have been notified and a comment has been added to the attached letter requesting the permittee be required to contact these departments prior to processing spent ABM.

The Cone Road facility, where they want to operate, has also been a source of complaints for noise and dust for the existing operation. No less than twenty complaints have been received since 1994, but none have been received since 1998. They took corrective actions and we are continuing to monitor them. We mention this to advise you there is a sensitive land use immediately adjacent to their site.

rsk

September 10, 2001

Mr. C.H. Fancy
Chief, Bureau of Air Regulation
Florida Department of Environmental Protection
3900 Commonwealth Boulevard
Tallahassee, FL 32399-3000

Re: Conrad Yelvington Distributors, Inc.
Co-Review of Draft Air Construction Permit No.: 7770473-004-AC

Dear Mr. Fancy:

Thank you for the opportunity to review and submit comments on the above referenced intent. The Environmental Protection Commission (EPC) of Hillsborough County has reviewed the intent dated August 27, 2001. After reviewing the permit, EPC staff offer the following comments:

1. The Technical Evaluation stated the screener is capable of handling materials down to 3/8 of an inch in diameter. Since the spent ABM has a diameter smaller than 3/8 of an inch, what is being screened from the spent ABM? How are the screenings (material removed from the spent ABM) being disposed of and where? Which industries are being sold the screenings from the spent ABM, and what is it used for? Which industries are being sold the screened material (ABM), what is it used for? Specific Condition No. 16(i) should also require the permittee to record where, and to whom, the material screened from the spent ABM is shipped to as well. EPC staff offer the following language for your consideration:

16(i) If the product is spent ABM: the lot number, laboratory reference reports, and size of the lot; sampling details; when the material was received on site; the producer of the material; when and to where it was shipped after processing; **and, when, and to where the material screened from the spent ABM was shipped after processing.**
16(j) Time of operation, beginning and ending

2. The reasonable precautions listed in Specific Condition No. 10, Section II, Emissions Limiting Standards, should also specify

the following:
(f) Maximum allowable drop heights,
(g) Minimization of the use of front end loaders,
(h) Speed limits for trucks while on site,
(i) Covering all trucks prior to leaving the site,
(j) Curtailing operation if winds are entraining unconfined particulate matter in excess of 5 percent opacity,
(k) Require any storage of the spent ABM to be done on an impermeable surface, and
(l) The use of water spays at each transfer point and drop point associated with the screener.

3. Specific Condition No. 2, Section III, Subsection A, states the screener is authorized to operate 16 hours per day. There have been 17 noise complaints from a low income residential area immediately south logged since 1994 for this facility. Since these types of operations are noisy by their nature, operational restrictions (hours during which the screener may not operate) should be imposed on the facility, while operating at the Cone Road site, to ensure the screening operation will not be a source of noise pollution during the evening and early morning hours. Since some residential areas are near the facility, operating 16 hours per day may not be reasonable. Additionally, specific Condition No. 16 should also require the time of operation not just the duration be recorded (See comment No.1).

4. Specific Condition No. 4, Section III, Subsection A, requires visible emissions testing. EPC staff requests Specific Condition No. 4 require the screening operation to be tested for opacity within Hillsborough County and within the PM maintenance area in order to provide a compliance demonstration that the screening operation can comply with the 5% opacity limitation before being issued an operation permit.

5. Within Hillsborough County, the shipbuilding facilities have been prohibited from using spent abrasive materials. Testing has indicated that the metal concentrations in spent abrasives can exceed the TCLP levels referenced in Technical Evaluation and Specific Condition No. 19. Abrasive materials which have tested positive for metal concentrations which exceed the TCLP levels are required to be handled as a hazardous waste. EPC staff requests the permit require immediate notification, by phone followed by written notification to the solid waste division of the appropriate agency, upon the receipt of any spent ABM which fails the TCLP testing to ensure the material is handled and disposed of in an appropriate manner. The requirements may be added to the requirements listed under Specific Condition No. 19, Section III, Subsection A. EPC staff offer the following language for your consideration:

19(g) The permittee upon receipt of any lot of spent ABM which fails the TCLP testing required by this permit shall immediately notify the appropriate agency with jurisdiction over the location that the screener is located at by phone,

followed by written notification, identifying the lot and the actions to be taken to properly dispose of the material as a hazardous waste.

6. EPC staff does agree with the restriction that no asbestos containing materials are to be processed. Several facilities within Hillsborough County are restricted from processing asbestos containing materials but must perform a polarized light microscopy test in order to determine if asbestos is present. How is the facility determining if asbestos is present? EPC staff requests that polarized light microscopy be required in Specific Condition No. 32, Section III, Subsection A, in order to demonstrate that no asbestos containing materials are processed. EPC staff request immediate notification, by phone followed by written notification, upon receipt of any asbestos containing materials in order to ensure the material is handled and disposed of in an appropriate manner be added to the requirements listed under Specific Condition No. 32, Section III, Subsection A. EPC staff offer the following language for your consideration:

19(g) The permittee upon receipt of any material which tests positive for the presence of asbestos shall immediately notify the appropriate agency with jurisdiction over the location that the screener is located at by phone, followed by written notification, identifying the material and the actions to be taken to properly dispose of the material in an appropriate manner.

There are a couple of issues that need to be addressed which do not fall within the realm of air permitting. One is the solid waste issues associated with handling this material. The facility needs to acquire a Director's Authorization from the solid waste division of the EPC before handling this material. Please direct the permittee to contact Mr. Ron Cope (813) 272-5530, ext. 1292 in order get a Director's Authorization. The second issue is the handling of the material and any impacts there may be on the groundwater cleanup at the site. Please direct the permittee to contact Mr. Mike Gonsalves at the Southwest District of the Florida Department of Environmental Protection at (813) 744-6100, ext. 376. EPC staff wishes to thank you again for the opportunity to comment on this project.

If you have any questions, please call me or any of the air permitting staff at (813) 272-5530.

Sincerely,

Jerry Campbell, P.E.
Director
Air Management Division

Enclosures

rsk

cc: Gerald J. Kissel, P.E., FDEP, SW-District
William C. Thomas, III, Conrad Yelvington Distributors, Inc.

md-p-Conrad Yelvington

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md-p-Conrad Yelvington

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intentpkgfinal7770...	274KB	Microsoft Word Doc...	8/24/01 2:21 PM
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intentpkgfinal7770...	284KB	Microsoft Word Doc...	8/17/01 1:38 PM
paint chips	74KB	Microsoft Word Doc...	8/17/01 11:39 AM
62-204	23KB	Microsoft Word Doc...	8/10/01 3:52 PM
intentpkgfinal7770...	265KB	Microsoft Word Doc...	8/10/01 3:49 PM
ideas010807	24KB	Microsoft Word Doc...	8/8/01 4:55 PM
noreasonableassur...	40KB	Microsoft Word Doc...	7/13/01 5:24 PM
noreasonablassura...	44KB	Microsoft Word Doc...	7/13/01 2:52 PM
lefflerlogic	44KB	Microsoft Word Doc...	7/13/01 11:04 AM
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intentpkgfinal7770...	255KB	Microsoft Word Doc...	7/5/01 3:45 PM
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May 14 2d rai	26KB	Microsoft Word Doc...	5/15/01 9:10 AM
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April 03	21KB	Microsoft Word Doc...	4/4/01 4:29 PM
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cydisummary010306	46KB	Microsoft Word Doc...	3/8/01 8:36 AM
010118warningletter	27KB	Microsoft Word Doc...	2/1/01 3:43 PM
memo010117	22KB	Microsoft Word Doc...	1/18/01 10:54 AM
MEMO010117	24KB	Microsoft Word Tem...	1/17/01 1:23 PM
MEMO001114	21KB	Microsoft Word Tem...	11/14/00 4:42 PM
ABMspreadsheet	28KB	Microsoft Excel Wor...	11/14/00 10:24 AM
mwmotofile 001016	22KB	Microsoft Word Doc...	10/17/00 10:35 AM
October 6 incompl...	32KB	Microsoft Word Doc...	10/16/00 9:24 AM
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REVIEW
PUBLICATIONS, INC.

Published Weekly
Clearwater, Pinellas County, Florida

COUNTY OF HILLSBOROUGH

S.S.

STATE OF FLORIDA

Before the undersigned authority personally appeared James F. Bailey, Jr. who on oath says that he is Publisher of the Tampa Bay Review, a weekly newspaper published at Clearwater in Pinellas County, Florida; that the attached copy of advertisement,

being a Notice of Intent to Issue Air Construction Permit

in the matter of Draft Air Construction Permit No.: 7770473-004-AC

in the ________ Court, was published in said newspaper in the

issues of September 7, 2001

Affiant further says that the said Tampa Bay Review is a newspaper published at Clearwater, Pinellas County, Florida, and that the said newspaper has heretofore been continuously published and has been entered as second-class matter at the Post Office in Clearwater in said Pinellas County, Florida, for a period of one year next preceding the first publication of the attached copy of advertisement; and affiant further says that he has neither paid nor promised any person, firm or corporation any discount, rebate, commission or refund for the purpose of securing this advertisement for publication in said newspaper.

James F. Bailey, Jr.

Sworn to and subscribed before me this

7th day of September A.D. 2001,
by James F. Bailey, Jr., who is personally known to me.

Diana Campbell

Diana Campbell Notary Public, State of Florida

Diana Campbell
My Commission CC887125
Expires December 4, 2003
(SEAL)

RECEIVED
SEP 14 2001
BUREAU OF AIR REGULATION

STATE OF FLORIDA, DEPARTMENT OF ENVIRONMENTAL PROTECTION
PUBLIC NOTICE OF INTENT TO ISSUE AIR CONSTRUCTION PERMIT

CONRAD YELVINGTON DISTRIBUTORS, INC.
DRAFT AIR CONSTRUCTION PERMIT NO. 7770473-004-AC
STATEWIDE RELOCATABLE FACILITY

The Department of Environmental Protection (Department) gives notice of its intent to issue an air construction permit to Conrad Yelvington Distributors, Inc., for a relocatable diesel engine powered Powerscreen "Chieftain 510" scalper/screener/classifier unit and associated conveyors that will be operated at construction and industrial sites throughout Florida. The facility is a minor source of air pollution and not subject to the Prevention of Significant Deterioration (PSD) regulations at Rule 62-212.400, Florida Administrative Code (F.A.C.). A Best Available Control Technology determination was not required for this operation. The applicant's name and address are: Conrad Yelvington Distributors, Inc., 2326 Bellevue Road, Daytona Beach, Florida 32114.

The facility has been reviewed for potential operation in all counties of Florida. The facility will emit fugitive particulate matter emissions; and, the diesel fuel firing will generate small amounts of the products of combustion.

The scalper/screener/classifier is allowed to process sand, gravel, crushed stone, and recycled asphalt pavement at a maximum rate of 550 tons per hour, for 16 hours per day and 300 days per calendar year. The total material that can be processed is 2,640,000 tons per calendar year.

The processing of spent abrasive blast media (ABM), not otherwise classified as hazardous waste, is authorized up to 23,000 tons per calendar year. The operation throughput is limited to 80 tons per hour, and the hours of operation are limited to 200 hours per calendar year in Hillsborough County. An additional 100 hours per calendar year is allowed for the processing of spent ABM elsewhere throughout the state in counties authorized in Appendix PC. No additional materials are authorized. Consideration of additional materials for processing requires an air construction permit.

Control of process particulate matter will be accomplished by wetting the material as needed at unloading and conveyor transfer points, as well as the haul roads and stockpiles. Because of the low emissions and limited time of operation at any one site, the facility will not cause or contribute to any violation of an ambient air quality standard.

The Department will issue the Final permit, in accordance with the conditions of the Draft permit, unless a response received in accordance with the following procedures results in a different decision or significant change of terms or conditions.

