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ENVIRONMENTAL SERVICES
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BUREAU OF AIR REGULATION

KA 624-08-04
November 7, 2008

Mr. A.A. Linero
Bureau of Air Regulation
Department of Environmental Protection
2600 Blair Stone Road, MS # 5500
Tallahassee, Florida 32399-2400

SUBJECT: Response to Request for Additional Information (RAI) dated October 29, 2008
Suwannee American Cement – Branford, Suwannee County
DEP File No. 1210465-016-AC (PSD-FL-259G)
Alternative Fuel Materials Testing – SAC Cement Kiln
P.E. Certification

Dear Mr. Linero:

The enclosed package includes the RAI response information requested by your letter to Tom Messer of Suwannee American Cement dated October 29, 2008 regarding the subject permit application. In accordance with Rule 62-4.050(3), I have sealed this letter with enclosure as certification by a professional engineer. Enclosed please find four (4) copies of the RAI response. I trust this response addresses the information of your request and appreciate your expedited review.

Please feel free to contact me at (352) 377-5822 or mlee@kooglerassociates.com if you have any questions regarding this submittal.

Sincerely,

Max Lee, Ph.D., P.E.

11/7/08
Date

P.E. Seal: 58091

NO. 58091
STATE O

cc: Trina Vielhauer, FDEP
Celso Martini, SAC
Tom Messer, SAC
Krishna Cole, SAC

Enclosure: 4 copies-AC Permit Application RAI Response

Suwannee American Cement, LLC
P.O. Box 410, 5117 US Hwy 27
Branford, FL 32008
(386) 935-5000 • (386) 935-5080 fax

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Department of Environmental Protection
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Alternative Fuel Materials Testing – SAC Cement Kiln

Dear Mr. Linero:

Suwannee American Cement (SAC) includes the following information in response to the Florida Department of Environmental Protection's (Department) request for additional information (RAI) dated October 29, 2008. SAC has included text from the Department's RAI in ***bold italics*** for clarity with SAC responses following each question.

Should the Department have additional questions or wish to meet to discuss the application, SAC would welcome this opportunity. SAC would be pleased to meet with the Department to clarify any outstanding issues or present the information in the application.

If the Department should have any additional questions please feel free to contact me directly to discuss at (386) 935-5023 or by e-mail at krishnac@suwanneecement.com.

Sincerely,

Krishna C. Cole
Suwannee American Cement

CC: Trina Vielhauer - DEP
Celso Martini – SAC
Tom Messer - SAC

1. Please provide more specific details on the type of alternative fuel likely to be used. Include the origin of each fuel, percent fuel substitution for each, a schedule for firing such fuels, and a proposal to evaluate emissions of nitrogen oxides (NOX), carbon monoxide (CO), volatile organic compounds (VOC) and sulfur dioxide (SO2) from the continuous emissions monitoring systems (CEMS) record to demonstrate no increase in emissions above permitted levels.

There are three types of fuel to be tested depending on availability of the fuel material. These materials are described in detail in Attachment A of the original permit application dated September 29, 2008 along with photos supplied in Attachment C. SAC proposes to test Fluff (a.k.a. auto shredder residue), recycled paper byproducts (RPB), and sawdust (woodchips). All of these potential sources for alternative fuel materials come from facilities located in North Florida that produce these materials as a byproduct of their process. In total there are two potential sources for fluff, two potential sources for RPB, and one potential source for woodchips.

PROPOSED SCHEDULE:

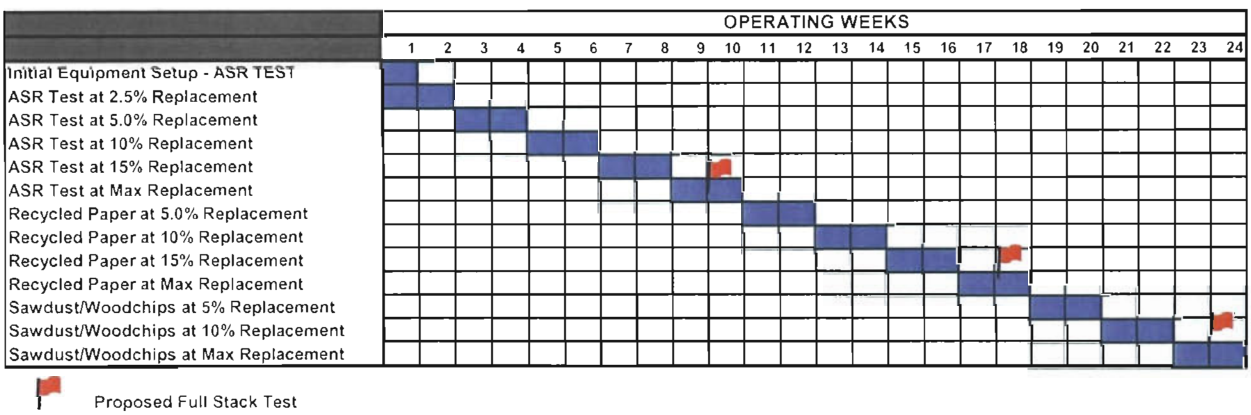


Fig.1 - Proposed schedule for testing.

The Proposed Schedule is subject to the availability of the fuel material and runtime of the process; which is highly variable during this current time of economic downturn. SAC will update accordingly and provide to the Department as changes occur. This proposed schedule is simply an estimate and does not suggest continuous testing from start to finish. Between periods of testing it may be necessary to evaluate the results and/or make adjustments to the temporary pilot plant.

Emissions of nitrogen oxides (NOX), volatile organic compounds (VOC) and sulfur dioxide (SO2) will be monitored continuously with the continuous emissions monitoring systems (CEMS) currently installed and used for compliance. These data are available real time and historically with full reports to the Department's District Office. Additionally, a summary of all data would be provided to the Department at the conclusion of the test in the final test report.

Carbon monoxide (CO) emissions would be monitored continuously through a Process CEM located in the downcomer of the pyro-processing preheater tower. This location provides for data past all points of fuel entry and provides reasonable data for assurance on increases or decreases in CO emissions. Pre and Post CO data for the test would also be summarized and provided to the Department at the conclusion of the test in the final test report. This would follow the same protocol for CO as utilized during the Fly Ash tests approved by the Department (October 18, 2004 Permit No. 1210465-012 AC).

2. Estimate potential emissions of criteria pollutants, hydrogen chloride (HCl), mercury (Hg) and dioxin/furan (D/F).

Due to the design of modern cement pyroprocessing systems, including SAC's pyroprocessing system; and the feed location of these fuels there is no estimated increase in Hydrogen Chloride (HCl) or Dioxin and Furan (D/F) Emissions from the use of the proposed alternative fuels. Constituents such as organics or chlorine that are the primary drivers for creation of these emissions that are present in the fuel would not exit through the process. Chlorine would be trapped in the inherent Sulfur/Chlorine Cycle of the kiln and organics would be destroyed due to the high temperatures. Furthermore, baseline testing has been conducted for both HCl and D/F and SAC does not expect any increase above baseline.

Also the United States Environmental Protection Agency (US EPA) has determined that further control of HCl emissions from new or existing cement manufacturing plants under section 112(d) of the Clean Air Act (CAA) is not necessary (full EPA summary in Attachment 1). Although control of HCl is not required, SAC will conduct stack testing to measure for HCl during the test trial period. Additionally, SAC would continue to operate the kiln gas exhaust system in a manner that would limit the retention time of the gases through the critical temperature window for formation of D/F. D/F is formed more or less from reactions with organic chlorides (chloro-aromatics) and organic particles or gas in a specific temperature profile around 650°F. The two keys to control Dioxin and Furans is to limit the organic chloride inputs in the raw materials (fuels are input at much higher temperatures) and avoid prolonged exposure to gas temperatures around 650°F. SAC uses natural raw materials like limestone and sand with low chloride content, and SAC's process is designed to minimize the temperature profile in the necessary windows for formation of D/F by incorporation of an in-line raw mill and gas conditioning tower.

During the fuel testing, stack testing would be conducted by SAC to measure emissions of HCl and D/F to compare against pre test emissions. Additional stack testing for D/F is already scheduled for the first week of December 2008. See the chart below for SAC's most recent D/F stack test results.

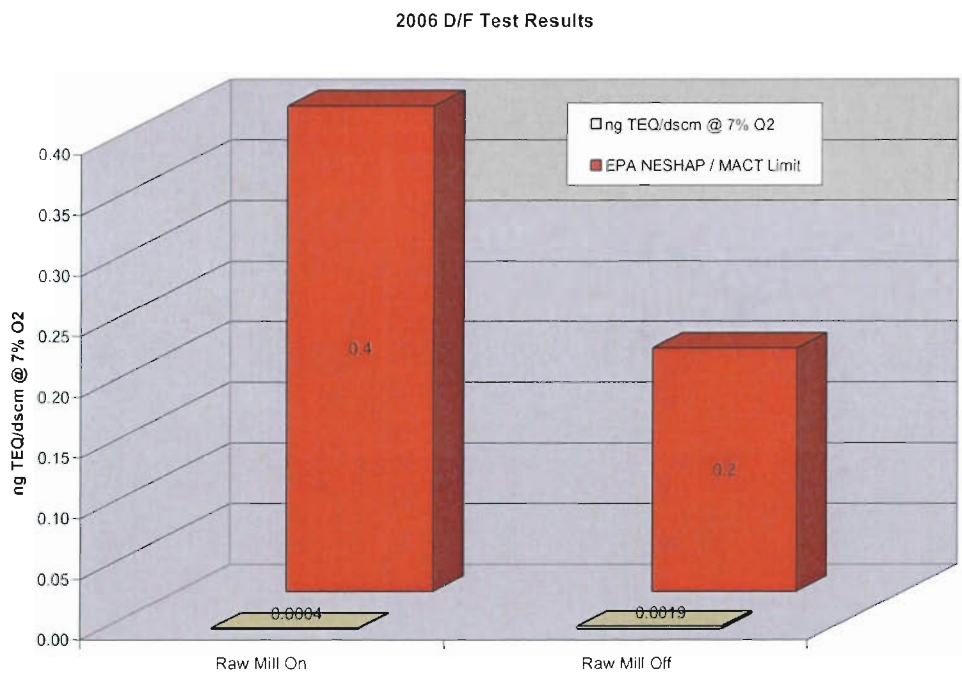


Fig. 2 - SAC's 2006 D/F Stack Test Results

The chart above shows that SAC operates well below its limits for dioxin & furans and does not expect major increases as a result of using the proposed alternative fuels.

Mercury would be closely monitored per the existing procedures and limits with the SAC Title V (Permit No. 1210465-006). This mass balance approach would ensure that the input of Mercury did not exceed any given permit limits. Due to the conservative nature of this procedure this assures mass emissions from the stack would be below these limits.

Permit No. 1210465-006 - Specific Condition C.17

"The owner or operator shall demonstrate compliance with the mercury throughput limitation by material balance and making and maintaining records of monthly and rolling 12-month mercury throughput. The owner or operator shall, for each month of sampling required by this condition, perform daily sampling of the raw mill feed, coal, petroleum coke and shall composite the daily samples each month and shall analyze the monthly composite sample to determine mercury content of these materials for the month. The owner or operator shall determine the mass of mercury introduced into the pyroprocessing system (in units of pounds per month) from the total of the product of the mercury content from the monthly composite analysis and the mass of each material or fuel used during the month."

Additionally fuel makes up a small portion of the calculated mercury input into the system and the replacement of coal with alternate fuels should not impact the overall Mercury numbers (see Fig.3). Furthermore, during the test trial, the alternative fuels will replace high carbon fly ash (HCFA) during the test as a fuel, and also it will offset some of the mercury from the coal. The figure below displays annual nominal mercury inputs by raw material and fuels in pounds.