The Department will accept written comments concerning the proposed Draft permit issuance action for a period of 14 (fourteen) days from the date of publication of this Notice. Written comments should be provided to the Department's Bureau of Air Regulation, 2600 Blair Stone Road, Mail Station #5505, Tallahassee, Florida 32399-2400. Any written comments filed shall be made available for public inspection. If written comments received result in a significant change in this Draft permit, the Department shall issue a Revised Draft permit and require, if applicable, another Public Notice.

The Department will issue the Final permit with the conditions of the Draft permit unless a timely petition for an administrative hearing is filed pursuant to Sections 120.569 and 120.57, Florida Statutes (F.S.). Mediation is not available for this action. The procedures for petitioning for a hearing are set forth below.

A person whose substantial interests are affected by the Department's proposed permitting decision may petition for an administrative hearing in accordance with Sections 120.569 and 120.57, F.S. The petition must contain the information set forth below and must be filed (received) in the Office of General Counsel of the Department, 3900 Commonwealth Boulevard, Mail Station #35, Tallahassee, Florida, 32399-3000 (telephone: 850/488-9370; fax: 850/487-4938). Petitions must be filed within fourteen days of publication of the public notice or within fourteen days of receipt of this notice of intent, whichever occurs first. A petitioner must mail a copy of the petition to the applicant at the address indicated above, at the time of filing. The failure of any person to file a petition within the appropriate time period shall constitute a waiver of that person's right to request an administrative determination (hearing) under Sections 120.569 and 120.57, F.S., or to intervene in this proceeding and participate as a party to it. Any subsequent intervention will be only at the approval of the presiding officer upon the filing of a motion in compliance with Rule 28-5.207, F.A.C.

A petition must contain the following information: (a) The name, address, and telephone number of each petitioner, the applicant's name and address, the Permit File Numbers and the county in which the project is proposed; (b) A statement of how and when each petitioner received notice of the Department's action or proposed action; (c) A statement of how each petitioner's substantial interests are affected by the Department's action or proposed action; (d) A statement of the material facts disputed by petitioner, if any; (e) A statement of facts that the petitioner contends warrant reversal or modification of the Department's action or proposed action; (f) A statement identifying the rules or statutes that the petitioner contends require reversal or modification of the Department's action or proposed action; and, (g) A statement of the relief sought by the petitioner, stating precisely the action that the petitioner wants the Department to take with respect to the Department's action or proposed action addressed in this notice of intent.

Because the administrative hearing process is designed to formulate final agency action, the filing of a petition means that the Department's final action may be different from the position taken by it in this notice of intent. Persons whose substantial interests will be affected by any such final decision of the Department on the application have the right to petition to become a party to the proceeding, in accordance with the requirements set forth above.

Copies of the proposed construction permit and the technical evaluation are available for public inspection during normal business hours, 8:00 a.m. to 5:00 p.m., Monday, through Friday, except legal holidays, at:

Florida Dept. of
Environmental Protection
Bureau of Air Regulation
111 S. Magnolia Drive, Suite 4
Tallahassee, Florida 32301
Telephone: 850/488-0114

Florida Dept. of
Environmental Protection
Central District Office
3319 Maguire Boulevard, Suite 232
Orlando, Florida 32803
Telephone: 407/894-7555

Orange County
Environmental Protection
Department - Air Program Section
800 Mercy Drive
Orlando, Florida 32808
Telephone: 407/836-1400

Florida Dept. of
Environmental Protection
Northwest District Office
160 Governmental Center
Pensacola, Florida 32501
Telephone: 850/595-8300

Florida Dept. of
Environmental Protection
Northeast District Office
7825 Baymeadows Way, Suite 200B
Jacksonville, Florida 32256
Telephone: 904/807-3300

Florida Dept. of
Environmental Protection
Southwest District Office
3804 Coconut Palm Drive
Tampa, Florida 33619
Telephone: 813/744-6100

Florida Dept. of
Environmental Protection
Southeast District Office
400 North Congress Avenue
West Palm Beach, Florida 33416
Telephone: 561/681-6755

Florida Dept. of
Environmental Protection
South District Office
2295 Victoria Avenue, Suite 364
Fort Myers, Florida 33902
Telephone: 941/332-6975

Broward County Department of
Natural Resource Protection
218 Southwest First Avenue
Fort Lauderdale, Florida 33301
Telephone: 954/519-1202

Dade County Department of
Environmental Resources Management
33 Southwest Second Avenue, Suite 900
Miami, Florida 33130
Telephone: 305/372-6925

Regulatory and Environmental
Services Department
117 West Duval Street, Suite 225
Jacksonville, Florida 32202
Telephone: 904/630-3484

Hillsborough County Environmental
Protection Commission
1410 North 21 Street
Tampa, Florida 33605
Telephone: 813/272-5530

Palm Beach County Health Department
901 Evernia Street
Post Office Box 29
West Palm Beach, Florida 33401
Telephone: 561/355-3070

Pinellas County Department of
Environmental Management
300 South Garden Avenue
Clearwater, Florida 33756
Telephone: 727/464-4422

Sarasota County Natural Resources
Department
1301 Cattleman Road, Building A
Sarasota, Florida 34232
Telephone: 941/378-6128

The complete project file, which includes the application, technical evaluation, Draft construction permit, and information submitted by the applicant, exclusive of confidential records under Section 403.111, F.S., is available in the office of the permitting authority in Tallahassee. Interested persons may contact William Leffler, P.E., project engineer, at 111 South Magnolia Drive, Suite 4, Tallahassee, Florida 32301, or call 850/921-9522, for additional information.

September 7, 2001 01-6602

BEST AVAILABLE COPY

ENVIRONMENTAL PROTECTION COMMISSION HILLSBOROUGH COUNTY

ADMINISTRATIVE OFFICES, LEGAL & WATER MANAGEMENT DIVISION
1900 - 9TH AVENUE
TAMPA, FLORIDA 33605
TELEPHONE (813) 272-5960
FAX (813) 272-5157

AIR MANAGEMENT DIVISION
TELEPHONE (813) 272-5530
WASTE MANAGEMENT DIVISION
TELEPHONE (813) 272-5788
WETLANDS MANAGEMENT DIVISION
TELEPHONE (813) 272-7104

ENVIRONMENTAL PROTECTION COMMISSION of Hillsborough County

FAX Transmittal Sheet

DATE: 9/10/01

TO: William Leffler

FAX Phone: 850-922-6979 **Voice Phone:**

TOTAL NUMBER OF PAGES INCLUDING THIS COVER PAGE: 7

EPC FAX Transmission Line: (813) 272-5605
For retransmission or any FAX problems, call:
(813) 272-5530 ext. 1288

FROM: Rob Kalch

(Circle applicable section below)

Air Division

-Compliance -Enforcement/Analysis

-Monitoring/Toxics -Permitting

SPECIAL INSTRUCTIONS:

BEST AVAILABLE COPY

ENVIRONMENTAL PROTECTION COMMISSION
HILLSBOROUGH COUNTY

ADMINISTRATIVE OFFICES,
LEGAL & WATER MANAGEMENT DIVISION
THE ROGER P. STEWART ENVIRONMENTAL CENTER
1900 - 9TH AVENUE • TAMPA, FLORIDA 33605
PHONE (813) 272-5960 • FAX (813) 272-5157

AIR MANAGEMENT DIVISION
FAX (813) 272-5605

WASTE MANAGEMENT DIVISION
FAX (813) 276-2256

WETLANDS MANAGEMENT DIVISION
FAX (813) 272-7144

1410 N. 21ST STREET • TAMPA, FLORIDA 33605

September 10, 2001

Mr. C.H. Fancy
Chief, Bureau of Air Regulation
Florida Department of Environmental Protection
3900 Commonwealth Boulevard
Tallahassee, FL 32399-3000

Re: Conrad Yelvington Distributors, Inc.
Co-Review of Draft Air Construction Permit No.: 7770473-004-AC

Dear Mr. Fancy:

Thank you for the opportunity to review and submit comments on the above referenced intent. The Environmental Protection Commission (EPC) of Hillsborough County has reviewed the intent dated August 27, 2001. After reviewing the permit, EPC staff offer the following comments:

1. The Technical Evaluation stated the screener is capable of handling materials down to 3/8 of an inch in diameter. Since the spent ABM has a diameter smaller than 3/8 of an inch, what is being screened from the spent ABM? How are the screenings (material removed from the spent ABM) being disposed of and where? Which industries are being sold the screenings from the spent ABM, and what is it used for? Which industries are being sold the screened material (ABM), what is it used for? Specific Condition No. 16(i) should also require the permittee to record where, and to whom, the material screened from the spent ABM is shipped to as well. EPC staff offer the following language for your consideration:

16(i) If the product is spent ABM: the lot number, laboratory reference reports, and size of the lot; sampling details; when the material was received on site; the producer of the material; when and to where it was shipped after processing; **and, when, and to where the material screened from the spent ABM was shipped after processing.**
16(j) Time of operation, beginning and ending

2. The reasonable precautions listed in Specific Condition No. 10, Section II, Emissions Limiting Standards, should also specify

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the following:

(f) Maximum allowable drop heights,
(g) Minimization of the use of front end loaders,
(h) Speed limits for trucks while on site,
(i) Covering all trucks prior to leaving the site,
(j) Curtailing operation if winds are entraining unconfined particulate matter in excess of 5 percent opacity,
(k) Require any storage of the spent ABM to be done on an impermeable surface, and
(l) The use of water spays at each transfer point and drop point associated with the screener.

3. Specific Condition No. 2, Section III, Subsection A, states the screener is authorized to operate 16 hours per day. There have been 17 noise complaints from a low income residential area immediately south logged since 1994 for this facility. Since these types of operations are noisy by their nature, operational restrictions (hours during which the screener may not operate) should be imposed on the facility, while operating at the Cone Road site, to ensure the screening operation will not be a source of noise pollution during the evening and early morning hours. Since some residential areas are near the facility, operating 16 hours per day may not be reasonable. Additionally, specific Condition No. 16 should also require the time of operation not just the duration be recorded (See comment No.1).

4. Specific Condition No. 4, Section III, Subsection A, requires visible emissions testing. EPC staff requests Specific Condition No. 4 require the screening operation to be tested for opacity within Hillsborough County and within the PM maintenance area in order to provide a compliance demonstration that the screening operation can comply with the 5% opacity limitation before being issued an operation permit.

5. Within Hillsborough County, the shipbuilding facilities have been prohibited from using spent abrasive materials. Testing has indicated that the metal concentrations in spent abrasives can exceed the TCLP levels referenced in Technical Evaluation and Specific Condition No. 19. Abrasive materials which have tested positive for metal concentrations which exceed the TCLP levels are required to be handled as a hazardous waste. EPC staff requests the permit require immediate notification, by phone followed by written notification to the solid waste division of the appropriate agency, upon the receipt of any spent ABM which fails the TCLP testing to ensure the material is handled and disposed of in an appropriate manner. The requirements may be added to the requirements listed under Specific Condition No. 19, Section III, Subsection A. EPC staff offer the following language for your consideration:

19(g) The permittee upon receipt of any lot of spent ABM which fails the TCLP testing required by this permit shall

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immediately notify the appropriate agency with jurisdiction over the location that the screener is located at by phone, followed by written notification, identifying the lot and the actions to be taken to properly dispose of the material as a hazardous waste.

6. EPC staff does agree with the restriction that no asbestos containing materials are to be processed. Several facilities within Hillsborough County are restricted from processing asbestos containing materials but must perform a polarized light microscopy test in order to determine if asbestos is present. How is the facility determining if asbestos is present? EPC staff requests that polarized light microscopy be required in Specific Condition No. 32, Section III, Subsection A, in order to demonstrate that no asbestos containing materials are processed. EPC staff request immediate notification, by phone followed by written notification, upon receipt of any asbestos containing materials in order to ensure the material is handled and disposed of in an appropriate manner be added to the requirements listed under Specific Condition No. 32, Section III, Subsection A. EPC staff offer the following language for your consideration:

19(g) The permittee upon receipt of any material which tests positive for the presence of asbestos shall immediately notify the appropriate agency with jurisdiction over the location that the screener is located at by phone, followed by written notification, identifying the material and the actions to be taken to properly dispose of the material in an appropriate manner.

There are a couple of issues that need to be addressed which do not fall within the realm of air permitting. One is the solid waste issues associated with handling this material. The facility needs to acquire a Director's Authorization from the solid waste division of the EPC before handling this material. Please direct the permittee to contact Mr. Ron Cope (813) 272-5530, ext. 1292 in order get a Director's Authorization. The second issue is the handling of the material and any impacts there may be on the groundwater cleanup at the site. Please direct the permittee to contact Mr. Mike Gonsalves at the Southwest District of the Florida Department of Environmental Protection at (813) 744-6100, ext. 376. EPC staff wishes to thank you again for the opportunity to comment on this project.

If you have any questions, please call me or any of the air permitting staff at (813) 272-5530.

BEST AVAILABLE COPY

Sincerely,

Jerry Campbell

Jerry Campbell, P.E.
Director
Air Management Division

Enclosures

rsk

cc: Gerald J. Kissel, P.E., FDEP, SW-District
William C. Thomas, III, Conrad Yelvington Distributors, Inc.

Brooks & Associates, Inc.
5068 NW 85th Rd.
Coral Springs, FL 33067

Mr. Bill Leffler, PE
FDEP Air Resources Mgmt
2600 Blair Stone RD MS 5500
Tallahassee FL 32399-2400

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FINANCIAL NEWS &

Daily Record

PROOF OF PUBLICATION

(Published Daily Except Saturday and Sunday)
Jacksonville, Duval County, Florida

STATE OF FLORIDA,
} SS:
COUNTY OF DUVAL,

Before the undersigned authority personally appeared James F. Bailey, Jr., who on oath says that he is the Publisher of FINANCIAL NEWS and DAILY RECORD, a daily (except Saturday and Sunday) newspaper published at Jacksonville, in Duval County, Florida; that the attached copy of advertisement, being a Public Notice of Intent to Issue Air Construction Permit

in the matter of Permit #7770473-004-AC

in the __________ Court, of Duval County, Florida, was published in said newspaper in the issues of September 7, 2001

Affiant further says that the said FINANCIAL NEWS and DAILY RECORD is a newspaper at Jacksonville, in said Duval County, Florida, and that the said newspaper has heretofore been continuously published in said Duval County, Florida, each day (except Saturday and Sunday) and has been entered as second class matter at the post office in Jacksonville, in said Duval County, Florida, for a period of one year next preceding the first publication of the attached copy of advertisement; and affiant further says that he has neither paid nor promised any person, firm or corporation any discount, rebate, commission or refund for the purpose of securing this advertisement for publication in said newspaper.

Publisher

Sworn to and subscribed before me this day of September 7, 2001

RECEIVED
SEP 14 2001
BUREAU OF AIR REGULATION

ANGELA DEGNER
Notary Public, State of Florida
My comm. expires April 10, 2005
Comm. No. DD 017056

Angela Degner
Notary Signature

Angela Degner
Notary Public
DD017056

seal

James F. Bailey, Jr. personally known to me

STATE OF FLORIDA
DEPARTMENT OF
ENVIRONMENTAL PROTECTION
PUBLIC NOTICE OF INTENT
TO ISSUE
AIR CONSTRUCTION PERMIT
CONRAD YELVINGTON
DISTRIBUTORS, INC.
DRAFT AIR CONSTRUCTION
PERMIT NO.: 7770473-004-AC
STATEWIDE
RELOCATABLE FACILITY

The Department of Environmental Protection (Department), gives notice of its intent to issue an air construction permit to Conrad Yelvington Distributors, Inc., for a relocatable diesel engine powered Powerscreen "Chieftain 510" scalper/screener/classifier unit and associated conveyors that will be operated at construction and industrial sites throughout Florida. The facility is a minor source of air pollution and not subject to the Prevention of Significant Deterioration (PSD) regulations at Rule 62-212.400, Florida Administrative Code (F.A.C.). A Best Available Control Technology determination was not required for this operation. The applicant's name and address are: Conrad Yelvington Distributors, Inc., 2326 Bellevue Road, Daytona Beach, Florida 32114.

The facility has been reviewed for potential operation in all counties of Florida. The facility will emit fugitive particulate matter emissions; and, the diesel fuel firing will generate small amounts of the products of combustion.

The scalper/screener/classifier is allowed to process sand, gravel, crushed stone, and recycled asphalt pavement at a maximum rate of 550 tons per hour, for 16 hours per day and 300 days per calendar year. The total material that can be processed is 2,640,000 tons per calendar year.

The processing of spent abrasive blast media (ABM), not otherwise classified as hazardous waste, is authorized up to 23,000 tons per calendar year. The operation throughout is limited to 80 tons per hour, and the hours of operation are limited to 200 hours per calendar year in Hillsborough County. An additional 100 hours per calendar year is allowed for the processing of spent ABM elsewhere throughout the state in counties authorized in Appendix PC. No additional materials are authorized. Consideration of additional materials for processing requires an air construction permit.

Control of process particulate matter will be accomplished by wetting the material as needed at unloading and conveyor transfer points, as well as the haul roads and stockpiles. Because of the low emissions and limited time of operation at any one site, the facility will not cause or contribute to any violation of an ambient air quality standard.

The Department will issue the Final permit, in accordance with the conditions of the Draft permit, unless a response received in accordance with the following procedures results in a different decision or significant change of terms or conditions.

The Department will accept written comments concerning the proposed Draft permit issuance action for a period of 14 (fourteen) days from the date of publication of this Notice. Written comments should be provided to the Department's Bureau of Air Regulation, 2600 Blair Stone Road, Mail Station #5505, Tallahassee, Florida 32399-2400. Any written comments filed shall be made available for public inspection. If written comments received result in a significant change in this Draft permit, the Department shall issue a Revised Draft permit and require, if applicable, another Public Notice.

The Department will issue the Final permit with the conditions of the Draft permit unless a timely petition for an administrative hearing is filed pursuant to Sections 120.569 and 120.57, Florida Statutes (F.S.). Mediation is not available for this action. The procedures for petitioning for a hearing are set forth below.

A person whose substantial interests are affected by the Department's proposed permitting decision may petition for an administrative hearing in accordance with Sections 120.569 and 120.57, F.S. The petition must contain the information set forth below and must be filed (received) in the Office of General Counsel of the Department, 3900 Commonwealth Boulevard, Mail Station #35, Tallahassee, Florida 32399-3000 (telephone: 850/488-9370; fax: 850/487-4938). Petitions must be filed within fourteen days of publication of the public notice or within fourteen days of receipt of this notice of intent, whichever occurs first. A petitioner must mail a copy of the petition to the applicant at the address indicated above at the time of filing. The failure of any person to file a petition within the appropriate time period shall constitute a waiver of that person's right to request an administrative determination (hearing) under Section 120.569, and 120.57, FS, or to intervene in this proceeding and participate as a party to it. Any subsequent intervention will be only at the approval of the presiding officer upon the filing of a motion in compliance with Rule 28-5.207, F.A.C.

A petition must contain the following information: (a) The name, address, and telephone number of each petitioner, the applicant's name and address, the Permit File Numbers and the county in which the project is proposed; (b) A statement of how and when each petitioner received notice of the Department's action or proposed action; (c) A statement of how each petitioner's substantial interests are affected by the Department's action or proposed action; (d) A statement of the material facts disputed by petitioner, if any; (e) A statement of the facts that the petitioner contends warrant reversal or modification of the Department's action or proposed action; (f) A statement identifying the rules or statutes that the petitioner contends require reversal or modification of the Department's action or proposed action; and, (g) A statement of the relief sought by the petitioner, stating precisely the action that the petitioner wants the Department to take with respect to the Department's action or proposed action addressed in this notice of intent.

Because the administrative hearing process is designed to formulate final agency action, the filing of a petition means that the Department's final action may be different from the position taken by it in this notice of intent. Persons whose substantial interests will be affected by any such final decision of the Department on the application have the right to petition to become a party to the proceeding, in accordance with the requirements set forth above.

Copies of the proposed construction permit and the technical evaluation are available for public inspection during normal business hours, 8:00 a.m. to 5:00 p.m., Monday through Friday, except legal holidays, at:

Florida Dept. of Environmental Protection
Bureau of Air Regulation
111 S. Magnolia Drive, Suite 4
Tallahassee, Florida 32301
Telephone: 850/488-01114

Florida Dept. of Environmental Protection
Northwest District Office
160 Governmental Center
Pensacola, Florida 32501
Telephone: 850/595-8300

Florida Dept. of Environmental Protection
Southeast District Office
400 North Congress Avenue
West Palm Beach, Florida 33416
Telephone: 561/681-6755

Dade County Department of Environmental Resources Management
33 Southwest Second Avenue, Suite 900
Miami, Florida 33130
Telephone: 305/372-6925

Palm Beach County Health Department
901 Evernia Street
Post Office Box 29
West Palm Beach, Florida 33401
Telephone: 561/355-3070

Florida Dept. of Environmental Protection
Central District Office
3319 Maguire Boulevard, Suite 232
Orlando, Florida 32803
Telephone: 407/894-7555

Florida Dept. of Environmental Protection
Northeast District Office
7825 Baymeadows Way, Suite 200B
Jacksonville, Florida 32256
Telephone: 904/807-3300

Florida Dept. of Environmental Protection
South District Office
2295 Victoria Avenue, Suite 364
Fort Myers, Florida 33902
Telephone: 941/332-6975

Regulatory and Environmental Services Department
117 West Duval Street, Suite 225
Jacksonville, Florida 32202
Telephone: 904/630-3484

Pinellas County Department of Environmental Management
300 South Garden Avenue
Clearwater, Florida 33756
Telephone: 727/464-4422

Orange County Environmental Protection Department-Air Program Section
800 Mercy Drive
Orlando, Florida 32808
Telephone: 407/836-1400

Florida Dept. of Environmental Protection
Southwest District Office
3804 Coconut Palm Drive
Tampa, Florida 33619
Telephone: 813/744-6100

Broward County Department of Natural Resource Protection
218 Southwest First Avenue
Fort Lauderdale, Florida 33301
Telephone: 954/519-1202

Hillsborough County Environmental Protection Commission
1410 North 21 Street
Tampa, Florida 33605
Telephone: 813/272-5530

Sarasota County Natural Resources Department
1301 Cattleman Road, Building A
Sarasota, Florida 34232
Telephone: 941/378-6128

The complete project file, which includes the application, technical evaluation, Draft construction permit, and information submitted by the applicant, exclusive of confidential records under Section 403.111, F.S., is available in the office of the permitting authority in Tallahassee. Interested persons may contact William Leffler, P.E., project engineer, at 111 South Magnolia Drive, Suite 4, Tallahassee, Florida 32301, or call 850/921-9522, for additional information.

Sept. 7 (01-6484)

Orlando Business Journal

Orlando Business Journal

Published Weekly
Orlando, Orange County, Florida

STATE OF FLORIDA
COUNTIES OF ORANGE, SEMINOLE, OSCEOLA, LAKE, VOLUSIA & BREVARD

Before the undersigned authority personally appeared Marti McKeown, who states that she is Business Manager of Orlando Business Journal, a weekly newspaper published at Orlando in Orange, Seminole, Osceola, Lake, Volusia and Brevard Counties, Florida; that the attached copy of advertisement, being a Notice of Intent in the matter of Conrad Yelvington Distributors, Inc., was published in said newspaper in the issue of September 14, 2001.