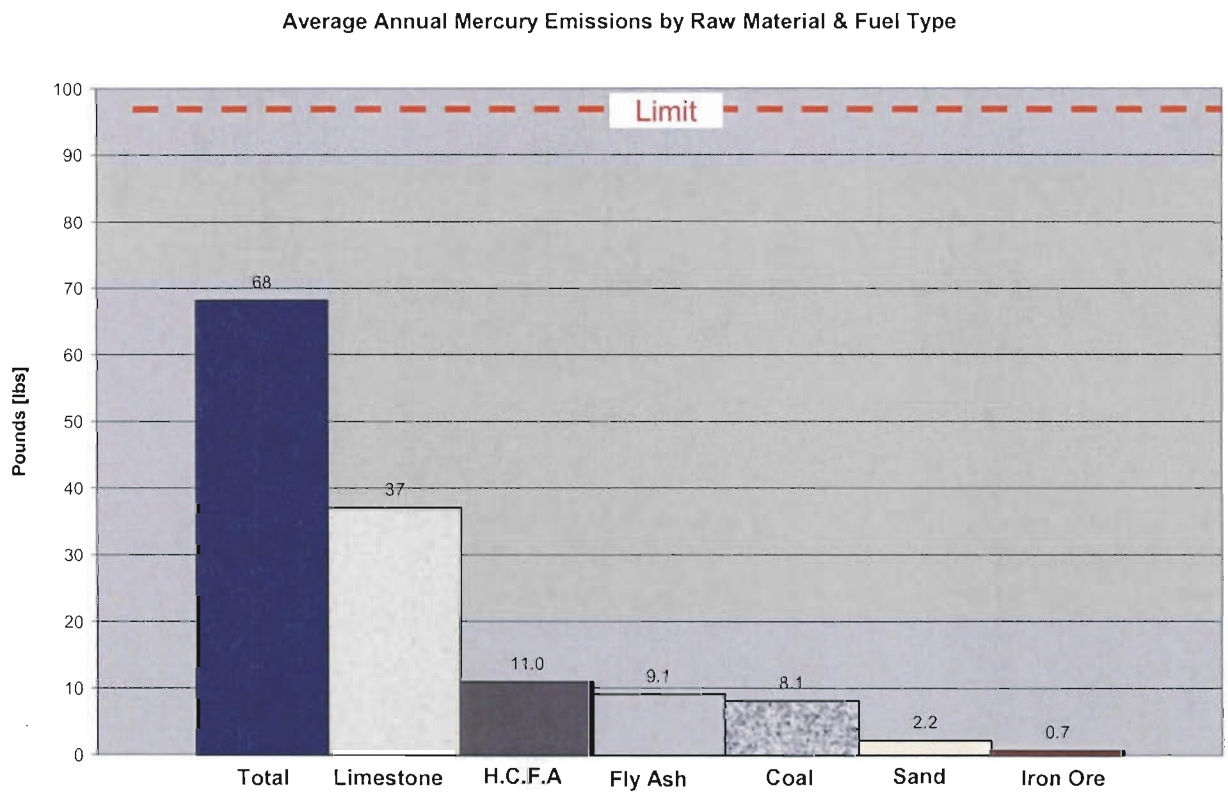


Fig.3 - Demonstrates that the majority of the mercury input into the pyroprocessing system is assumed to come from limestone since it accounts for approximately 87% of all material inputs by mass.

3. Consider whether techniques such as dust withdrawal are feasible to reduce the tendency to emit volatile and semi-volatile metals such as Hg, cadmium (Cd) and lead (Pb) to be emitted.

Due to the location of the feeding of the fuels and the previously discussed nature of the pyro-process, semi-volatile metals and non-volatile metals are incorporated into the clinker and are not present in the gas phase through the main baghouse. Therefore there is no anticipated increase in emissions for these metals.

For volatile metals such as mercury, these enter into a secondary cycle with the drying of raw materials in the Raw Mill. This cycle is dictated by temperatures and the vapor phase of the mercury. SAC would continue to monitor and control the mass input of mercury into the system as required by existing permit conditions to ensure no increase in mercury emissions above currently permitted limits. However, regarding techniques to remove mercury by dust removal, SAC is already voluntarily developing a test and sampling program, which was being discussed with the Department prior to the submittal of this test permit. SAC will continue with this program and will share its findings with the Department, but feels that it should not be made part of this test trial since in order to get conclusive evidence (sufficient samples at various operational conditions) this program will extend beyond the expected test trial period. As part of this technique SAC intends to also address some industry concerns regarding quality of cement, DOT regulation, and the effects on energy efficiency of the process.

4. According to the application, the heat values of the fuels are stated as below.
Fuel Heat Value Maximum Fuel Input Rate

ASR 12 MMBtu/ton 19.1 tons/hour Paper Byproducts 18 MMBtu/ton, dry basis 12.7 tons/hour Sawdust/woodchips 15.8 MMBtu/ton, dry basis 14.5 tons/hour

a. The ASR heat value is not stated as dry basis while the analytical test shows significant moisture in the material. Please clarify if the heat value of ASR is estimated on dry basis.

The table below displays analytical results for grab samples of the proposed materials.

BTU/LB	Coal	Fluff Ocala	Fluff Jacksonville	Sawdust Jacksonville	Paper Rejects Jacksonville
As Received	11,960	10,035	6,901	4,294	2,959
Dry	12,870	10,289	8,811	8,748	8,337

Table 1 - Expected fuel content [Btu/lb] by fuel type.

The heat value of Fluff is estimated in the permit application at 6000 Btu/lb or 12 MMBtu/ton or as received. However, if the actual fuel value is closer to 10,000 Btu/lb then the maximum fuel input rate at 50% coal replacement would be 11.5 tons/hour. Moisture in Fluff as received has been measured between 2.60% and 23.71%.

The sawdust/woodchips and recycled paper byproducts are estimated using dry basis. This is because the moisture content of the material is deemed too high to use as received, and some drying would be necessary. For the test trial, any material drying would be conducted offsite of SAC by the supplier.

The test trial would enable SAC to collect more conclusive data on the fuel value and chemistry of the alternative fuel materials. So far, samples have been spot/grab samples; but during the test, daily composite samples can be collected and analyzed to gather more conclusive data on these materials.

b. The maximum fuels throughput rates are estimated based on dry basis. It is believed that this might not be appropriate. For instance, if the applicant intends to limit the fuel usage for "up to maximum of 50% heat input rate", the actual fuel input rate will be significantly higher than what's stated in the application, since all the proposed fuels have significant moisture content.

The heat value of Fluff is estimated in the permit application at 6000 Btu/lb (lowest as received value) or 12 MMBtu/ton. Therefore, the expected coal substitution rate is a conservative estimate at 6,000 Btu/lb. This is done to ensure that the amount of fuel usage will not exceed the proposed maximum of 19.1 tons/hour.

It is not expected that during the test trial SAC will be able to sustain 50% coal replacement with these alternative fuels. However, this is a test trial and SAC would like the opportunity to attempt to achieve maximum substitution rates during these tests in order to gather sufficient data regarding system limitations.

Fuel Mix and Throughput Rate Measurement

5. It is unclear how the facility plans to measure the fuel input rate into the kiln. From the application, it appears that the facility will try different combination/percentage of fuel mix to evaluate the effectiveness of the combustion. It is believed that the accuracy of the measurement is crucial to validate that the combustions of these fuels is not going to cause significant emissions increases for the pollutants. For instance, if the unit is permitted to burn 20% by wt of ASR when mixed with 40 % of recycled paper product and 40% of Coal, how can the Department be assured that the measurement is reasonably accurate? If there is no dependable/accurate measurement method, then the established permitted capacity in the future might be "unenforceable". The applicant shall submit a detail test protocol describing how they are going to measure the fuel mix and the input rate during the test

SAC will test each alternative fuel separately according to the proposed schedule in section one of this document (Fig. 1) and will measure fuel usage rates using a weigh feeder belt system, proven in over 100 installations world wide by Shenck Process systems. The transport of the material is pneumatic transport and will use the existing 8" pneumatic line in place for flyash injection. The feed system is not a test or research device, it is a commercial product. The system will be integrated with the coal fuel feeding controls currently in operation and operated from the control room. The Shenck feed data will be monitored and recorded by SAC's PI Data Retrieval System; and all fuel feed and dry preheater feed data (including coal) will be made part of the final report to the Department.

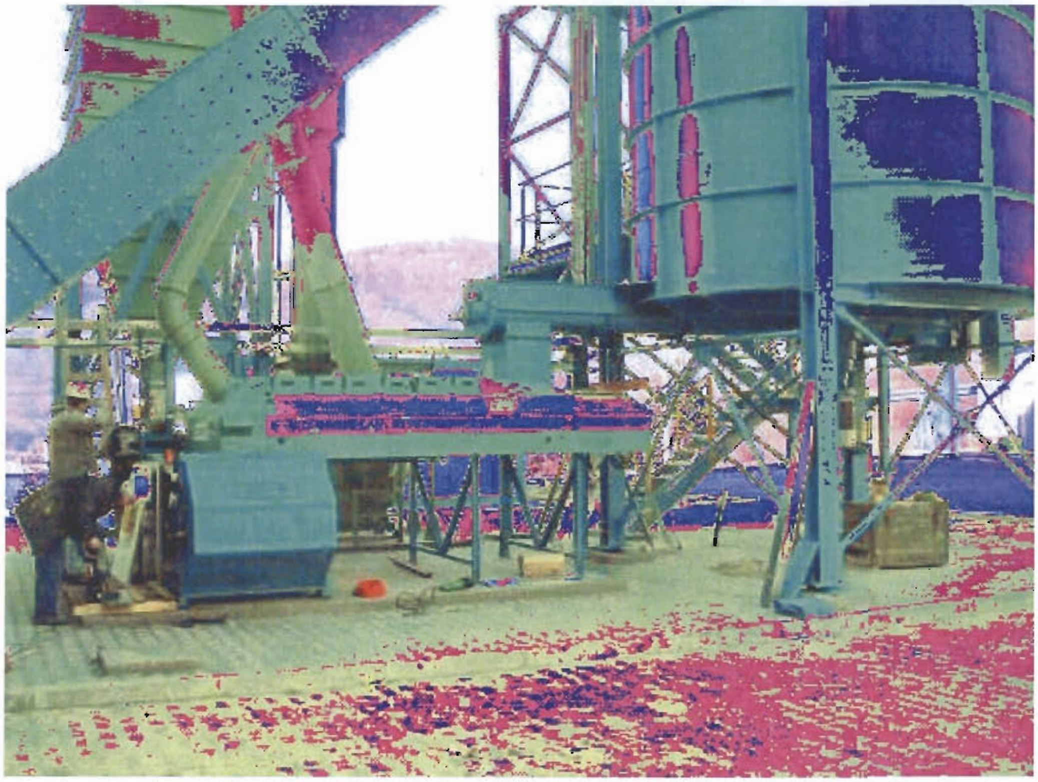


Fig.4 - Example of the Shenck process system at another facility.

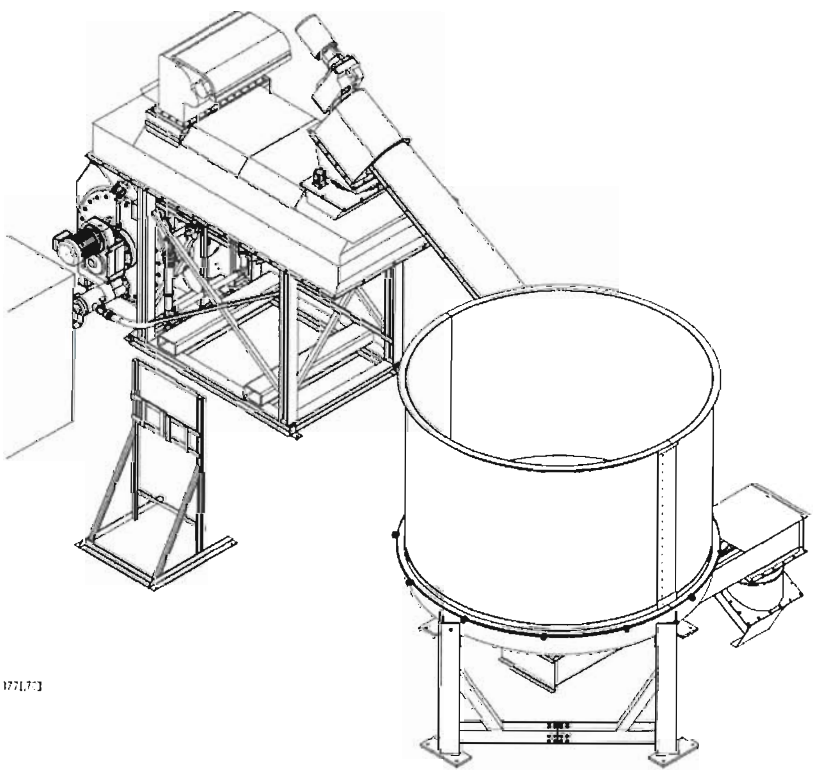


Fig.5 - Concept drawing of the Shenck process system.