Affiant further says that the said Orlando Business Journal is a newspaper published at Orlando in said Orange, Seminole, Osceola, Lake, Volusia and Brevard Counties, Florida, and that the said newspaper has heretofore been continuously published in said Orange, Seminole, Osceola, Lake, Volusia and Brevard Counties, Florida each week and has been entered as second-class mail matter at the post office in Orlando, in said Orange County, Florida for a period of one year next preceding the first publication of the attached copy of advertisement; and affiant further says that she has neither paid nor promised any person, firm or corporation any discount, rebate, commission or refund for the purpose of securing this advertisement for publication in the said newspaper.

Sworn to and subscribed before me this 14th day of September, 2001, by Marti McKeown, who is personally known to me.

Marti McKeown
Marti McKeown, Business Manager

Judy L. Dwyer
Judy L. Dwyer, Notary

STATE OF FLORIDA NOTARY PUBLIC
JUDY L. DWYER
My Comm Exp. 3/14/04
No. CC 918429
[✓] Personally Known [ ] Other I.D.

315 East Robinson Street, Suite 250, Orlando, Florida 32801-4323 Phone: 407-649-8470 Fax: 407-649-8469 News Fax: 407-420-1625

Orlando Business Journal

STATE OF FLORIDA, DEPARTMENT OF ENVIRONMENTAL PROTECTION PUBLIC NOTICE OF INTENT TO ISSUE AIR CONSTRUCTION PERMIT

Conrad Yelvington Distributors, Inc.
Draft Air Construction Permit No.: 7770473-004-AC
Statewide Relocatable Facility

The Department of Environmental Protection (Department) gives notice of its intent to issue an air construction permit to Conrad Yelvington Distributors, Inc., for a relocatable diesel engine powered Powerscreen "Chieftain 510" scalper/screener/classifier unit and associated conveyors that will be operated at construction and industrial sites throughout Florida. The facility is a minor source of air pollution and not subject to the Prevention of Significant Deterioration (PSD) regulations at Rule 62-212.400, Florida Administrative Code (F.A.C). A Best Available Control Technology determination was not required for this operation. The applicant's name and address are: Conrad Yelvington Distributors, Inc., 2326 Bellevue Road, Daytona Beach, Florida 32114.

The facility has been reviewed for potential operation in all counties of Florida. The facility will emit fugitive particulate matter emissions; and, the diesel fuel firing will generate small amounts of the products of combustion.

The scalper/screener/classifier is allowed to process sand, gravel, crushed stone, and recycled asphalt pavement at a maximum rate of 550 tons per hour, for 16 hours per day and 300 days per calendar year. The total material that can be processed is 2,640,000 tons per calendar year.

The processing of spent abrasive blast media (ABM), not otherwise classified as hazardous waste, is authorized up to 23,000 tons per calendar year. The operation throughput is limited to 80 tons per hour, and the hours of operation are limited to 200 hours per calendar year in Hillsborough County. An additional 100 hours per calendar year is allowed for the processing of spent ABM elsewhere throughout the state in counties authorized in Appendix PC: No additional materials are authorized. Consideration of additional materials for processing requires an air construction permit.

Control of process particulate matter will be accomplished by wetting the material as needed at unloading and conveyor transfer points, as well as the haul roads and stockpiles. Because of the low emissions and limited time of operation at any one site, the facility will not cause or contribute to any violation of an ambient air quality standard.

The Department will issue the Final permit, in accordance with the conditions of the Draft permit, unless a response received in accordance with the following procedures results in a different decision or significant change of terms or conditions.

The Department will accept written comments concerning the proposed Draft permit issuance action for a period of 14 (fourteen) days from the date of publication of this Notice. Written comments should be provided to the Department's Bureau of Air Regulation, 2600 Blair Stone Road, Mail Station #5505, Tallahassee, Florida 32399-2400. Any written comments filed shall be made available for public inspection. If written comments received result in a significant change in this Draft permit, the Department shall issue a Revised Draft permit and require, if applicable, another Public Notice.

The Department will issue the Final permit with the conditions of the Draft permit unless a timely petition for an administrative hearing is filed pursuant to Sections 120.569 and 120.57, Florida Statutes (F.S.). Mediation is not available for this action. The procedures for petitioning for a hearing are set forth below.

A person whose substantial interests are affected by the Department's proposed permitting decision may petition for an administrative hearing in accordance with Sections 120.569 and 120.57, F.S. The petition must contain the information set forth below and must be filed (received) in the Office of General Counsel of the Department, 3900 Commonwealth Boulevard, Mail Station #35, Tallahassee, Florida 32399-3000 (telephone: 850/488-9370; fax: 850/487-4938). Petitions must be filed within fourteen days of publication of the public notice or within fourteen days of receipt of this notice of intent, whichever occurs first. A petitioner must mail a copy of the petition to the applicant at the address indicated above, at the time of filing. The failure of any person to file a petition within the appropriate time period shall constitute a waiver of that person's right to request an administrative determination (hearing) under Sections 120.569 and 120.57, F.S., or to intervene in this proceeding and participate as a party to it. Any subsequent intervention will be only at the approval of the presiding officer upon the filing of a motion in compliance with Rule 28-5.207, F.A.C.

A petition must contain the following information: (a) The name, address, and telephone number of each petitioner, the applicant's name and address, the Permit File Numbers and the county in which the project is proposed; (b) A statement of how and when each petitioner received notice of the Department's action or proposed action; (c) A statement of how each petitioner's substantial interests are affected by the Department's action or proposed action; (d) A statement of the material facts disputed by petitioner, if any; (e) A statement of the facts that the petitioner contends warrant reversal or modification of the Department's action or proposed action; (f) A statement identifying the rules or statutes that the petitioner contends require reversal or modification of the Department's action or proposed action; and, (g) A statement of the relief sought by the petitioner, stating precisely the action that the petitioner wants the Department to take with respect to the Department's action or proposed action addressed in this notice of intent.

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Copies of the proposed construction permit and the technical evaluation are available for public inspection during normal business hours, 8:00 a.m. to 5:00 p.m., Monday through Friday, except legal holidays, at:

Florida Dept. of Environmental Protection Bureau of Air Regulation
111 S. Magnolia Drive, Suite 4
Tallahassee, Florida 32301
Telephone: 850/488-0114

Florida Dept. of Environmental Protection Central District Office
3319 Maguire Boulevard, Suite 232
Orlando, Florida 32803
Telephone: 407/894-7555

Orange County Environmental Protection Department – Air Program Section
800 Mercy Drive
Orlando, Florida 32808
Telephone: 407/836-1400

Florida Dept. of Environmental Protection Northwest District Office
160 Governmental Center
Pensacola, Florida 32501
Telephone: 850/595-8300

Florida Dept. of Environmental Protection Northeast District Office
7825 Baymeadows Way, Suite 200B
Jacksonville, Florida 32256
Telephone: 904/807-3300

Florida Dept. of Environmental Protection Southwest District Office
3804 Coconut Palm Drive
Tampa, Florida 33619
Telephone: 813/744-6100

Florida Dept. of Environmental Protection Southeast District Office
400 North Congress Avenue
West Palm Beach, Florida 33416
Telephone: 561/681-6755

Florida Dept. of Environmental Protection South District Office
2295 Victoria Avenue, Suite 364
Fort Myers, Florida 33902
Telephone: 941/332-6975

Broward County Department of Natural Resource Protection
218 Southwest First Avenue
Fort Lauderdale, Florida 33301
Telephone: 954/519-1202

Dade County Department of Environmental Resources Management
33 Southwest Second Avenue, Suite 900
Miami, Florida 33130
Telephone: 305/372-6925

Regulatory and Environmental Services Department
117 West Duval Street, Suite 225
Jacksonville, Florida 32202
Telephone: 904/630-3484

Hillsborough County Environmental Protection Commission
1410 North 21 Street
Tampa, Florida 33605
Telephone: 813/272-5530

Palm Beach County Health Department
901 Evernia Street
Post Office Box 29
West Palm Beach, Florida 33401
Telephone: 561/355-3070

Pinellas County Department of Environmental Management
300 South Garden Avenue
Clearwater, Florida 33756
Telephone: 727/464-4422

Sarasota County Natural Resources Department
1301 Cattleman Road, Building A
Sarasota, Florida 34232
Telephone: 941/378-6128

The complete project file, which includes the application, technical evaluation, Draft construction permit, and information submitted by the applicant, exclusive of confidential records under Section 403.111, F.S., is available in the office of the permitting authority in Tallahassee. Interested persons may contact William Leffler, P.E., project engineer, at 111 South Magnolia Drive, Suite 4, Tallahassee, Florida 32301, or call 850/921-9522, for additional information.

September 14, 2001

State of Florida
Department of Environmental Protection

TO:	Clair Fancy
THRU:	Bruce Mitchell
FROM:	William Leffler, P.E.
DATE:	October 11, 2001
SUBJECT:	**Final Determination** **Conrad Yelvington Distributors, Inc.** **Permit No.: 7770473 - 004 -AC** **<u>Powerscreen Chieftain (for use with spent ABM and other materials)</u>**

FINAL DETERMINATION

1. An intent to issue and a draft construction permit were clerked in the Tallahassee office on August 27, 2001.

2. The applicant arranged for publication of the appropriate notice as follows:

NEWSPAPER	COUNTY(S) OF PUBLICATION	PUBLICATION DATE
Tampa Bay Review	Hillsborough	September 7, 2001
Financial News and Daily Record	Duval	September 7, 2001
Orlando Business Journal	Orange, Seminole, Osceola, Lake, Volusia and Brevard	September 14, 2001

3. The following comments were received during the comment period allowed by the Public notice. The comment will not be repeated and the Departments response will be in the order of the comments submitted.

(a) <u>Comments from Gerald Kissel, P.E., SWD, received 9/4/01, via e-mail.</u>

(1) Response: The applicant agreed to annual VE testing to provide assurance of compliance with the stricter standards prevailing in the Hillsborough County Maintenance Area for particulate and to alleviate concerns about excessive particulate emissions when processing spent ABM elsewhere than Hillsborough County, and to document compliance against possible nuisance dust complains.

(2) .Response: See part II, paragraph 16 of the draft permit. It is incumbent on the operator to find a suitable site away from a Title V facility or to pursue a Title V permit modification for this additional emission unit/activity.

(b) Comments by Gerald Kissel, P.E., SWD, received 9/5/01, via e-mail.

(1) Response: Comment only. No change will be made.

(2) Response: The draft construction permit contains language that only authorizes setup and testing only and that an operation permit is necessary before commercial operation. See draft construction permit, Part II, paragraph 7.

Response: The throughput limitations are expressed appropriately in the table. No change will be made.

(c) Comments from Rob Kalch, Hillsborough County, received 9/10/01, via e-mail.

(1) Response: Comment only. No change will be made.

(2) Response: The permit contains specific conditions that address the acceptability and the documentation of the processing of the spent ABM. No change will be made.

(3) Response: Comment only. No change will be made.

(d) Comments from Jerry Campbell, Hillsborough County, received 9/10/01, via facsimile.

(1) Response: The 3/8 inch screen was selected to optimize the processing rate, minimize dust production, and make the spent ABM merchantable as an ingredient in portland cement. The cement producers require that the spent ABM be free of small metal scraps, nuts, bolts, cigarette butts, food and food wrappers, paint cans, brushes, masking tape and cleaning materials. This material is retained on the 3/8 screen, while allowing the wetted grit to pass. The entire fraction passing the 3/8 screen is retained for sale and the rejects will be disposed in a manner appropriate for the wastes encountered. CYDI will keep records in its operation log. The proposed Specific condition, new No. 16(j), is reasonable and will be included in the permit as follows:

New No. 16j:

Time of operation, beginning and ending.

(2) Response: These matters have been considered in the initial evaluation. Items (f), (g), and (h) are inherently limited by the nature of the machinery and process. Item (i) is required by DOT rules. Item (j) is inherently covered by the visible emission standard, and it is within the operators discretion whether to cease operations, or to employ extraordinary dust suppression measures should the unconfined particulate matter cause a visible emission to exceed any applicable standard. Items (g), (h), (i) and (k) are not within the jurisdiction of the Division of Air Resources. Item (l) has been carefully considered in the preliminary determination. Experience in similar operations indicates that processing material with an appropriate initial moisture level will effectively suppress dust throughout the several material drops through screens and at conveyor ends. At the same time, the Department recognizes that moisture, in excess of that necessary to suppress dust, creates an abrasive mud that causes excessive wear. It is the operator's burden to apply water for dust suppression at such points and in such a manner, as necessary, to prevent visual emissions from exceeding the applicable standard(s).

(3) Response: We do not regulate noise. However, the 16 hour day was requested to conform with the permitted time allowed for other operations at CYDI's Cone Road site. No change will be made.

(4) Response: The draft permit contemplates initial operation at the Cone Road, Tampa site. Any change of location requires proper notification. If the initial testing is conducted at any other site, CYDI is required to provide Hillsborough County with proper notice for compliance demonstration. No change will be made.

(5) Response: The issue is a solid waste concern. By permit, the facility is not allowed to receive materials not passing the TCLP screening test. No change will be made.

(6) Asbestos containing materials are not allowed to be processed by the permit. No change will be made.

(7) Response: See Response 3.(d)(5), above.

4. Conclusion.

It is recommended that the construction permit, No. 7770473-004-AC, be issued with the changes noted above.

Orlando Business Journal

RECEIVED
OCT 02 2001
BUREAU OF AIR REGULATION

No Attached proof

Orlando Business Journal

Published Weekly
Orlando, Orange County, Florida

STATE OF FLORIDA
COUNTIES OF ORANGE, SEMINOLE, OSCEOLA, LAKE, VOLUSIA & BREVARD

Before the undersigned authority personally appeared Marti McKeown, who states that she is Business Manager of Orlando Business Journal, a weekly newspaper published at Orlando in Orange, Seminole, Osceola, Lake, Volusia and Brevard Counties, Florida; that the attached copy of advertisement, being a Notice of Intent in the matter of Conrad Yelvington Distributors, Inc., was published in said newspaper in the issue of September 14, 2001.

Affiant further says that the said Orlando Business Journal is a newspaper published at Orlando in said Orange, Seminole, Osceola, Lake, Volusia and Brevard Counties, Florida, and that the said newspaper has heretofore been continuously published in said Orange, Seminole, Osceola, Lake, Volusia and Brevard Counties, Florida each week and has been entered as second-class mail matter at the post office in Orlando, in said Orange County, Florida for a period of one year next preceding the first publication of the attached copy of advertisement; and affiant further says that she has neither paid nor promised any person, firm or corporation any discount, rebate, commission or refund for the purpose of securing this advertisement for publication in the said newspaper.

Sworn to and subscribed before me this 14th day of September, 2001, by Marti McKeown, who is personally known to me.

Marti McKeown
Marti McKeown, Business Manager

Judy L. Dwyer
Judy L. Dwyer, Notary

STATE OF FLORIDA NOTARY PUBLIC
JUDY L. DWYER
My Comm Exp. 3/14/04
No. CC 918429
[✓] Personally Known [ ] Other I.D.

State of Florida
Department of Environmental Protection

TO:	Clair Fancy
THRU:	Bruce Mitchell
FROM:	William Leffler, P.E.
DATE:	October 2, 2001
SUBJECT:	**Draft Final Determination** **Conrad Yelvington Distributors, Inc.** **Permit No.: 7770473 - 004 -AC** **Powerscreen Chieftain (for use with spent ABM and other materials)**

DRAFT FINAL DETERMINATION

1. An intent to issue and a draft construction permit were clerked in the Tallahassee office on August 27, 2001.

2. The applicant arranged for publication of the appropriate notice as follows:

NEWSPAPER	COUNTY(S) OF PUBLICATION	PUBLICATION DATE
Tampa Bay Review	Hillsborough	September 7, 2001
Financial News and Daily Record	Duval	September 7, 2001
Orlando Business Journal	Orange, Seminole, Osceola, Lake, Volusia and Brevard	September 14, 2001

3. The following comments were received during the comment period allowed by the Public notice. The comment will not be repeated and the Departments response will be in the order of the comments submitted.

(a) Comments from Gerald Kissel, P.E., SWD, received 9/4/01, via e-mail.

(1) Response: The applicant agreed to annual VE testing to provide assurance of compliance with the stricter standards prevailing in the Hillsborough County Maintenance Area for particulate and to alleviate concerns about excessive particulate emissions when processing spent ABM elsewhere than Hillsborough County, and to document compliance against possible nuisance dust complains.

(2) .Response: See part II, paragraph 16 of the draft permit. It is incumbent on the operator to find a suitable site away from a Title V facility or to pursue a Title V permit modification for this additional emission unit/activity.

(b) Comments by Gerald Kissel, P.E., SWD, received 9/5/01, via e-mail.

(1) Response: Comment only. No change will be made.

(2) Response: The draft construction permit contains language that only authorizes setup and testing only and that an operation permit is necessary before commercial operation. See draft construction permit, Part II, paragraph 7.

Response: The throughput limitations are expressed appropriately in the table. No change will be made.

(c) Comments from Rob Kalch, Hillsborough County, received 9/10/01, via e-mail.

(1) Response: Comment only. No change will be made.

(2) Response: The permit contains specific conditions that address the acceptability and the documentation of the processing of the spent ABM. No change will be made.

(3) Response: Comment only. No change will be made.

(d) Comments from Jerry Campbell, Hillsborough County, received 9/10/01, via facsimile.

(1) Response: The 3/8 inch screen was selected to optimize the processing rate, minimize dust production, and make the spent ABM merchantable as an ingredient in portland cement. The cement producers require that the spent ABM be free of small metal scraps, nuts, bolts, cigarette butts, food and food wrappers, paint cans, brushes, masking tape and cleaning materials. This material is retained on the 3/8 screen, while allowing the wetted grit to pass. The entire fraction passing the 3/8 screen is retained for sale and the rejects will be disposed in a manner appropriate for the wastes encountered. CYDI will keep records in its operation log. The proposed Specific condition, new No. 16(j), is reasonable and will be included in the permit as follows:

New No. 16j:

Time of operation, beginning and ending.

(2) Response: These matters have been considered in the initial evaluation. Items (f), (g), and (h) are inherently limited by the nature of the machinery and process. Item (i) is required by DOT rules. Item (j) is inherently covered by the visible emission standard, and it is within the operators discretion whether to cease operations, or to employ extraordinary dust suppression measures should the unconfined particulate matter cause a visible emission to exceed any applicable standard. Items (g), (h), (i) and (k) are not within the jurisdiction of the Division of Air Resources. Item (l) has been carefully considered in the preliminary determination. Experience in similar operations indicates that processing material with an appropriate initial moisture level will effectively suppress dust throughout the several material drops through screens and at conveyor ends. At the same time, the Department recognizes that moisture, in excess of that necessary to suppress dust, creates an abrasive mud that causes excessive wear. It is the operator's burden to apply water for dust suppression at such points and in such a manner, as necessary, to prevent visual emissions from exceeding the applicable standard(s).

(3) Response: We do not regulate noise. However, the 16 hour day was requested to conform with the permitted time allowed for other operations at CYDI's Cone Road site. No change will be made.

(4) Response: The draft permit contemplates initial operation at the Cone Road, Tampa site. Any change of location requires proper notification. If the initial testing is conducted at any other site, CYDI is required to provide Hillsborough County with proper notice for compliance demonstration. No change will be made.

(5) Response: The issue is a solid waste concern. By permit, the facility is not allowed to receive materials not passing the TCLP screening test. No change will be made.

(6) Asbestos containing materials are not allowed to be processed by the permit. No change will be made.

(7) Response: See Response 3.(d)(5), above.

4. **Conclusion.**

It is recommended that the construction permit, No. 7770473-004-AC, be issued with the changes noted above.

10-2-01 e-mailed to Geoff Smith
(called Becky)
@ 2:35 - she received the FD

State of Florida
Department of Environmental Protection

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THRU:	Bruce Mitchell
FROM:	William Leffler, P.E.
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4. Conclusion.

It is recommended that the construction permit, No. 7770473-004-AC, be issued with the changes noted above.

Memorandum

State of Florida

Department of Environmental Protection

TO: Clair Fancy

THRU: Bruce Mitchell

FROM: William Leffler, PE

DATE: October 23, 2001

SUBJECT **Conrad Yelvington Distributors, Inc.**
Tampa Electric Co.
Woodruff & Sons, Inc.
Florida Crushed Stone, Inc.

I have reviewed a letter dated September 7, from William Kutash, P.E., Solid Waste Administrator in the Southwest District, to Geoff Smith, attorney for Conrad Yelvington Distributors, Inc.

The solid waste section in the Southwest District office is concerned that CYDI will presume our Air Construction Permit is permission for CYDI to start processing spent abrasive blasting media (ABM at the Cone Road specified in our construction permit.

The District is not requiring a full blown waste management facility permit of CYFI, because the concept of beneficial reuse takes the facility out of direct waste jurisdiction. Since the material that they are handling is not a "waste" because of a market for its reuse, the district uses an emption agreement coupled with a commitment to use "best management practices" to create conditions by which it can deal with groundwater and storm-water issues and provide a standard for material handling. Violation of the exemption agreement, or operating without such a site specific agreement, will invoke the same penalties as if the operation was subject to a waste facility permit.

The excerpts from **Tampa Electric Co.'s Woodruff & Sons, Inc.'s and Florida Crushed Stone, Inc.'s** correspondence are suggestions of what needs to be included in the exemption agreement.

While CYDI has an air construction permit, the Southywest District will not permit CYDI to stockpile or process spent ABM until the exemption agreement is completed.

Department of Environmental Protection

Jeb Bush
Governor

Southwest District
3804 Coconut Palm Drive
Tampa, Florida 33619

David B. Struhs
Secretary

September 7, 2001

Geoffery D. Smith, Esq.
Blank, Meenan & Smith, P.A.
Attorneys at Law
P.O. Box 11068
Tallahassee, Florida 32302-3068

Re: Conrad Yelvington Distributors, Inc.

Dear Geoff:

The Department has received your letter dated August 31, 2001 relating to the referenced facility. As you requested I have attached copies of the Department approval letters approving submitted BMP's for both Florida Crushed Stone Company and Woodruff & Sons, Inc. relating to management of only TEC Gannon Station ash for your information.

The Department is currently in the review process relating to the TECO Big Bend Facility bottom ash. At this time the Department has not completed its review due to additional information required from TEC to satisfy the exemption demonstration for industrial by-products. I have attached the Department letter to TEC dated August 31, 2001 identifying the additional information required.

Recently the District was in receipt of an Intent to Issue an Air Construction Permit (DEP File No. 7770473-004-AC) to Conrad Yelvington Distributors Inc. dated August 27, 2001 for the construction of a Powerscreen. The air permit authorizes the processing of 23,000 tons/year of spent abrasive blast medium (ABM) and states the initial testing and operation will begin at 4800 Cone Road, Tampa, Hillsborough County, Florida. At a previous Department meeting with you and your client the Department was informed that after the existing spent abrasive blast medium was removed from the site earlier this year the facility at Cone Road would no longer accept spent abrasive blast medium at the site. The Waste Management Division of the Department has not received a request for a permit or BMP to review storage or staging procedures that your client will implement for the spent abrasive blast medium intended to be accepted, and how leachate discharging from the material will not continue to further contaminate the site.