Applicable Rule(s) and Regulation(s)

6. The application states that the facility will have to install equipment to temporarily or permanently accommodate the proposed alternative fuels. Ultimately the facility will need to address changes in emissions as well as rule applicability. Please include a rule evaluation with respect to the applicability of any of the federal solid waste rules that might apply to the facility.

Based on telephone discussions with the Department's Division of Solid Waste there will be no solid waste permitting requirements for the test trial since all materials will be stored under cover. Northeast District Department of Solid Waste Administrator, Michael Fitzsimmons, indicated that after the trial burn is completed and a permanent ASR fuel system is needed, the Department will determine if solid waste permitting is required.

These waste streams (Fluff (a.k.a. auto shredder residue), recycled paper byproducts (RPB), and sawdust (woodchips) have not been clearly defined in the Federal or the Department's solid waste rules. RPB may be considered as "recoverable materials" defined in 62-701.200, F.A.C which is regulated under 62-701.220(2)(c), F.A.C. due to use and properties as paper. As such RPB usage would require registration under Chapter 62-722, F.A.C. The ASR and woodchips may be considered "industrial byproducts" in 62-701.200,F.A.C. which are regulated under 62.701.220(2)(d), F.A.C.

As mentioned above, the Solid Waste Department Administrator indicated no solid waste permitting is required for the trial burn.

The temporary equipment to be installed for this test trial is described in Attachments A and D of the original permit application dated September 29, 2008. The following steps will be taken to prepare the received materials for feeding to the pyroprocessing system.

1. Receive materials by covered truck.
2. Store under cover (to prevent stormwater runoff).
3. Load material by frontend loader into shredder hopper.
4. Shred material.
5. Screen material (1/2 inch or less will be used for fuel).
6. Return oversize material to shredder hopper to re-shred.
7. Half (1/2) inch or less material fed pneumatically into existing flyash feed line or stored under cover.

8. Prepared material stored under cover will be loaded by frontend loader into the pneumatic feed hopper.

The temporary equipment will be a mobile shredder to reduce the particle size of materials received to a half (1/2) inch or less. Shredded material will be screened (using a trommel screen) and any material greater than a half (1/2) inch will be returned back to the shredder. The shredded material will be pneumatically conveyed through the existing flyash feed lines using a Shenck Feeder System (see Fig. 4 and 5 above). It is expected that the equipment modifications will result in some fugitive emission increases. However, all of the material to be processed is expected to contain moisture of approximately 10% and the increase in particulate matter (PM) emissions shall be minimal, and is estimated in the table below:

Estimate of ARS Processing emissions
SAC, Branford Plant
Emission Calculations

STEP	Action/Tasks	generic description	% of Total Throughput	PM Emission Factor [b]	PM_{10} Emission Factor [b]	PM Emissions tons	PM_{10} Emissions tons
1	Receive materials by covered truck.		*accounted for by normal fuel transport substituted by alternate fuels transport*				
2	Store under cover (to prevent stormwater runoff and fugitives).		*negligible when stored under cover*				
3	Load material by frontend loader into shredder hopper. [c]	loading without cover	100	0.000883 lb/ton	0.000418 lb/ton	0.01	0.00
4	Shred material.	crushing	100	0.0012 lb/ton	0.00054 lb/ton	0.01	0.00
5	Screen material (1/2 inch or less will be used for fuel). [a]	screening	100	0.0022 lb/ton	0.00074 lb/ton	0.02 [a]	0.01
6a	Return oversize material to shredder hopper to re-shred by conveyor	conveying	10	0.00014 lb/ton	0.000046 lb/ton	0.00	0.00
6b	Return oversize material, re-shred.	crushing	10	0.0012 lb/ton	0.00054 lb/ton	0.00	0.00
7	Half (1/2) inch or less material fed pneumatically into existing flyash feed line or stored under cover.	conveying	100	0.00014 lb/ton	0.000046 lb/ton	0.00	0.00
8	Prepared material stored under cover will be loaded by frontend loader into the pneumatic feed hopper. [c]	loading without cover	100	0.000883 lb/ton	0.000418 lb/ton	0.01	0.00
					Total =	**0.031**	**0.012**

Based on process rates of: *total =* **13,680** tons of ARS

Notes:

[a] This screen will operate as a wet screen most of the time. However since it may operate without water sprays, emissions are calculated for this emissions point.

[b] Emission factors of screening, crushing, and conveying based on AP-42 Table 11.19.2-2. Alternate fuel PM factors assumed to have similar emissions as aggregate operation. Controlled emission factors are used since the moisture content of the raw material is estimated to be >1.5% (AP-42 basis for "controlled" emissions).

Fuels Sampling and Analysis

7. Since the ASR is not a homogeneous material, the facility shall submit a detailed material sampling plan for review in order to ensure proper sampling procedure will be taken and sufficient sample will be collected to obtain reliable analysis data. Please also include the information about the source of material coming from for each sample.

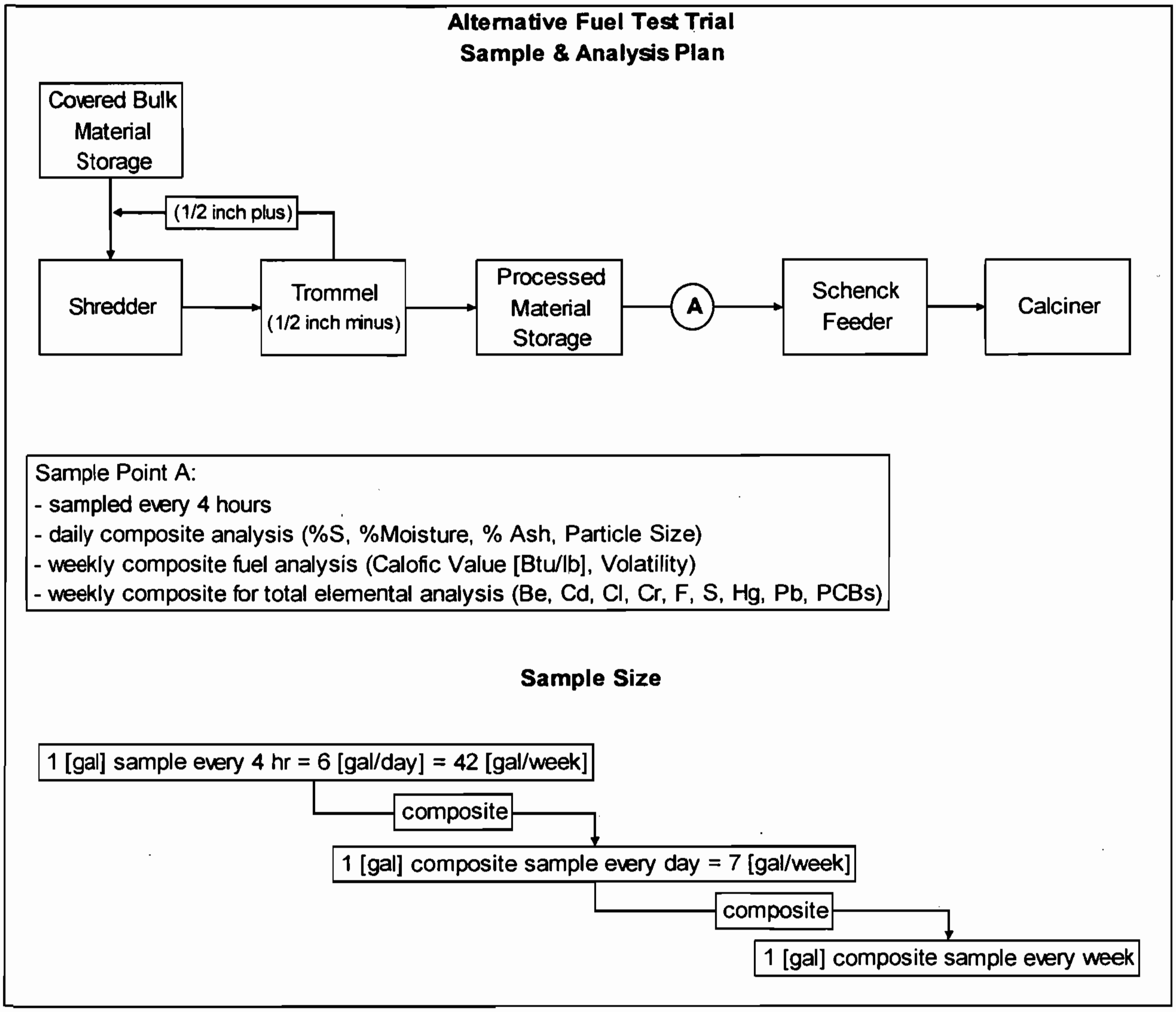


Fig.7 - SAC's proposed sampling and analysis plan during the test trial.

The figure above lays out a basic material sampling and analysis plan for the test trial. The daily and weekly fuel analysis would be conducted by SAC's lab or an outside third party as necessary. However, the weekly total elemental analysis of weekly composites would have to be conducted by Florida certified third party lab. The 4 hour samples will be collected from a process stream and not a stock pile. This would help avoid any bias that may occur from selective sampling of a pile.

Fluff is not homogenous, and therefore sampling of already shredded material (half (1/2) inch minus) will help ensure a better sample and preparation of sample for analysis.

All daily and weekly composite analysis for moisture, sulfur, ash, particle size, calorific value, and volatility will be conducted according to established American Society for Testing and Materials (ASTM) methods and will be conducted internally or externally as necessary. However, weekly composite samples sent to external laboratories for total elemental analysis will be analyzed using EPA approved methods of analysis. All of the data and results will be available to the Department.

8. The additional fuel analyses are needed for the following materials to further evaluate the air quality impact for the proposed project.
Material Analysis
ASR
- ***Cadmium***
- ***PCB***
- ***Chromium***
- ***Chlorine content***

Recycle paper byproduct
- ***Chlorine content***

The materials in question are certified non hazardous by the supplier per EPA's TSCA requirements. However, with regards to further analysis of Fluff, the material properties of this alternative fuel (as received) make it difficult to properly analyze. SAC does not have conclusive chemical analysis of this material (sample size n=1), but there are some data available. The table below contains all of the material analysis results from SAC.

SAC October 2008 Material Analysis (Dry Basis)

	Fluff Ocala	Fluff Jacksonville	Sawdust Jacksonville	RPB Jacksonville
Moisture % (as received)	2.60	23.71	50.91	64.50
Ash %	35.59	45.81	0.52	9.31
Volatile %	56.82	54.31	81.08	80.66
Fixed Carbon	9.04	7.77	18.40	10.03
Sulfur %	0.30	0.43	0.13	0.29
Chlorine %	0.44	1.93	**	**
Fluorine ppm	86	172*	16	27
Mercury ppm	1.03	0.85	<0.02	<0.02
Beryllium ppm	<1	<1	<1	<1
Lead ppm	720	810	<2	<2
PCB	**	**	**	**
Chromium	**	**	**	**
Cadmium	**	**	**	**
* As Received (Not Dry Basis) ** No Data				

Table 2 - SAC alternative fuel analysis (sample size n = 1).