If you have any questions concerning this letter or attachments you may contact me at 813-744-6100, Ext. 353.

Sincerely,

William Kutash
Waste Program Administrator
Southwest District

Attachments

cc: C. H. Fancy, P.E. Chief, Bureau of Air Regulation
Michael Gonsalves, P.G. – GWCU
Deborah Getzoff, District Manager
Robert Butera, P.E. Solid Waste

"More Protection, Less Process"

Printed on recycled paper.

Department of Environmental Protection

Lawton Chiles
Governor

Southwest District
3804 Coconut Palm Drive
Tampa, Florida 33619

Virginia B. Wetherell
Secretary

August 31, 2001

Tampa Electric
C/O Mr. Robert E. Stafford
Administrator, Environmental Affairs
P.O. Box 111
Tampa, Fla. 33601-0111

RE: Consent Order Paragraph #19, Industrial Byproduct Exemption
OGC Case # -1275, Hillsborough County

Dear Mr. Stafford:

The Department has reviewed your letter submittal of Jul 6, 2001 that was intended to fulfill Tampa Electric Company's (TEC) obligations under the terms of Paragraph #19 in Consent Order # 1275 and has found that additional information is needed by the Department to complete our review of the exemption demonstration for the industrial byproducts generated at TEC's Big Bend facility.

The demonstration of exemption required by Statute and the terms of the Order consist of three criteria. The Departments comments on the submittal referenced above will be categorized into the same three categories.

One of the criteria is "that the industrial byproduct are not hazardous waste as defined under 403.703 and rules adopted under this section". The Department agrees that none of the industrial byproducts identified and tested by TEC are characteristically hazardous or otherwise regulated as a hazardous waste as defined by Statute 403.703 and related rules.

The information and data table submitted to demonstrate compliance with the second criteria "that the majority of the industrial byproducts were sold, used, or reused within one year", did not address all of the industrial waste streams generated at Big Bend and did not contain sufficient waste generation and management data detail to demonstrate that the four types of industrial waste that were identified in the submittal meet the exemption criteria.

While the generic data table submitted indicates that a large portion of the fly ash, slag, bottom ash and gypsum material is sold, the specific points of generation, generation rates, location (and method) of on site material management as well as specific beneficial reuse for each waste type still need to be identified.

For example, is slag, fly and bottom ash waste from all generating units at Big Bend included in the table column titled "Production"? Or do the differing generating units produce various byproducts, at differing rates that are managed in a variety of management units? We understand, for example, that gypsum byproduct is only recovered from selected generating units at Big Bend – what is the generation rate and fate of other "gypsum" waste from these units (or other units) other than the byproduct that is recovered and managed in the storage unit at the south end of the Big Bend site? Is all fly ash generated from all units collected in management units (Silo's?) and does all fly ash generated by TEC go to reuse vendors? We understand that some volume of fly ash waste is directed to disposal in DA2 when "upsets" occur and/or on weekends. Are these disposal amounts included in the "Production" column for fly ash?

Based on the above, the Department request that the byproduct generation rate and specific management units for each waste be identified for each generating unit and that the "disposition" part of table be expanded to indicate volumes disposed of onsite or off site. The table should also identify the specific beneficial reuse of each byproduct (vendor and product).

Several industrial waste streams generated at the Big Bend facility are not included in the byproduct production and disposition table. These include waste such as the gypsum blow down, some slag, bottom ash and similar waste that are collected within the industrial waste water settling pond (Unit #17 on site plan) as wells as the waste accumulating in the "equalizer" fly ash units (number #19 on site plan) and waste placed within the unit known as DA2. Should the Department conclude that TEC does not consider these waste to be industrial byproducts and that the management of these waste at Big Bend in these units should be evaluated as disposal of solid waste?

The final demonstration criteria for these byproducts to be exempt from permitting require that the materials be managed on site so that applicable department environmental standards are not exceeded. Your demonstration letter relies in part on the results of the byproduct sampling and analysis plan submitted to the Department on May 16, 2001. John Morris in our Solid Waste Program has reviewed the May 16th sampling and analysis plan submittal and his comments and request for additional information are attached to this letter. The onsite byproduct management comments included in your letter appear to acknowledge that current and recent management of some of these byproduct materials has resulted in discharges to the environment and /or violation of standards. These discharges and their environmental impact are subject to the on going environmental assessment required under the terms of the Order and many of the current waste management methods and units are proposed to be corrected/modified by TEC in the near future.

For example, the bottom ash management units are being relined and specific management plan (wastewater management and liner protection during mining of byproduct) are being prepared for these pond units. Once the waste management plan is finalized, these units and the bottom ash byproduct they manage would appear to meet the exemption requirements for environmental impact management. The gypsum byproduct characterization, on the other hand, indicates that the byproduct has some pollutant leaching potential and therefore might be a threat to groundwater standards. However, the actual impact of the gypsum byproduct management unit on groundwater is being assessed and evaluated under the terms of the Order so we cannot yet resolve whether the potential to exceed standards is actually or reasonably likely to occur.

The Department therefore believes that TEC's byproduct demonstration will be contingent on the completion of these accessory aspects of byproduct management at Big Bend and a final evaluation of the exemption status of the byproducts by the Department should be delayed until corrective actions, waste management plans and or environmental impact evaluations are completed.

While we have discussed a variety of onsite management options for several of your byproducts and waste management units with various TEC staff, specific proposals to address or resolve either the existing environmental impacts associated with current management of these byproducts or modification of waste management practices designed to prevent future discharges, have not been finalized or implemented. We suggest that a meeting be set to review the current and future status of each of the byproducts generated at the Big Bend facility in light of TEC's proposed management unit plans and the establishment of an understanding between the parties as to how and when these changes will be made and the byproduct demonstration evaluation can conclude. Please contact me at 813 744-6100, ext 353 so that such a meeting can be arranged to occur within thirty days after the date of this letter.

Sincerely,

William Kutash
Environmental Administrator
SWD Waste Division

Cc: Bob Butera
Tim Parker
John Morris
Deborah Getzoff
Richard Tedder,

TO: William Kutash, Waste Program Administrator
THROUGH: Robert Butera, P.E., Solid Waste Section Manager
FROM: John Morris, P.G.
DATE: August 23, 2001
SUBJECT: Tampa Electric Company – Big Bend Station
Combustion By-Products Sampling Report, prepared by Environmental Consulting & Technology, Inc. (ECT), dated May 2001, received May 17, 2001

I have reviewed the above-referenced report that was submitted in compliance with Consent Order No. 00-1275 and have compared the information provided in this submittal with the following items and present my review comments below:

- *Combustion By-Products Sampling Plan, Big Bend Station, Tampa, Florida,* prepared by ECT, dated March 2001, received March 14, 2001;
- Correspondence from FDEP, dated March 8, 2001 that provided conditional approval regarding implementation of the proposed sampling plan to characterize the contents of the southern bottom ash pond at Big Bend Station; and,
- Correspondence from FDEP, dated March 29, 2001 that provided conditional approval regarding implementation of the proposed sampling plan to characterize combustion by-products (bottom ash, fly ash, contents of DA-2, slag, and gypsum) at Big Bend Station.

1. **REPRESENTATIVENESS OF THE BY-PRODUCT CHARACTERIZATION** – It appears that the sampling activities conducted at several of the by-product storage/disposal areas were inconsistent with the proposed sampling plan and/or the DEP conditions, as summarized in the following table:

BY-PRODUCT	PROPOSED SAMPLING ACTIVITIES	DEP APPROVAL CONDITIONS	ECT SAMPLING PLAN REPORT
Bottom ash pond (southern pond)	- Collect samples from 5 random locations along the perimeter of the ash piles by driving pipe 10 feet horizontally into piles and/or - Collect samples from 5 random grid cells at depths of 0-2 and 4-6 feet	Collect continuous samples from the pile surface to within 1 foot of the liner depth	- Collected samples from ash piles in Cells 8 & 10 to depths of 4 feet - Collected samples from 3 "random" cells to depths of about 6 feet where it was indicated that the liner was encountered
Disposal area DA-2B	Collect samples from 5 random grid cells using a small boat as necessary to access areas with standing water at depths of 0-2 and 5-7 feet	Collect composite sample of entire thickness of the material generated by the sampling process	- Collected samples from "random" Cells 6 & 10 from boat to depths of 1-2 feet - Collected samples from "random" Cells 3,5, and 13 from shorelines to depths of 3-4 feet

BY-PRODUCT	PROPOSED SAMPLING ACTIVITIES	DEP APPROVAL CONDITIONS	ECT SAMPLING PLAN REPORT
Disposal area DA-2C	Collect samples from 5 random grid cells using a small boat as necessary to access areas with standing water at depths of 0-2 and 5-7 feet	Collect composite sample of entire thickness of the material generated by the sampling process	Collected samples from 5 "random" cells from boat to depths of 1-2 feet
Slag sluice pond (northern pond)	Collect samples from 5 random grid cells at depths of 0-2 and 5-7 feet	Collect composite sample of entire thickness of the material generated by the sampling process	Collected samples from 5 "random" cells to depths ranging between 4-6 feet, no comment provided to indicate samples were collected through the thickness of the materials
Gypsum storage area	Collect samples from 5 random locations along the perimeter of the gypsum piles by driving pipe 10 feet horizontally into piles	Collect composite sample of entire thickness of the material generated by the sampling process	Collected samples from gypsum piles at 4 "random" perimeter locations to depths of 4 feet

Concerns about the representativeness of the collected by-products samples are summarized below:

- Bottom ash pond – It is unclear why the sampling depths departed from the proposed activities and if the entire ash piles were adequately characterized by the sample depths that were indicated.
- Disposal areas DA-2B and DA-2C – It is unclear why the sampling depths departed from the proposed activities and if the entire thickness of disposed materials were adequately characterized by the sample depths that were indicated.
- Slag sluice pond – It is unclear if the entire thickness of disposed materials was adequately characterized by the sample depths that were indicated.
- Gypsum storage area -- It is unclear why the sampling depths departed from the proposed activities and if the entire gypsum piles were adequately characterized by the sample depths that were indicated.

2. **VARIANCE OF THE BY-PRODUCT ANALYSES** – Tables 2 through 7 of the ECT report summarize the analytical results for the by-product samples. These tables also provide a statistical analysis of sample result variance that is generally consistent with Chapter 9 of the EPA document entitled *Test Methods for Evaluating Solid Waste* (SW-846). It is noted that Tables 2 through 7 contain a number of inconsistencies when compared with the laboratory reports provided in Appendix A. The majority of these inconsistencies are associated with reporting individual parameters at or below the method detection limit. Apparent numerical errors (other than the MDL inconsistencies) that will affect the statistical analyses of sample variance are summarized below:

- Table 2 – Comp. #5, boron should be reported at 0.8 mg/L;
- Table 3 – Flyash-21, molybdenum should be reported at 0.088 mg/L,
  Flyash-36, aluminum should be reported at <0.2 mg/L,
  Flyash-36, beryllium should be reported at <0.004 mg/L; and,

– Table 7 -- GYP11-C, iron should be reported at 0.07 mg/L.