The California EPA has conducted a life cycle analysis of ASR resource recovery and their analysis suggested that use as a fuel in cement manufacturing offers the most promise. However, they also followed up this study with an evaluation of ASR and found that although there are barriers to the use of ASR as an alternative fuel in cement manufacturing; it is still the most promising (B. Boughton). Below is material analysis from the California EPA study:

Table 3
Averaged elemental concentration in SR fractions (ppm sample dry weight basis, $n = 6$)

Element	<0.5 in.	<0.5 in.	0.5–1.5 in.	0.5–1.5 in.	<0.5–1.5 in.[a]	1.5–4 in.
Antimony	101	98	113	165	117	125
Arsenic	8	9	5	3	5	4
Barium	828	987	636	376	676	110
Chromium	171	89	95	38	134	101
Cobalt	13	22	18	10	17	14
Copper	15333	16345	24461	29454	29560	15735
Lead	784	692	148	560	233	64
Molybdenum	17	30	30	103	21	23
Nickel	212	235	190	133	338	148
Magnesium	5008	4808	3385	2994	4156	1744
Silver	6	25	3	3	5	1.0
Titanium	538	643	706	704	639	386
Vanadium	9	15	15	11	12	7
Zinc	7092	6482	8868	9793	5089	3415

[a] Three samples of facility recombined material.

Table 3 - Average elemental concentration in ASR fractions by particle size (B. Boughton).

Table 4
Metal concentrations from other SR samples[a] and estimated loss from ashing

Metal	Average (ppm)[a]	Estimated % loss (%)[b]
Cadmium	18	100
Lead	3120	95
Zinc	6890	35
Arsenic	6	85
Vanadium	29	65
Mercury[a]	2	100

[a] Except for mercury, values for landfilled SR from numerous facilities (DTSC, 2002); mercury results are for material before ashing.
[b] % loss from ashing (present study results vs. other SR as disposed).

Table 4 - Metal concentrations from ASR samples (B. Boughton)

SAC proposes to test all materials and analyze according to Figure 7 of this document, with a greater sample size. All of the results of this test trial will be made part of the final report to the Department. The main purpose of this test trial is to gather sufficient evidence regarding the efficacy of the use of this material in cement manufacturing via a dry preheater/precalciner system like SAC's (a modern cement plant).

The only data regarding PCBs in ASR, currently available to SAC, comes from the Toxicity Characteristic Leaching Procedure (TCLP) testing supplied in Attachment B of the original permit application, dated September 29, 2008. SAC would test all materials and analyze according to Figure 7 of this document. However, it is not expected that high concentrations of PCBs will be in the material since PCB production in the US has been banned since 1979, and therefore should not be present in significant concentrations in vehicles manufactured in or imported to the US. For materials containing trace amounts of PCBs, conditions in the pyroprocessing system completely destroy organic compounds containing only carbon and hydrogen, producing carbon dioxide (CO_2) and water. However, if the organic compounds contain sulfur or chlorine, then acid gases such as hydrogen chloride (HCl) and sulfur dioxide (SO_2) are also produced. These gases are absorbed and neutralized by lime and other alkaline materials within the kiln (i.e. limestone). Also, SAC would conduct stack testing for HCl during the test trial and all data will be made available as part of the final report to the Department. SAC already has significant baseline data on SO_2 and will continue to monitor SO_2 throughout the test using its continuous emission monitor.

Extensive studies have demonstrated that metals such as antimony, arsenic, barium, beryllium, cadmium, chromium, copper, lead, nickel, selenium, vanadium and zinc are captured by the kiln feed and nearly 100% of these metals are retained in the solids (Attachment 2 & 3). Therefore, it is not expected that these metals will be significantly present in the gas stream.

Component	EF in %	TC in %
Cadmium	< 0.01 bis < 0.2	0.003
Thallium	< 0.01 bis < 1	0.02
Antimony	< 0.01 bis < 0.05	0.0005
Arsenic	< 0.01 bis 0.02	0.0005
Lead	< 0.01 bis < 0.2	0.002
Chromium	< 0.01 bis < 0.05	0.0005
Cobalt	< 0.01 bis < 0.05	0.0005
Copper	< 0.01 bis < 0.05	0.0005
Manganese	< 0.001 bis < 0.01	0.0005
Nickel	< 0.01 bis < 0.05	0.0005
Vanadium	< 0.01 bis < 0.05	0.0005

Table 5 - Emission factors (EF, emitted portion of the total input) and transfer coefficients (TC, emitted portion of the fuel input) for rotary kiln systems with cyclone preheater (Attachment 2).

Performance Stack Testing

9. Additional stack testing is needed to further evaluate the effects for the proposed project. The facility should conduct stack test(s) using EPA test methods for the following pollutants during the trial burn of ASR and recycle paper byproduct.

- ***Dioxin/Furan***
- ***HCl***

In addition to the monitoring proposed in the application for test trial, SAC will monitor during the test trial burn of ASR and recycle paper byproduct (using EPA approved test methods) for D/F and HCl.

Miscellaneous Items

10. During the October 22, 2008 meeting between SAC with the Department's Northeast District Office, the SAC representatives suggested that there are other facilities in the United States burning ASR. Please provide a list of those facilities, with specific information in relation to the purpose of each subject facility, the end products for each facility, what fuels are used, what percentage of ASR is burned, what controls are employed, what testing is performed and the results of that testing, and facility contact.

SAC provided an EPA Report on the use of Alternate Fuels in Cement Kilns to the Northeast District (Attachment 4). In this report it discussed ASR use at a Texas Industries (TXI) Plant located in Midlothian, Texas. Please see the attached Permit for the TXI Plant in regards to specific conditions required for the ASR (Attachment 5). No additional controls are required for the specific use of ASR. It is also believed that there is some use of ASR by a Holcim plant in Michigan. Please see the attached Holcim Alternative Fuels Permit (Attachment 6).

SAC is attempting to get other permits in other states via FOYA requests. Perhaps the Department could also contact the agencies directly.

11. The SAC representatives also represented that special separating devices will be used to promote a more uniform material. Please provide detailed information as to where these special separating devices will be, how they operate, what they will separate out, their efficiency, rule applicability, controls, monitoring and means of process measurement. Please also address if there are any air pollutants emissions from the separation process.

The special separating devices being referred to may be related to separation techniques studied in the California EPA ASR evaluation for resource recovery (B. Boughton). The research conducted by the California EPA concluded that separation of ASR by specific gravity (SG) alone can be effective to increase the fuel value of ASR and decrease some of the heavy metals and other undesirable aspects of ASR. This information was brought up, in discussion with Department officials, to address the future potential to improve the quality of ASR for use as a fuel. Currently there is little or no incentive for ASR sources to consider alternatives to landfill. SAC believes that if this material is proven through testing that it is suitable for fuel in a cement kiln, then there will be opportunity to work with suppliers to improve the quality of material received from production, quality, and environmental perspective. Right now there is no incentive for the suppliers to make any modifications to their process. The point being made is that "getting our foot in the door" will enable SAC to communicate to potential suppliers the benefits of improving ASR to reduce any undesirable aspects and to increase fuel value. These improvements would be implemented by auto shredding facilities, driven by economic incentive and the desire to maintain customer relationships. Both operations considered as sources for test trial already employ the following separation techniques that could maybe be improved to make ASR more attractive as a fuel:

- Known materials containing contaminants (i.e. mercury switches) removed prior to shredding (Florida Environmental Compliance Manual for Auto Shredders - Attachment 8).
- Post shredding separation (both operations considered as sources for the test trial already employ various post separation techniques to recover valuable materials)

This discussion does not imply that SAC will employ any special separation techniques of materials received at its facility, but only to inform Department officials of SAC's future self interest to work closely with sources to help improve the quality of ASR used as a fuel.

12. The SAC representatives also represented that if allowed to perform the trial burn, that ASR will be stored in a covered area. Will fuels or raw materials be displaced from covered areas to provide cover for the ASR?

Fuels and raw materials will not be displaced for the test. Materials will be stored under cover at all time (see Attachment D of application).

13. The SAC representatives presented that the kiln operating temperatures are 3000 degrees F. Is this the temperature throughout the kiln? If not please present the temperature distribution between the top of the preheater and the main kiln burner.

Within any heated system there are temperature gradients; therefore, it is impossible to say that the entire system is maintained at 3000 °F. However, normal operation of cement kilns result in extremely high temperatures in the kiln gases (up to 3000 °F in the combustion gas from the main burners and up to 2000 °F in the gas from the burners in the precalciner). To make clinker (cement precursor) temperatures in the system must be hot enough to heat the materials (limestone, sand, iron, and flyash) to a point approaching a molten/liquid state, see the figures below:

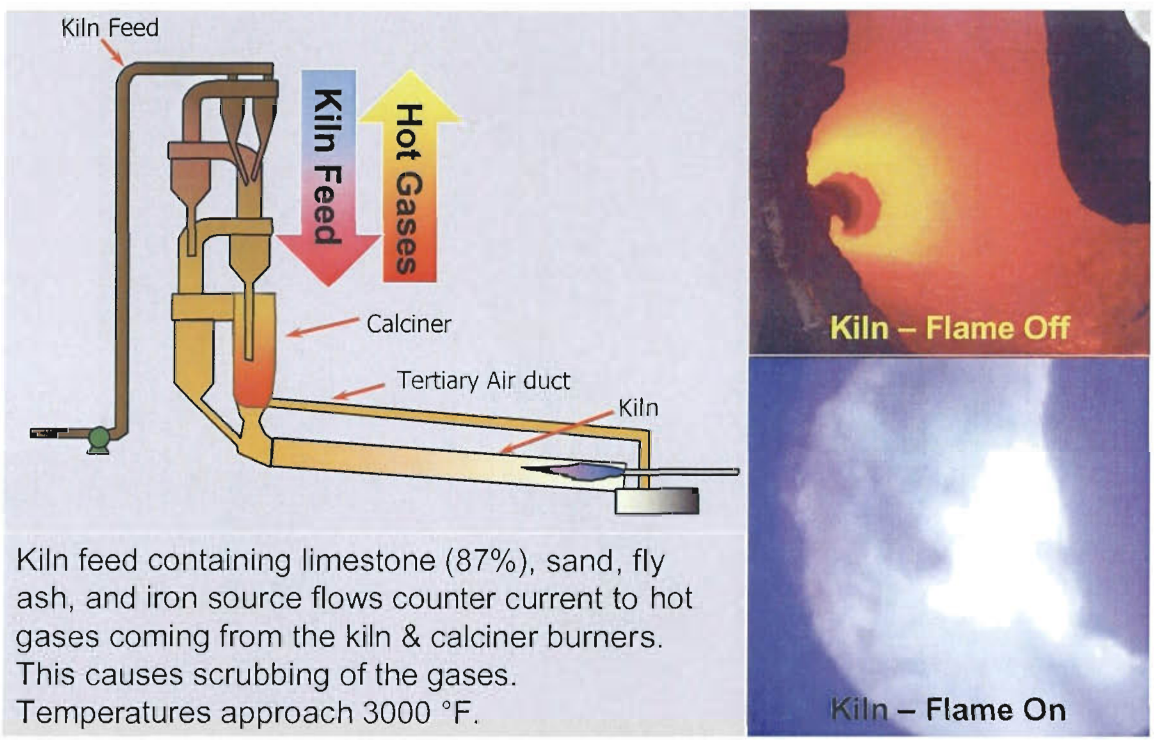


Fig. 8 - This is a simple diagram showing the main parts of SAC's pyroprocessing system. The photos were taken from SAC's kiln exit with the main burner flame on and off (shows that materials approach molten state).

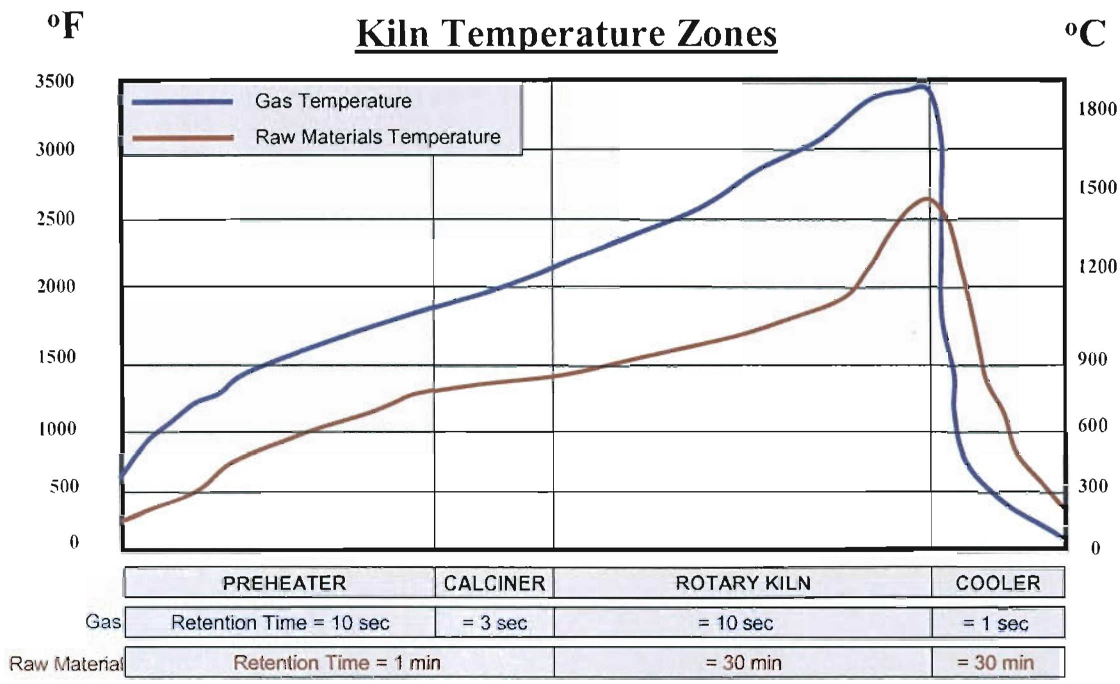


Fig. 9 - Typical temperature profile and expected retention times for gases and raw materials.

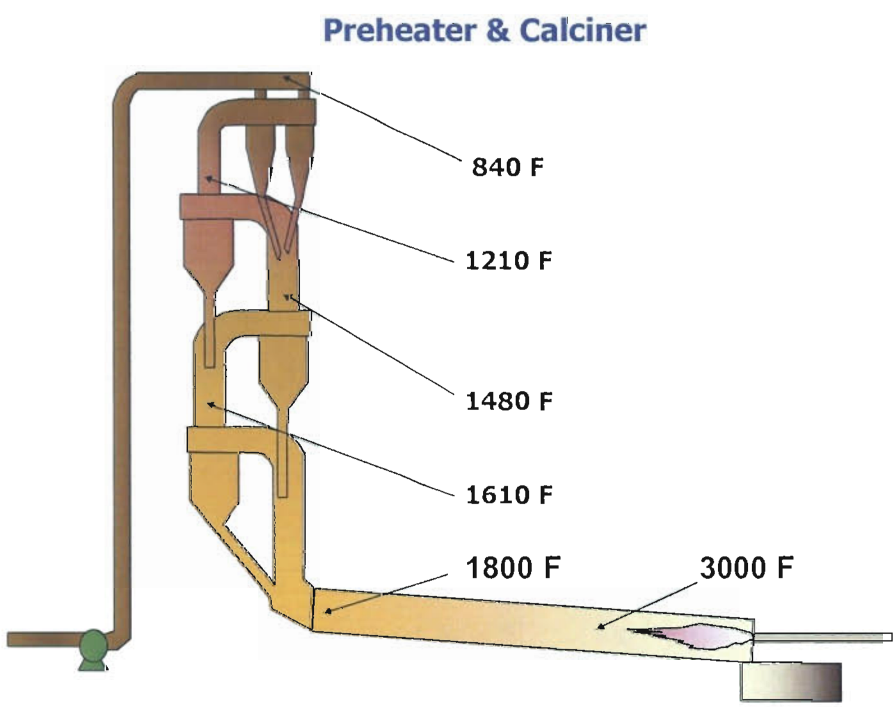
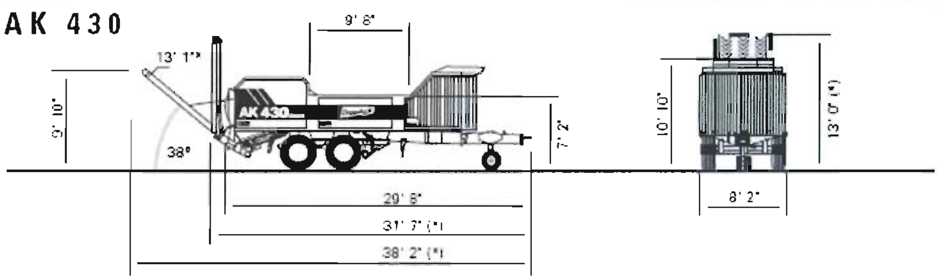


Fig. 10 - Typical estimated gas temperature profile.

14. Facility representatives suggested that there will be a shredder on site. Please advise if this will be a re-shredder, meaning further shredding of ASR from an automobile shredder located elsewhere. Please provide information about the shedder i.e. horsepower, fuel type, feed capacity, means of feeding the shredder, and means of controlling fugitives. Please provide information concerning the point of discharge, and product flow chart through the system, including control of fugitives if needed. Please also address if there are any air pollutant emissions expected from the separation process?

SAC will not be shredding automobiles. All materials coming to the plant will have come from auto shredding facilities and is a byproduct of their process that is currently sent to landfill. However, the material as received ranges in particle size from less than a quarter (1/4) of an inch to six (6) inches in size (see Photo 1 in Attachment C of the application). In order for SAC to convey this material pneumatically and to ensure complete burn out of this material, it will be necessary to further reduce (re-shred) this material to a particle size of half (1/2) inch or less. Therefore, the following equipment (or similar) will be used to re-shred the material to the desired particle size (also see attachment D of application):



Model weight	41,890 lb.
Engine	MB OM 460 LA
HP	430
Exhaust Level	TIER 3
Fuel Tank	120 gal.
Speed	850–1000 rpm
Conveyor Width	72"
Conveyor Length	13'

Also available on tracked chassis

Fig. 11 - A mobile, diesel powered shredding system (similar to the one in this Figure) will be used to re-shred the material to its desired particle size.

The materials to be shredded are moist. Therefore, fugitive emissions should be limited. See the table below for particulate matter (PM) emission estimates.

Estimate of ARS Processing emissions
SAC, Branford Plant
Emission Calculations

STEP	Action/Tasks	generic description	% of Total Throughput	PM Emission Factor [b]	PM_{10} Emission Factor [b]	PM Emissions tons	PM_{10} Emissions tons
1	Receive materials by covered truck.		*accounted for by normal fuel transport subsitituted by alternate fuels transport*				
2	Store under cover (to prevent stormwater runoff and fugitives).		*negligible when stored under cover*				
3	Load material by frontend loader into shredder hopper. [c]	loading without cover	100	0.000883 lb/ton	0.000418 lb/ton	0.01	0.00
4	Shred material.	crushing	100	0.0012 lb/ton	0.00054 lb/ton	0.01	0.00
5	Screen material (1/2 inch or less will be used for fuel). [a]	screening	100	0.0022 lb/ton	0.00074 lb/ton	0.02 [a]	0.01
6a	Return oversize material to shredder hopper to re-shred by conveyor	conveying	10	0.00014 lb/ton	0.000046 lb/ton	0.00	0.00
6b	Return oversize material, re-shred.	crushing	10	0.0012 lb/ton	0.00054 lb/ton	0.00	0.00
7	Half (1/2) inch or less material fed pneumatically into existing flyash feed line or stored under cover.	conveying	100	0.00014 lb/ton	0.000046 lb/ton	0.00	0.00
8	Prepared material stored under cover will be loaded by frontend loader into the pneumatic feed hopper. [c]	loading without cover	100	0.000883 lb/ton	0.000418 lb/ton	0.01	0.00
					Total =	**0.031**	**0.012**

Based on process rates of: ***total =*** **13,680** tons of ARS

Notes:

[a] This screen will operate as a wet screen most of the time. However since it may operate without water sprays, emissions are calculated for this emissions point.

[b] Emission factors of screening, crushing, and conveying based on AP-42 Table 11.19.2-2. Alternate fuel PM factors assumed to have similar emissions as aggregate operation. Controlled emission factors are used since the moisture content of the raw material is estimated to be >1.5% (AP-42 basis for "controlled" emissions).

15. Please describe if the facility will implement any waste separation plan to remove the materials that contain mercury, lead, cadmium polychlorinated biphenyls (PCB) and any other materials that can be construed as constituents of hazardous wastes. If so, please submit the material separation plan for the Department's review.

As described above, SAC would not implement any waste separation plan, but would rely on certification by the source (necessary to landfill) to ensure materials delivered to SAC are certified non-hazardous (Attachment B of the application submitted September 29, 2008). Furthermore, the control and handling of these constituents of concern by SAC's pyroprocessing system and environmental management system has been extensively addressed throughout this document (Sections 2, 3, 7, 8, and 13). Also, the sources proposed for this test have internal procedures and agreements with contractors stipulating the types of materials that they will not accept for shredding and have programs to inspect incoming materials. Materials or materials containing the following will not be accepted (Attachment 7 & 8):

Sealed and Flammable Containers

- Propane Tanks
- Gas Tanks
- Aerosol Cans

Scrap Bearing Lead

- Pipes with lead
- Chemical tanks with lead lining

PCB Containing Devices

- Ballasts
- Capacitors
- Microwave Ovens

Batteries

Miscellaneous Items

- Air bag canisters
- Mercury switches
- Electronics
- Computers
- Heavy Off-Spec Steel
- Material containing Freon

- Transformers
- Liquids or sludge
- Lead battery cable ends

Radioactive Material

- Military equipment
- Fertilizer related equipment
- Radium dials
- Smoke detectors

SAC will also work with suppliers to improve the quality of the ASR to be used as a fuel through extensive sampling, testing, and analyzing of this material as described in section seven of this document.

REFERENCES

B. Boughton, "Environmental assessment of shredder residue management", Resources, Conservation and Recycling 47 (2006) 1-25

B. Boughton, "Evaluation of shredder residue as cement manufacturing feedstock", Resources, Conservation and Recycling 51 (2007) 621-642

US EPA, 40 CFR 63 National Emission Standards for Hazardous Air Pollutants from the Portland Cement Manufacturing Industry; Final Rule and Proposed Rule

ATTACHMENT 1

40 CFR Part 63

National Emission Standards for Hazardous Air Pollutants from the Portland Cement Manufacturing Industry; Final Rule and Proposed Rule

B. Determination of MACT for HCl Emissions

Pages 76527 - 76529

Because the final standard is more stringent than the standard EPA proposed, the compliance date for sources which commenced construction after December 2, 2005, and before promulgation of this final rule is three years from December 20, 2006. See section 112(i)(2). New sources that commence construction after the date of promulgation of today's action must comply with the final rule upon start-up. However, as we are reconsidering the new source mercury standard and plan to take final action on that reconsideration in no more than a year and as construction of a new kiln generally takes at least 20–24 months, it is unlikely that any new source will be subject to the standard before completion of reconsideration.

We are also requiring that new sources demonstrate compliance by doing mercury emission testing with the raw mill off and with the raw mill on. The reason to test under both conditions is that (as explained in section A.1.c above) one other operation factor besides wet scrubber performance affecting emissions is the recycling of CKD. A facility could cut off CKD recycling for purposes of meeting the emission limit during testing with raw mill off, and then start recycling after the test which could result in the emissions limit being exceeded. We could simply limit CKD recycling to the level during the raw mill off test, but we believe this would potentially and needlessly restrict the ability of a facility to recycle CKD during raw mill on operation. During the test under each condition, the facility must record the amount of CKD recycle. The amount of CKD recycle becomes an operating limit not to be exceeded.

The limit for new sources adopted here also applies to both area and major new sources. We have applied this limit to area sources consistent with section 112(c)(6).

For facilities that elect to meet mercury emissions limits using ACI, we are incorporating the operating and monitoring requirements for ACI that are applicable when ACI is used for dioxin control.

B. Determination of MACT for HCl Emissions

In developing the 1999 Portland Cement NESHAP we concluded that no add-on air pollution controls were being used whose performance could be used as a basis for the MACT floor for existing Portland cement plants. For new source MACT, we identified two kilns that were using alkaline scrubbers for the control of SO2 emissions. But we concluded that because these devices were operated only intermittently, their performance could not be used as a basis for the MACT floor for new sources. Alkaline scrubbers were then considered for beyond-the-floor controls. Using engineering assessments from similar technology operated on municipal waste combustors and medical waste incinerators, we estimated costs and emissions reductions. Based on the costs of control and emissions reductions that would be achieved, we determined that beyond-the-floor controls were not warranted (63 FR 14203, March 24, 1998).