It is noted that except for Table 2 (bottom ash pond) and Table 4B (disposal area DA-2B), the ECT report includes the results of the collected duplicate samples in the statistical analyses. The summary spreadsheets that I prepared as a check of the ECT report purposely excluded the results of the duplicate samples to minimize the potential to skew the characterization of the individual by-products. While this approach provides a different data set for the statistical analysis than used by ECT, it is considered to be more consistent and conservative. Therefore, my spreadsheets provide a different list of parameters for which the upper 95% confidence level exceeds ground water standards/guidance concentrations and for which an inadequate number of samples were analyzed, as summarized below:

BY-PRODUCT	UPPER 95% CONFIDENCE LEVEL EXCEEDS GROUND WATER STANDARDS/CRITERIA	INADEQUATE NUMBER OF SAMPLES ANALYZED TO CHARACTERIZE BY-PRODUCT
Bottom ash pond	Boron	None
Fly ash pond	Aluminum, antimony, boron, manganese, molybdenum, sulfate, and vanadium	Antimony, manganese, molybdenum, sulfate, and vanadium
Disposal area DA-2A	Antimony, boron, fluoride, manganese, molybdenum, and sulfate	Fluoride and molybdenum
Disposal area DA-2B	Antimony, boron, fluoride, manganese, molybdenum, sulfate, and thallium	Antimony, fluoride, manganese, and thallium
Disposal area DA-2C	Antimony, boron, chloride, fluoride, manganese, molybdenum, sulfate, and thallium	Antimony, chloride, manganese, sulfate, and thallium
Fly ash silos	Aluminum, antimony, arsenic, boron, chromium, fluoride, molybdenum, selenium, sulfate, and vanadium	Antimony, arsenic, chromium, fluoride, and vanadium
Slag sluice pond	Boron, manganese, and nickel	Boron, manganese, and nickel
Gypsum pile	Antimony, fluoride, sulfate, and thallium	Antimony, fluoride, and thallium

3. **LEACHING POTENTIAL FOR ON-SITE STORAGE** – The analytical results of the by-product samples and the analysis of sample variance have a direct effect on the investigation of potential impacts related to the by-product storage areas ("environmental comprehensive assessment program"). The assessment of the individual storage areas should include all the parameters for which the 95% confidence level exceeded the ground water standard/guidance concentration, as listed in comment No. 2, above.

4. **LEACHING POTENTIAL FOR OFF-SITE STORAGE/USE** – The ECT report does not address potential leaching impacts from the storage and end use of the by-products at off-site locations that receive the materials from Big Bend Station. Based on the potential for parameters to leach from the by-products and the inadequate characterization of the by-products (see comment No. 2, above), it appears reasonable to require all off-site locations to provide the demonstration required by Section 403.7045(1)(f)2, F.S., that the storage and use of by-products obtained from Big Bend Station do not discharge into any waters or otherwise enter the environment to cause a threat of contamination in excess of applicable standards and criteria.

jrm

Department of
Environmental Protection

Jeb Bush
Governor

Southwest District
3804 Coconut Palm Drive
Tampa, Florida 33619

David B. Struhs
Secretary

August 28, 2001

Woodruff & Sons, Inc.
c/o Mr. Rick Losiniecki
6450 31st St. East
Bradenton, FL 34282-0127

Re: Management Plan - Addendum No. 1
Use and Storage of Dredge, Coal and Coal Ash Byproduct Recycling from the Ash Storage Area at TECO's Gannon Station at Woodruff & Sons, Inc., Tampa Yard, dated July 2001 (received July 27, 2001)

Dear Mr. Losiniecki:

The Department has reviewed Addendum No. 1 to the Best Management Practices (BMPs) outlining your proposal to use TECO Gannon Station ash and industrial dredge material in the manufacturing of soil cement. This Department reuse exemption does not include Ash Byproducts other than those normally collected and stored in the Ash Storage Area at Gannon Station. Section 403.7045(1)(f), Florida Statutes (F.S.), provides that the following wastes or activities are not regulated by the Department as solid waste:

(f) Industrial byproducts, if:

1. A majority of the industrial byproducts are demonstrated to be sold, used, or reused within 1 year.

2. The industrial byproducts are not discharged, deposited, injected, dumped, spilled, leaked, or placed upon any land or water so that such industrial byproducts, or any constituent thereof, may enter other lands or be emitted into the air or discharged into any waters, including groundwater, or otherwise enter the environment such that a threat of contamination in excess of applicable department standards and criteria is caused.

3. The industrial byproducts are not hazardous wastes as defined under §403.703 and rules adopted under this section.

Based upon the information you have submitted in Addendum No. 1, the Department has concluded that, if the conditions set forth below are complied with, this proposed reuse is expected to meet each of the three criteria of the statute and does not require a permit from the Department. Specifically, the Department agrees that the proposed project does constitute the use or reuse of ash and industrial dredge materials; that the ash and industrial dredge materials are not a hazardous waste; and that the proposed reuse BMPs provide adequate assurance that the ash and industrial dredge materials will not be discharged, deposited, injected, dumped, spilled, leaked, or placed upon any land or water so that the waste, or any constituent thereof, may enter other lands or be emitted into the air or discharged into any waters, including ground water, or otherwise enter the environment such that a threat of contamination in excess of applicable department standards and criteria would result. This conclusion is conditional upon your compliance with the BMPs and with the following conditions:

1) The <u>total</u> amount of any byproduct (spent sand blast grit or dredge, coal and coal ash byproduct, or any combination) added shall not exceed 10%, by volume, of the soil cement product;

2) A minimum of 4%, by volume, of Portland cement shall be used in the manufacture of the soil cement;

3) The resulting soil cement shall have a minimum compressive strength of 300 psi;

4) The soil cement shall only be used as a 6-inch to 8-inch thick subbase for road construction and shall be covered by a layer of hot asphalt having a thickness of approximately 1.5 to 2 inches;

5) The soil cement shall be placed above the water table and shall not be used as fill in water bodies;

6) Should there by any reason to believe that the process or operation generating the dredge, coal and coal ash byproduct received from TECO Gannon Station has changed, Woodruff & Sons, Inc., shall test these materials to ensure that are not a characteristic hazardous waste, before receipt at the facility. Woodruff & Sons, Inc., shall maintain records of such testing on site for three years;

7) All byproducts received at the Woodruff & Sons, Inc., Tampa yard shall be weighed to determine tonnage. Byproducts not used within 24 hours of receipt at the mixing area shall be directed to the "Grit Storage Area" shown on the attached Facility Map. In the event of inclement weather, all incoming byproducts shall be directed to the "Grit Storage Area". On site storage of all byproducts shall not exceed 10,000 cubic yards;

8) Leachate collected from the "Grit Storage Area" shall be analyzed for arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver, aluminum, boron, molybdenum, and sulfates to determine proper leachate disposal. Woodruff & Sons, Inc., shall maintain records of leachate testing and documentation of leachate disposal locations on site for three years;

9) Waste quantity reports which detail the quantities of byproducts received, stored and processed (i.e., used on site) shall be maintained at the facility and provided to the Department upon request; and,

10) Woodruff & Sons, Inc., specifically agrees to allow authorized Department personnel, upon presentation of credentials or other documents as may be required by law and at reasonable times, access to the premises where the approved activity is located or conducted to:

(a) Have access to and copy any records provided for in the BMPs or above conditions;

(b) Inspect the facility, equipment, practices, or operations provided for in the BMPs or above conditions; and

(c) Sample or monitor any substances or parameters at any location reasonably necessary to assure compliance with the BMPs, above conditions, or Department rules.

The Department's conclusion that the proposed reuse of ash and industrial dredge materials is exempt from permitting under Section 403.7045(1)(f), F.S., is based upon compliance with the above conditions, and is applicable only for the specific processes and operations set forth in your submittals. If you fail to comply with these conditions and the proposed BMPs, or if you fail to meet any of the three criteria in Section 403.7045(1)(f), F.S., this conclusion will not be binding and the Department may initiate enforcement for disposal of solid waste without a permit.

Qualification for the exemption under Section 403.7045(1)(f), F.S., does not mean that you qualify for exemptions from any other Department or local permits which may be required for this project. It does not authorize any injury to public or private property or any invasion of rights, nor any infringement of federal, State, or local laws or regulations. It does not relieve you from any liability for harm or injury to human health or welfare, animal or plant life, or property caused by the construction or operation of this project, or from penalties therefore, nor does it allow you to cause pollution in contravention of Florida Statutes and Department rules. Finally, this exemption is based upon laws and rules currently in effect; if those laws or rules change in the future, you may be required to comply with those changed laws or rules within a reasonable period of time.

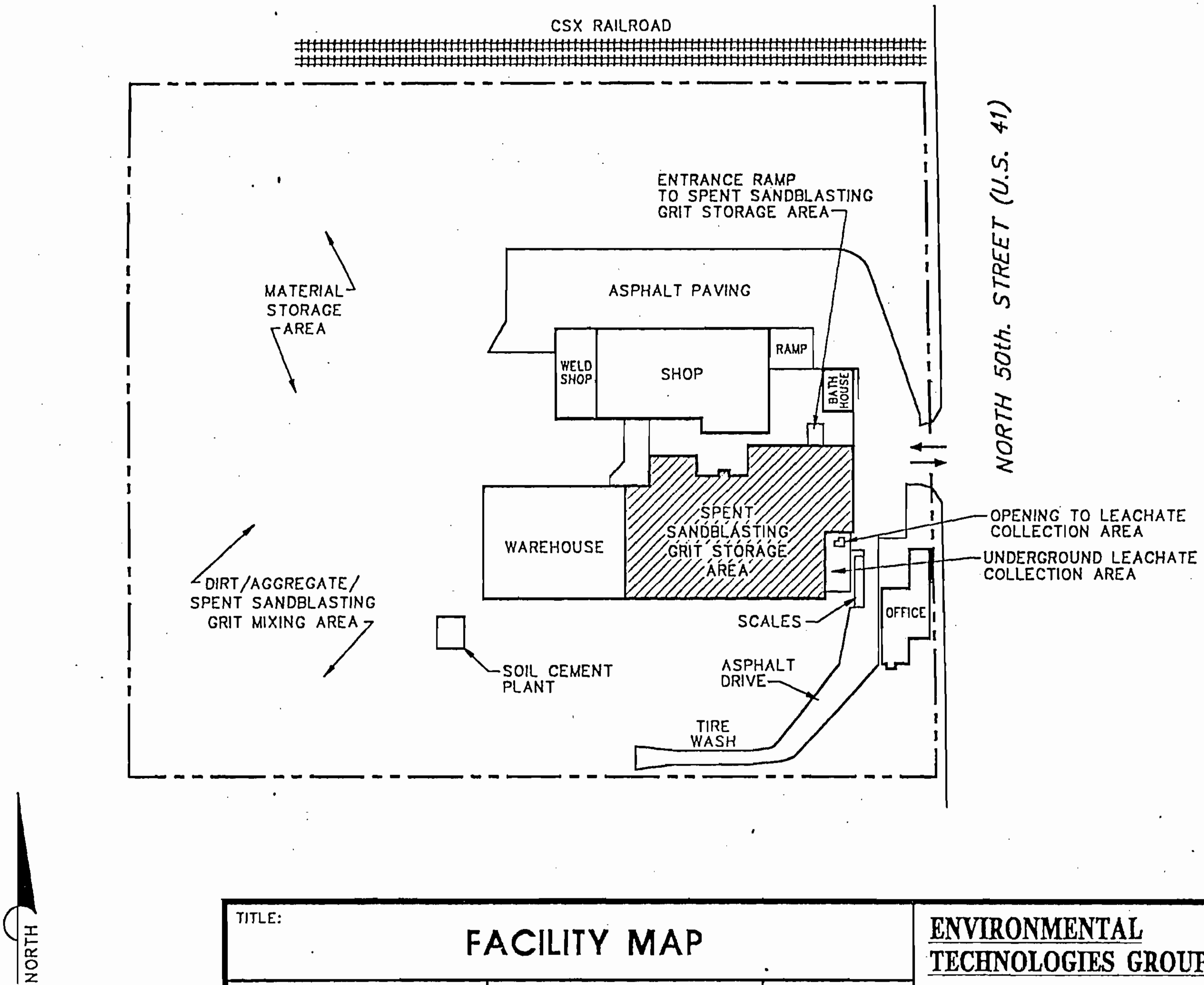
Thank you for your submittals and patience with this process. If you have any questions about this letter or other aspects of the waste reuse process, please contact William Kutash (813 744-6100, ext. 353) in our Tampa District office.