In the proposed amendments, we reexamined establishing a floor for control of HCl emissions from new Portland cement sources. Since promulgation of the NESHAP, wet scrubbers have been installed and are operating at a minimum of five Portland cement plants. See section IV.A.1.d above. For the reasons described above, this is an insufficient number of scrubbers on which to base an existing source floor for this category (id.). We did, however, propose to base the floor for new sources on the performance of continuously operated alkaline scrubbers, and proposed emissions levels of 15 ppmv at the control device outlet, or a 90 percent HCl emissions reduction measured across the scrubber, as the new source floor.

We also reexamined the MACT floor for existing sources. The only potential controls identified as a floor option was the operation of the kiln and PM control device themselves. Because the kiln and PM control system contain large amounts of alkaline CKD, the kilns themselves remove a significant amount of HCl (which reacts with the CKD and is captured as particulate). See 70 FR 72337 and 69 FR 21259 (April 20, 2004). We proposed as a floor the operation of the kiln and PM control as a work practice standard.

We also evaluated requiring the use of an alkaline scrubber as a beyond-the-floor control option for existing sources. We found that the costs and non-air quality health and environmental impacts were not reasonable for the emissions reductions achieved.

We also solicited comment on adopting alternative risk-based emission standards for HCl pursuant to section 112(d)(4) of the CAA (70 FR 72337). We suggested two possible approaches for establishing such standards. Under the first approach an alternative risk-based standard would be based on national exposure standards determined by EPA to ensure protection of public health with an ample margin of safety, and to be protective of the environment. For reasons discussed below we have decided to adopt this approach. Under the second approach, which we are not adopting, site specific risk analyses would be used to establish standards on a case-by case basis.

After careful consideration of the comments on the proposed amendments, we are not requiring control of HCl emissions from cement kilns under section 112(d). Under the authority of section 112(d)(4) of the CAA, we have determined that no further control is necessary because HCl is a "health threshold pollutant," and human health is protected with an ample margin of safety at current HCl emission levels. The following explains the statutory basis for considering health thresholds when establishing standards and the basis for today's decision, including a discussion of the risk assessment conducted to support the decision.

Section 112 of the CAA includes exceptions to the general statutory requirement to establish emission standards based on MACT. Of relevance here, section 112(d)(4) allows us to develop risk-based standards for HAP "for which a health threshold has been established" provided that the standards achieve an "ample margin of safety." Therefore, we believe we have the discretion under section 112(d)(4) to develop standards which may be less stringent than the corresponding technology-based MACT standards for threshold hazardous air pollutants emitted by some source categories. See 67 FR 78054, December 20, 2002 and 63 FR 18765, April 15, 1998.

In evaluating potential standards for HCl for this source category, we seek to assure that emissions from every source in the category result in exposures not causing adverse effects, with an ample margin of safety, even for an individual exposed at the upper end of the exposure distribution. The upper end of the exposure distribution is calculated using the "high end exposure estimate," defined as a plausible estimate of individual exposure for those persons at the upper end of the exposure distribution, conceptually above the 90th percentile, but not higher than the individual in the population who has the highest exposure. We believe that assuring protection to persons at the upper end of the exposure distribution is consistent with the "ample margin of safety" requirement in section 112(d)(4).

Our decision not to develop standards for HCl from cement kilns is based on the following. First, we consider HCl to be a threshold pollutant. See 63 FR 18767, 67 FR 78054, and 70 FR 59407, October 12, 2005. Second, we have defined threshold values for HCl in the form of an Inhalation Reference Concentration (RfC) and acute exposure guideline level (AEGL). Third, HCl is emitted from cement kilns in quantities that result in human exposure in the ambient air at levels well below these threshold values with an ample margin of safety. Finally, there are no adverse environmental effects associated with HCl emissions from cement kilns. The bases and supporting rationale for these conclusions are as follows.

For the purposes of section 112(d)(4), several factors are considered in our decision on whether a pollutant should be categorized as a health threshold pollutant. These factors include evidence and classification of carcinogenic risk and evidence of noncarcinogenic effects. For a detailed discussion of factors that we consider in deciding whether a pollutant should be categorized as a health threshold pollutant, please see the April 15, 1998, **Federal Register** document (63 FR 18766). In the April 15, 1998, action cited above, we determined that HCl, a Group D pollutant, is a health threshold pollutant for the purpose of section 112(d)(4) of the CAA (63 FR 18753).

The Portland Cement Association (PCA) conducted a risk assessment to determine whether the emissions of HCl from cement kilns at the current baseline levels resulted in exposures below the threshold values for HCl. We reviewed the risk assessment report prepared by the PCA and believe that it uses a reasonable and conservative methodology, is consistent with EPA methodology and practice, and reaches a reasonable conclusion that current levels of HCl emissions from cement kilns would be well under the threshold level of concern even for assumed worst-case human receptors.

The PCA analysis evaluated long-term and short-term ambient air concentrations resulting from emissions of HCl from Portland cement kilns in order to quantify potential non-cancer risks associated with such emissions, as well as to characterize potential ecological effects of those emissions. The approach is based on the USEPA guidance document entitled "A Tiered Modeling Approach for Assessing the Risks Due to Sources of Hazardous Air Pollutants" (USEPA 1992) (Tiered Modeling Approach) and is consistent with EPA risk characterization guidance "Air Toxics Risk Assessment Reference Library—Volume 2—Facility-Specific Assessment" (USEPA, 2004). The PCA conducted dispersion modeling for 67 cement plants and 112 cement kilns, representing about two-thirds of all operating cement plants in the U.S., using stack parameter data provided by cement companies and conservative assumptions regarding (among other factors) HCl stack concentrations, operating conditions, receptor locations, and dispersion characteristics. The kilns for which data were provided cover a full range of kiln types, operating conditions, and stack parameters. The three-tiered modeling approach consists of:

- Tier 1—Lookup tables.
- Tier 2—Screening dispersion modeling.
- Tier 3—Detailed dispersion modeling.

The concentration estimates from each modeling tier should be more accurate and less conservative than the previous one. As a result, the level of complexity of the modeling and data input information required for each tier is greater than for the previous tier. If a plant showed emissions below the threshold concentration in any tier, that plant was not included in the next tier of modeling.

In order to evaluate potential health impacts it is necessary to establish long term concentration thresholds. The RfC is a long-term threshold, defined as an estimate of a daily inhalation exposure that, over a lifetime, would not likely result in the occurrence of significant noncancer health effects in humans. We have determined that the RfC for HCl of 20 micrograms per cubic meter ($\mu g/m^3$) is an appropriate threshold value for assessing risk to humans associated with exposure to HCl through inhalation (63 FR 18766, April 15, 1998). Therefore, the PCA used this RfC as the threshold value in their exposure assessment for HCl emitted from cement kilns.

The general approach was that actual release characteristics were used for stack height, stack diameter, exit temperature, and exit velocity, based on information provided by the individual facilities modeled by the PCA. The analyses performed under each tier assumed worst case operating scenarios, such as maximum production rate and 24 hours per day, 365 days per year operation, and that all kilns were located 10 meters from the property boundary line. HC1 emission rates were assumed to be 130 ppmv for all kiln types. This is an extremely conservative number. Hydrogen chloride emission rates are below 10 ppmv at most facilities, and the highest value for which we have data is below 45 ppmv. In the Tier 2 analyses, worse case metrological conditions were assumed. Further, it is important to note that these predicted impacts are located adjacent to facility property lines, many times in locations where chronic exposure is not expected. Impacts at potential residential locations would be expected to be significantly below those presented in the analysis.

The PCA study generated estimates of chronic (annual average) concentrations for comparison to the relevant health reference values or threshold levels. Chronic exposures were compared to the RfC of 20 $\mu g/m^3$ for long-term continuous exposure.

Noncancer risk assessments typically use a metric called the Hazard Quotient (HQ) to assess risks of exposures to noncarcinogens. The HQ is the ratio of exposure (or modeled concentration) to the health reference value or threshold level (i.e., RfC or REL). HQ values less than 1 indicate that exposures are below the health reference value or threshold level and are likely to be without appreciable risk of adverse effects in the exposed population. HQ values above 1.0 do not necessarily imply that adverse effects will occur, but that the potential for risk of such effects increases as HQ values exceed 1.0.

For the PCA assessment, if the HQ was found to be less than one for any of the tiers using conservative defaults and modeling assumptions, the analysis concluded with that tier. On the other hand, if the HQ exceeded one, analysis proceeded to subsequent tiers.

The Tier 1 modeling resulted in an HQ above 1 for most facilities. Therefore, a Tier 2 analysis was required. In the Tier 2 analysis, all facilities except for five showed an HQ below 1.

For the five facilities with an HQ above 1, additional data were obtained on the actual HCl and stack moisture concentrations at these facilities and the Tier 2 modeling analysis was rerun. The refined Tier 2 analysis resulted in HQ values of 0.30 or less for all five facilities.

Thus, we have evaluated and are comfortable with PCA's calculations and feel confident that exposures to HCl emissions from the facilities in question are unlikely to ever exceed an HQ of 1.0. Therefore, we believe that the predicted exposures from these facilities should still be protective of human health with an ample margin of safety. Put another way, total exposures for nearby residents would not exceed the short-term or long-term health based threshold levels or health reference values. Similarly, based on the PCA analysis we believe that the acute exposure to HC1 for these facilities would not exceed the short-term, health-based threshold level.

The standards for emissions must also protect against significant and widespread adverse environmental effects to wildlife, aquatic life, and other natural resources. The PCA did not conduct a formal ecOological risk assessment. However, we have reviewed publications in the literature to determine if there would be reasonable expectation for serious or widespread adverse effects to natural resources.

We consider the following aspects of pollutant exposure and effects: toxicity effects from acute and chronic exposures to expected concentrations around the source (as measured or modeled), persistence in the environment, local and long-range transport, and tendency for biomagnification with toxic effects manifest at higher trophic levels.

No research has been identified for effects on terrestrial animal species beyond that cited in the development of the HCl RfC. Modeling calculations indicate that there is little likelihood of chronic or widespread exposure to HCl at concentrations above the threshold around cement manufacturing plants. Based on these considerations, we believe that the RfC can reasonably be expected to protect against widespread adverse effects in other animal species as well.

Plants also respond to airborne HCl levels. Chronic exposure to about 600 μg/m3 can be expected to result in discernible effects, depending on the plant species. Further, in various species given acute, 20 minute exposures of 6,500 μg/m3, field studies report different sensitivity to damage of foliage. The maximum modeled long-term HCl concentration (less than 100 μg/m^3) is well below the 600 μg/m^3 chronic threshold, and the maximum short-term HCl concentration (less than 1600 μg/m^3) is well below the 6,500 μg/m^3 acute exposure threshold. Therefore, no adverse exposure effects on plant species are anticipated.

HCl is not considered to be a strongly persistent pollutant or one where long range transport is important in predicting its ecological effects. In the atmosphere, HCl can be expected to be absorbed into aqueous aerosols, due to its great affinity for water, and removed from the troposphere by rainfall. Toxic effects of HCl to aquatic organisms would likely be due to the hydronium ion, or acidity. Aquatic organisms in their natural environments often exhibit a broad range of pH tolerance. Effects of HCl deposition to small water bodies and to soils will primarily depend on the extent of neutralizing by carbonates or other buffering compounds. Chloride ions are essentially ubiquitous in natural waters and soils so minor increases due to deposition of dissolved HCl will have much less effect than the deposited hydronium ions.

In conclusion, acute and chronic exposures to expected HCl concentrations around cement kilns are not expected to result in adverse environmental toxicity effects. HC1 is not persistent in the environment. Effects of HCl on ponds and soils are likely to be local rather than widespread. Finally, HCl is not believed to result in biomagnification or bioaccumulation in the environment. Therefore, we do not anticipate any adverse ecological effects from HCl.

The results of the exposure assessment showed that exposure levels to baseline HCl emissions from cement production facilities are well below the health threshold value. Additionally, the threshold values, for which the RfC and AEGL values were determined to be appropriate values, were not exceeded when considering conservative estimates of exposure resulting from cement kiln emissions as well as considering background exposures to HCl and therefore, represent an ample margin of safety. Furthermore, no significant or widespread adverse environmental effects from HCl are anticipated. Therefore, under authority of section 112(d)(4), we have determined that further control of HCl emissions from new or existing cement manufacturing plants under section 112(d) is not necessary.

C. Determination of MACT for THC Emissions

1. Floor Determinations

THC serve as a surrogate for non-dioxin organic HAP emissions for this source category. During the development of the 1999 Portland Cement NESHAP, EPA identified no add-on air pollution control technology being used in the Portland cement industry whose performance could be used as a basis for establishing a MACT floor for controlling THC emissions from existing sources. EPA did identify two kilns using a system consisting of a precalciner (with no preheater), which essentially acts as an afterburner to combust organic material in the feed. The precalciner/no preheater system was considered a possible basis for a beyond-the-floor standard for existing kilns and as a possible basis for a MACT floor for new kilns. However, this system was found to increase fuel consumption relative to a preheater/precalciner design, to emit six times as much SO_2, two and one half times as much NO_X, and 1.2 times as much CO_2 as a preheater/precalciner kiln of equivalent clinker capacity. Taking into account the adverse energy and environmental impacts, we determined that the precalciner/no preheater design did not represent MACT (63 FR 14202, March 24, 1998). We also considered feed material selection for existing sources as a MACT floor technology and concluded that this option is not available to existing kilns, or to new kilns located at existing plants because these facilities generally rely on existing raw material sources located close to the source due to the cost of transporting the required large quantities of feed materials. However, for new greenfield kilns, feed material selection as achieved through appropriate site selection and feed material blending is demonstrated and is the basis for new source MACT (63 FR 14202, March 24, 1998).

In our proposed amendments we reexamined MACT for THC for both new and existing facilities. We proposed to adopt the same standards for Portland cement kilns as are applicable to kilns that fire hazardous waste (40 CFR 63.1220(a)(5)). Those standards are based on using good combustion conditions to destroy hazardous air pollutants in fuels. Our rationale for proposing to adopt these standards was that the THC and carbon monoxide (CO) standards guarantee that the kiln will operate under good combustion conditions and will minimize formation (and hence, emissions) of non-dioxin organic HAP from fuel combustion. We believed that the control of THC emissions from cement kilns which do not fire hazardous waste should be no more difficult to control than emissions for kilns that do fire hazardous waste because GCP are maintainable by either type of kiln, and the hazardous waste cement kilns would be the more challenged in that regard. Because we had no data upon which to set a different standard, and because we believed these levels were indicative of good combustion in any case, the adoption of the standards for cement kilns firing hazardous waste was deemed appropriate.

We continue to believe that good fuel combustion conditions are indicative of the performance of the median of the best performing 12 percent of existing sources for controlling non-dioxin organic HAP. However, based on comments received on the proposed amendments, and additional emission data analysis, we believe our proposed quantified method of monitoring good fuel combustion, i.e. setting specific THC or CO levels, was flawed.

Industry commenters had noted that the majority of the THC emissions from a cement kiln main stack result from the

ATTACHMENT 2

Trace Metal Report - VDZ

5.11 Gaseous inorganic chlorine compounds (HCl)

Chlorides are minor additional constituents contained in the raw materials and fuels of the clinker burning process. They are released when the fuels are burnt or the kiln feed is heated, and primarily react with the alkalis from the kiln feed to form alkali chlorides. These compounds, which are initially vaporous, condense on the kiln feed or the kiln dust, respectively, at temperatures between 700 °C and 900 °C, subsequently re-enter the rotary kiln system and evaporate again. This cycle in the area between the rotary kiln and the preheater can result in coating formation. A bypass at the kiln inlet allows to effectively reduce alkali chloride cycles and to thus diminish operational malfunctions.

During the clinker burning process, gaseous inorganic chlorine compounds are either not emitted at all or in very small quantities only. Owing to the alkaline kiln gas atmosphere, the formation of hydrogen chloride (HCl) in the exhaust gas can be virtually ruled out. Gaseous inorganic chlorides detected in the exhaust gas of rotary kiln systems are generally attributable to ultra-fine grain size fractions of alkali chlorides in the clean gas dust. They can pass through measuring gas filters, thus feigning the presence of the gaseous compounds.

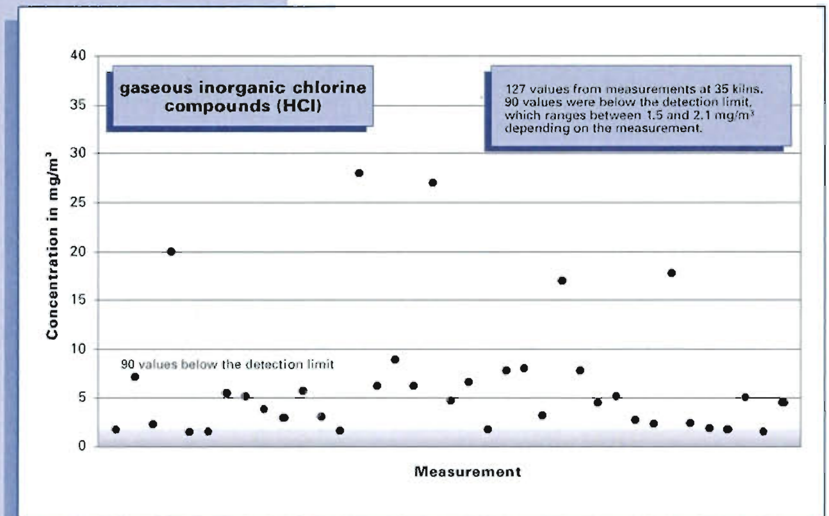


Fig. 5-21: Gaseous inorganic chlorine compound concentration values (year 2001) measured in the clean gas of 35 rotary kilns and given as HCl.

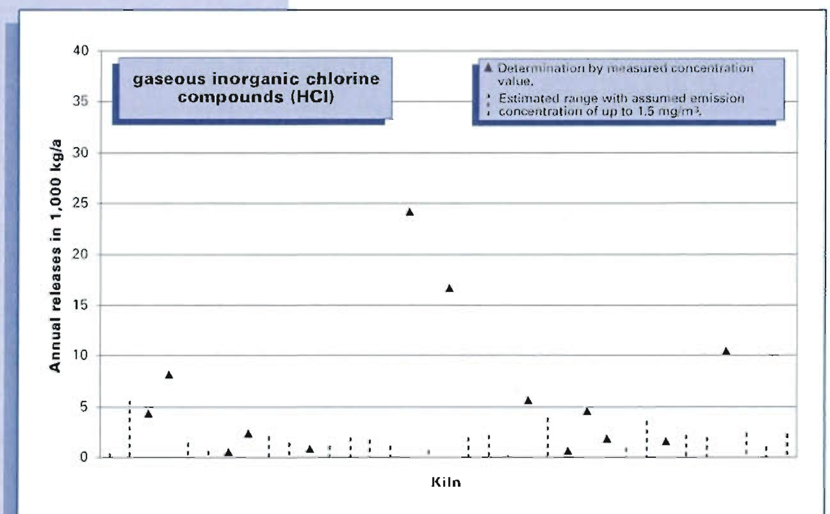


Fig. 5-22: HCl emissions (annual releases in 2001) of 35 rotary kilns.
If the values measured are below the detection limit, the releases can only be estimated. In these cases, the range of possible emissions is represented by a broken line, the upper limit of which was calculated using a concentration of 1.5 mg/m³.

5.12 Gaseous inorganic fluorine compounds (HF)

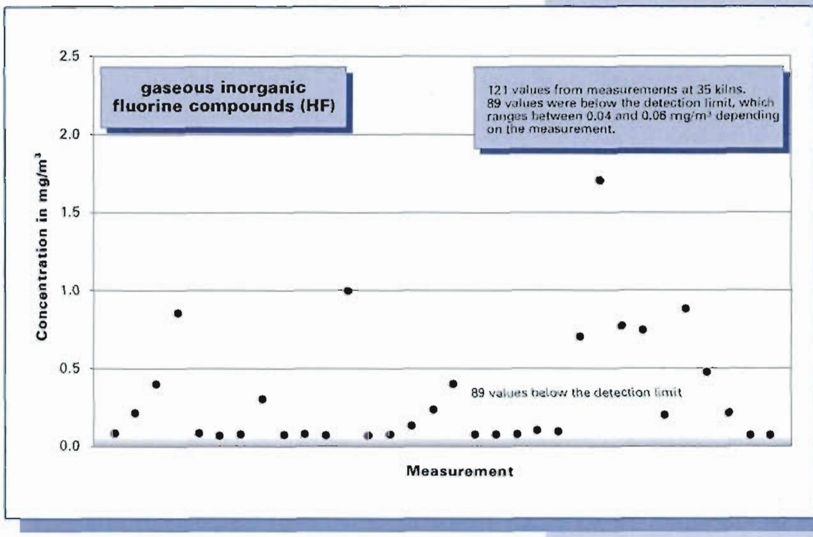


Fig. 5-23: Gaseous inorganic fluorine compound concentration values (year 2001) measured in the clean gas of 35 rotary kilns and given as HF.

Of the fluorine present in rotary kilns, 90 to 95 % is bound in the clinker, and the remainder is bound with dust in the form of calcium fluoride stable under the conditions of the burning process. Owing to the great calcium excess, the emission of gaseous fluorine compounds, and of hydrogen fluoride in particular, is virtually excluded. Ultra-fine dust fractions that pass through the measuring gas filter may feign low contents of gaseous fluorine compounds in rotary kiln systems of the cement industry.

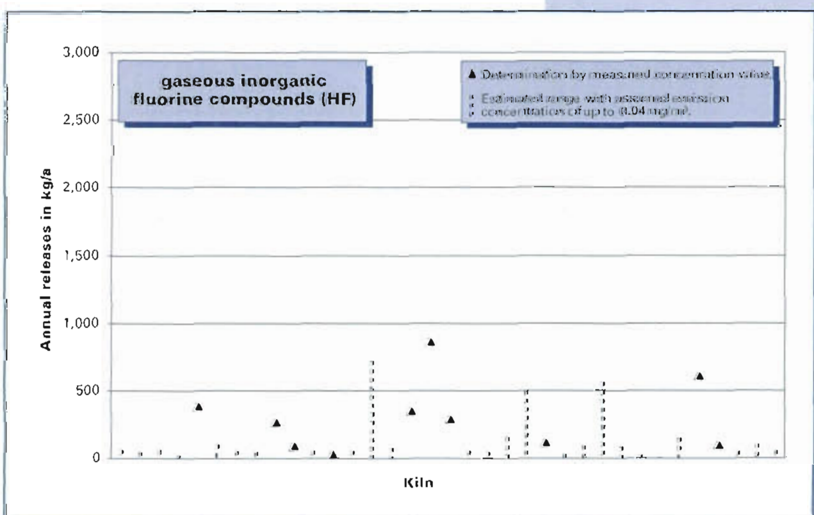


Fig. 5-24: HF emissions (annual releases in 2001) of 35 rotary kilns.
If the values measured are below the detection limit, the releases can only be estimated. In these cases, the range of possible emissions is represented by a broken line, the upper limit of which was calculated using a concentration of 0.04 mg/m³.

5.13 Trace elements

The emission behaviour of the individual elements in the clinker burning process is determined by the input scenario, the behaviour in the plant and the precipitation efficiency of the dust collection device. The trace elements introduced into the burning process via the raw materials and fuels may evaporate completely or partially in the hot zones of the preheater and/or rotary kiln depending on their volatility, react with the constituents present in the gas phase, and condense on the kiln feed in the cooler sections of the kiln system. Depending on the volatility and the operating conditions, this may result in the formation of cycles that are either restricted to the kiln and the preheater or include the combined drying and grinding plant as well.

Trace elements from the fuels initially enter the combustion gases, but are emitted to an extremely small extent only owing to the retention capacity of the kiln and the preheater. Table 5-4 gives representative transfer coefficients for rotary kiln systems equipped with cyclone preheaters. These coefficients serve to calculate the proportion of trace elements from fuels emitted with the clean gas.