Sincerely yours,

Deborah A. Getzoff
Director of District Management
Southwest District Office

Attachment

cc: Polly Lespinasse, 1701 Tanglewood Drive, Wesley Chapel, FL 33543
Robert Stafford, TECO, Environmental Affairs
William Kutash, FDEP Waste Management Program Administrator, Tampa
Robert Butera, P.E., FDEP Solid Waste Manager, Tampa
Richard Teddar, P.E., FDEP BSHW, Tallahassee
Chris McGuire, FDEP OGC, Tallahassee
Buck Oven, FDEP Siting Coordination Office, Tallahassee



TITLE: **FACILITY MAP**

CLIENT: WOODRUFF & SONS, INC.

ADDRESS: 1502 NORTH 50th. STREET TAMPA, FLORIDA

DATE: 4/14/99

ATTACHMENT: 2

ENVIRONMENTAL TECHNOLOGIES GROUP, INC.
813 WEST PLATT STREET
TAMPA, FLORIDA 33606
(813) 251-3773

Department of Environmental Protection

Southwest District
3804 Coconut Palm Drive
Tampa, Florida 33619

Jeb Bush
Governor

David B. Struhs
Secretary

June 5, 2001

Florida Crushed Stone Company
c/o Mr. Charles E. Allen
10311 Cement Plant Road (34601)
P.O. Box 1508
Brooksville, FL 34605-1508

RE: Reuse BMP for Dredge, Coal and Coal Ash Byproduct Recycling from the Ash Storage Area at TECO's Gannon Station at Florida Crushed Stone - dated April 2001 (received April 30, 2001)

Dear Mr. Allen:

The Department has reviewed the Best Management Practices (BMPs) and additional information submitted by ECT, Inc. outlining your proposal to use TECO Gannon Station ash and industrial dredge material in the manufacturing of cement. This Department reuse exemption does not include Ash Byproducts other than those normally collected and stored in the Ash Storage Area identified in attached Figure #1. Section 403.7045(1)(f), Florida Statutes (F.S.), provides that the following wastes or activities are not regulated by the Department as solid waste:

(f) Industrial byproducts, if:

1. A majority of the industrial byproducts are demonstrated to be sold, used, or reused within 1 year.

2. The industrial byproducts are not discharged, deposited, injected, dumped, spilled, leaked, or placed upon any land or water so that such industrial byproducts, or any constituent thereof, may enter other lands or be emitted into the air or discharged into any waters, including groundwaters, or otherwise enter the environment such that a threat of contamination in excess of applicable department standards and criteria is caused.

3. The industrial byproducts are not hazardous wastes as defined under §403.703 and rules adopted under this section.

Based upon the information you have submitted, the Department has concluded that, if the conditions set forth below are complied with, this proposed reuse is expected to meet each of the three criteria of the statute and does not require a permit from the Department. Specifically, the Department agrees that the proposed project does constitute the use or reuse of the ash and industrial dredge materials; that the ash and industrial dredge materials is not a hazardous waste; and that the proposed reuse BMP provides adequate assurance that the ash and industrial dredge materials will not be discharged, deposited, injected, dumped, spilled, leaked, or placed upon any land or water so that the waste, or any constituent thereof, may enter other lands or be emitted into the air or discharged into any waters, including groundwaters, or otherwise enter the environment such that a threat of contamination in excess of applicable department standards and criteria would result. This conclusion is conditional upon your compliance with the BMPs and with the following conditions:

1) Florida Crushed Stone shall continue to test to ensure that the ash and industrial dredge materials are not a characteristic hazardous waste. The TECO Gannon Ash and industrial dredge material, before receipt at the facility, should be retested whenever their is reason to believe that the process or operation generating the waste has changed, and Florida Crushed Stone shall maintain records of such testing on site for three years

2) Stormwater runoff which contacts solid waste (i.e. slag/dredge material) in the staging area shall be managed as leachate and shall not be discharged to the soil, ground water or surface waters.

3) Waste quantity reports which detail the quantities received, stored and processed (i.e. used on site) shall be maintained at the facility and provided to the Department upon request.

4) Florida Crushed Stone specifically agrees to allow authorized Department personnel, upon presentation of credentials or other documents as may be required by law and at reasonable times, access to the premises where the approved activity is located or conducted to:

(a) Have access to and copy any records provided for in the BMPs or above conditions;

(b) Inspect the facility, equipment, practices, or operations provided for in the BMPS or above conditions; and

(c) Sample or monitor any substances or parameters at any location reasonably necessary to assure compliance with the BMPs, above conditions, or Department rules.

The Department's conclusion that the proposed reuse ash and industrial dredge materials is exempt from permitting under Section 403.7045(1)(f), F.S., is based upon compliance with the above conditions, and is applicable only for the specific processes and operations set forth in your submittals. If you fail to comply with these conditions and the proposed BMPs, or if you fail to meet any of the three criteria in Section 403.7045(1)(f), F.S., this conclusion will not be binding and the Department may initiate enforcement for disposal of solid waste without a permit.

Qualification for the exemption under Section 403.7045(1)(f), F.S., does not mean that you qualify for exemptions from any other Department or local permits which may be required for this project. It does not authorize any injury to public or private property or any invasion of rights, nor any infringement of federal, State, or local laws or regulations. It does not relieve you from any liability for harm or injury to human health or welfare, animal or plant life, or property caused by the construction or operation of this project, or from penalties therefore, nor does it allow you to cause pollution in contravention of Florida Statutes and Department rules. Finally, this exemption is based upon laws and rules currently in effect; if those laws or rules change in the future, you may be required to comply with those changed laws or rules within a reasonable period of time.

Thank you for your submittals and patience with this process. If you have any questions about this letter or other aspects of the waste reuse process, please contact William Kutash (813 744-6100 x353) in our Tampa District office.

Sincerely yours,

Deborah A. Getzoff
Director of District Management
Southwest District Office

RJB/ab

cc: Robert Stafford, TECO, Environmental Affairs
F.J. "Paco" Amram, P.E., ECT, Inc.
Mark Culbreth, P.G., ECT, Inc.
Mary Jean Yon, BSHW, Tallahassee
Chris Mcguire, OGC, Tallahassee
Richard Teddar, BSHW, Tallahassee
William Kutash, SWD Waste Div., Tampa
Buck Oven, Power Plant Siting, Tallahassee

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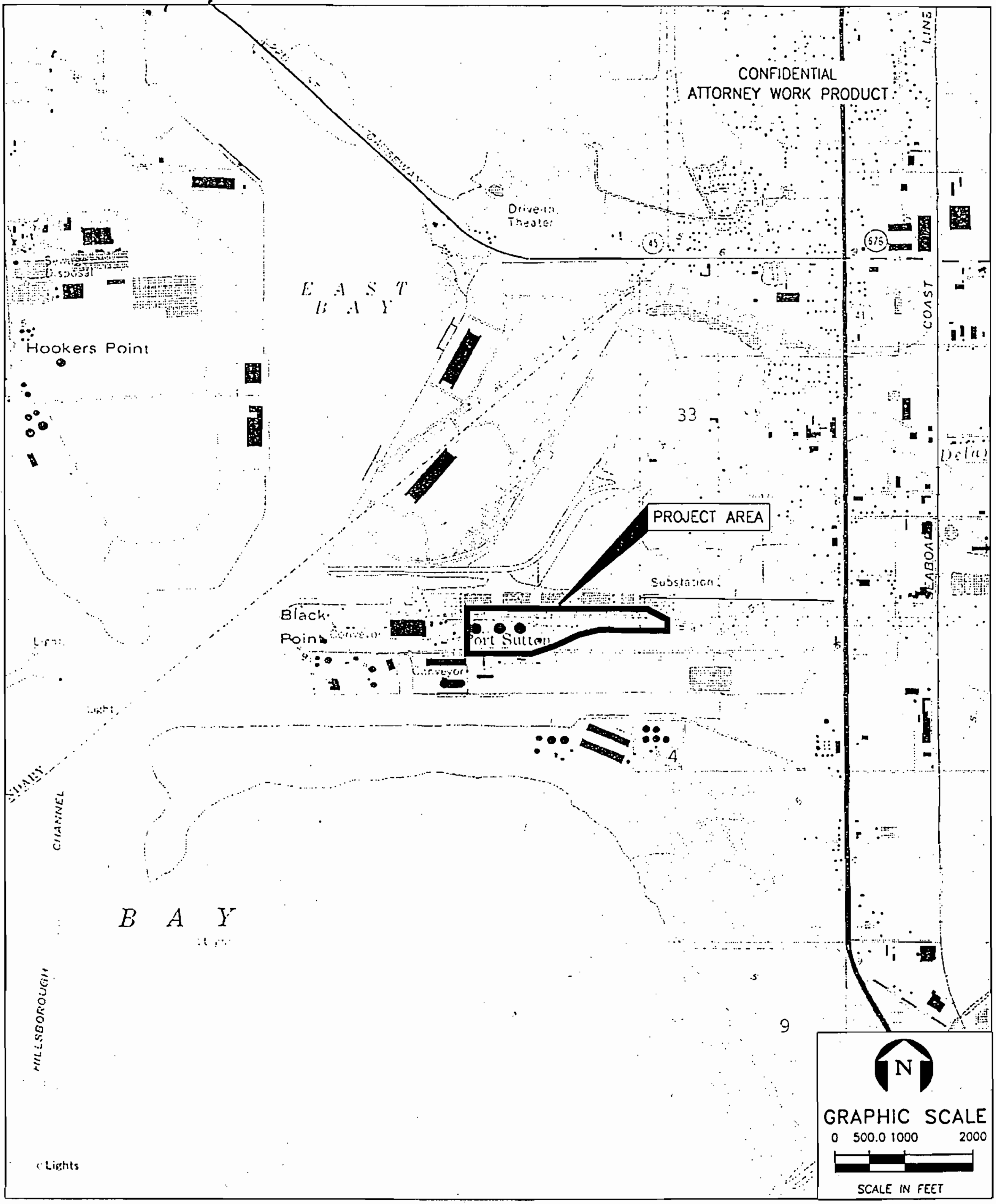

FIGURE 1.
SITE LOCATION MAP
TECO F.J. GANNON STATION
PORT SUTTON ROAD
TAMPA, FLORIDA
Sources: USGS Quad Map of Tampa, Fl., 1981; ECT, 2001.

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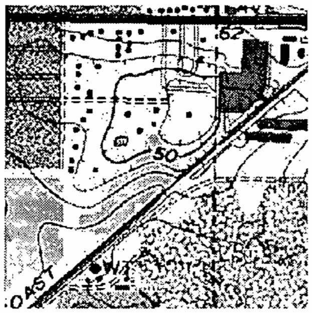

Other Imagery:

USGS Topo Map

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Mitchell, Bruce

To: Zhu, Yi
Cc: Fancy, Clair; Sheplak, Scott
Subject: ARMS check for Conrad Yelvington Distributers, Inc.: 7770473-004-AC.

1/8/2001

Dear Yi,

Please check the ARMS entry for the above referenced facility and project. Also, please delete the EU ID #005, for it is not part of this project (relocatable). Many thanks.

Bruce