By contrast, the emission factors listed in the Table are higher than the corresponding transfer coefficients. Apart from fuel-related emissions, they also take into account raw material-related emissions, which usually predominate by a significant margin. The bandwidths indicated for the emission factors result from inventory investigations. No values are given for mercury since measurement results primarily depend on the respective operating conditions.

Component	EF in %	TC in %
Cadmium	< 0.01 bis < 0.2	0.003
Thallium	< 0.01 bis < 1	0.02
Antimony	< 0.01 bis < 0.05	0.0005
Arsenic	< 0.01 bis 0.02	0.0005
Lead	< 0.01 bis < 0.2	0.002
Chromium	< 0.01 bis < 0.05	0.0005
Cobalt	< 0.01 bis < 0.05	0.0005
Copper	< 0.01 bis < 0.05	0.0005
Manganese	< 0.001 bis < 0.01	0.0005
Nickel	< 0.01 bis < 0.05	0.0005
Vanadium	< 0.01 bis < 0.05	0.0005

Table 5-4: Emission factors (EF, emitted portion of the total input) and transfer coefficients (TC, emitted portion of the fuel input) for rotary kiln systems with cyclone preheater

Under the conditions prevailing in the clinker burning process, non-volatile elements (e.g. arsenic, vanadium, nickel) are completely bound in the clinker. Elements such as lead and cadmium preferably react with the excess chlorides and sulphates in the section between the rotary kiln and the preheater, forming low-volatile compounds. Owing to the large surface area available, these compounds condense on the kiln feed particles at temperatures between 700 °C and 900 °C. In this way, the low-volatile elements accumulated in the kiln-preheater-system are precipitated again in the cyclone preheater, remaining almost completely in the clinker.

Thallium and its compounds condense in the upper zone of the cyclone preheater at temperatures between 450 °C and 500 °C. As a consequence, a cycle can be formed between preheater, raw material drying and exhaust gas purification.

Mercury and its compounds are not precipitated in the kiln and the preheater. They condense on the exhaust gas route due to the cooling of the gas and are partially adsorbed by the raw material particles. This portion is precipitated in the kiln exhaust gas filter.

Owing to trace element behaviour during the clinker burning process and the high precipitation efficiency of the dust collection devices trace element emission concentrations are on a low overall level. For example, the average values measured in 2001 of the trace elements listed in the German regulation on waste incineration (17th BImSchV) were above the detection limit in merely about 20 % of all cases.

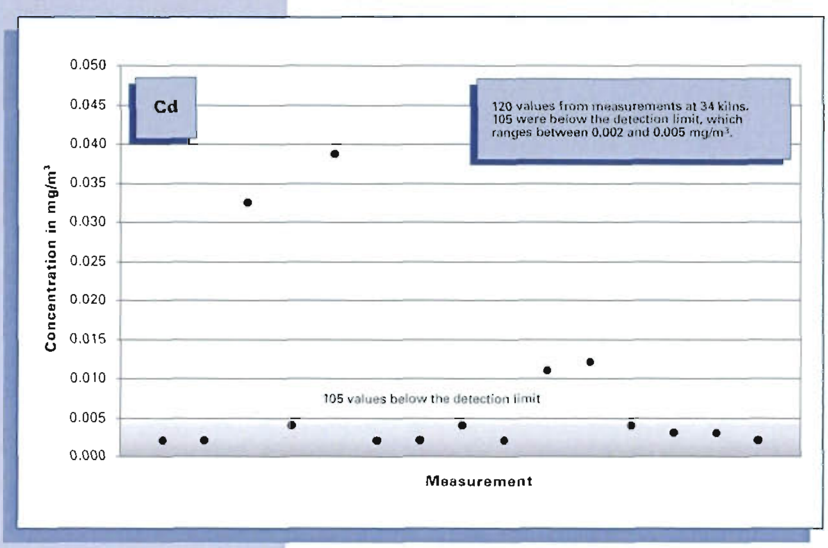


Fig. 5-25: Cadmium concentration values (year 2001) measured in the clean gas of 34 rotary kilns.

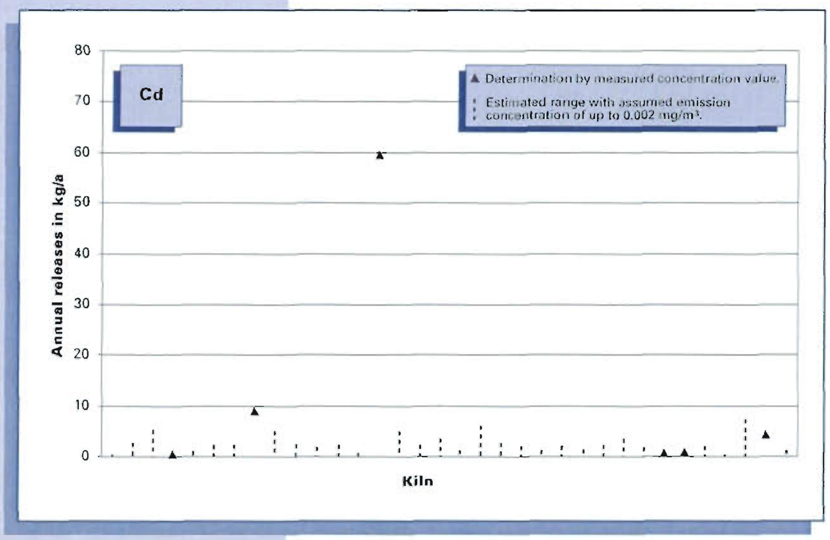


Fig. 5-26: Cadmium emissions (annual releases in 2001) of 34 rotary kilns.
If the values measured are below the detection limit, the releases can only be estimated. In these cases, the range of possible emissions is represented by a broken line, the upper limit of which was calculated using a concentration of 0.002 mg/m³.

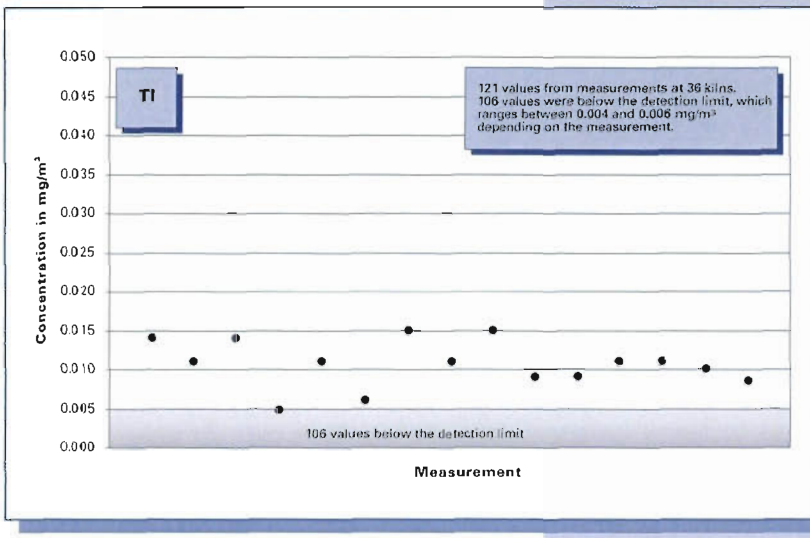


Fig. 5-27: Thallium concentration values (year 2001) measured in the clean gas of 36 rotary kilns.

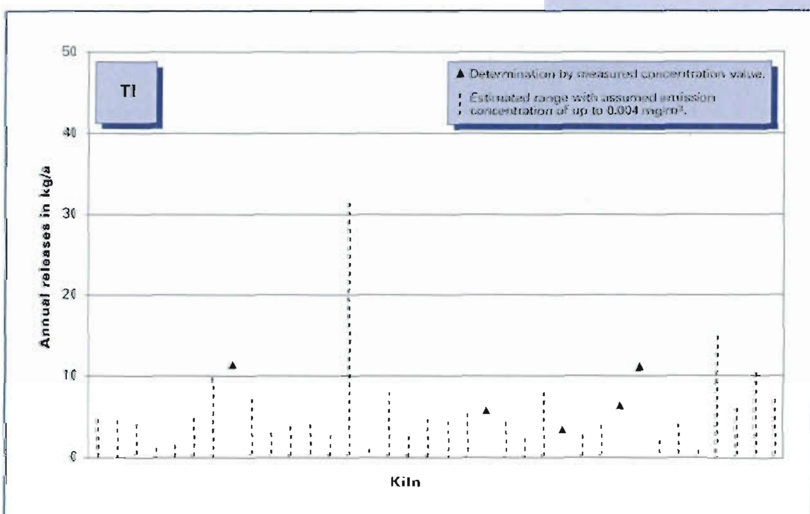


Fig. 5-28: Thallium emissions (annual releases in 2001) of 36 rotary kilns.
If the values measured are below the detection limit, the releases can only be estimated. In these cases, the range of possible emissions is represented by a broken line, the upper limit of which was calculated using a concentration of 0.004 mg/m³.

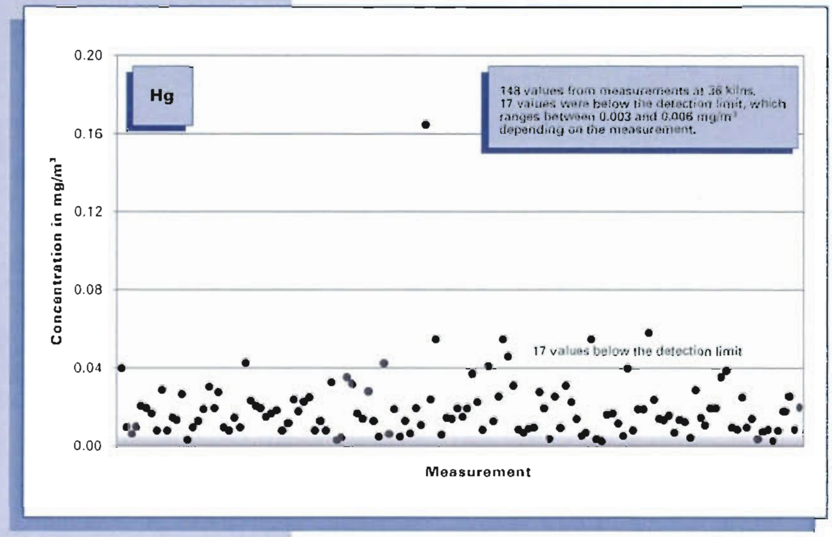


Fig. 5-29: Mercury concentration values (year 2001) measured in the clean gas of 36 rotary kilns.

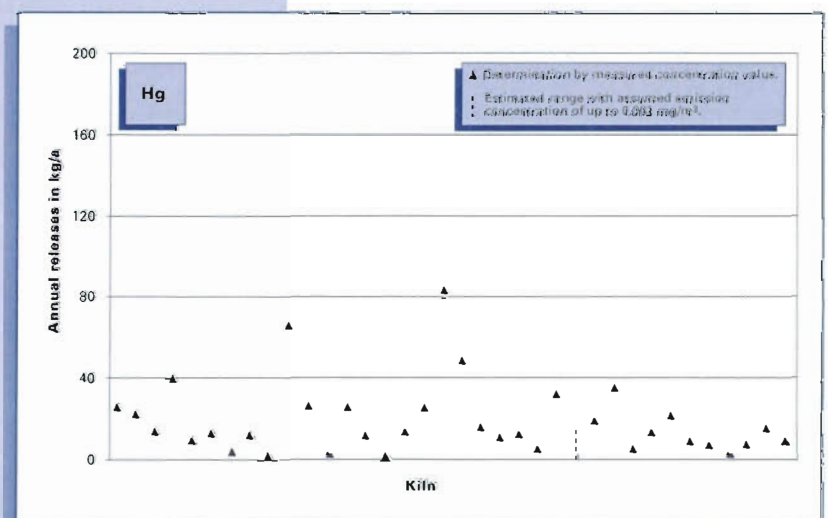


Fig. 5-30: Mercury emissions (annual releases in 2001) of 36 rotary kilns.
If the values measured are below the detection limit, the releases can only be estimated. In these cases, the range of possible emissions is represented by a broken line, the upper limit of which was calculated using a concentration of 0.003 mg/m³.

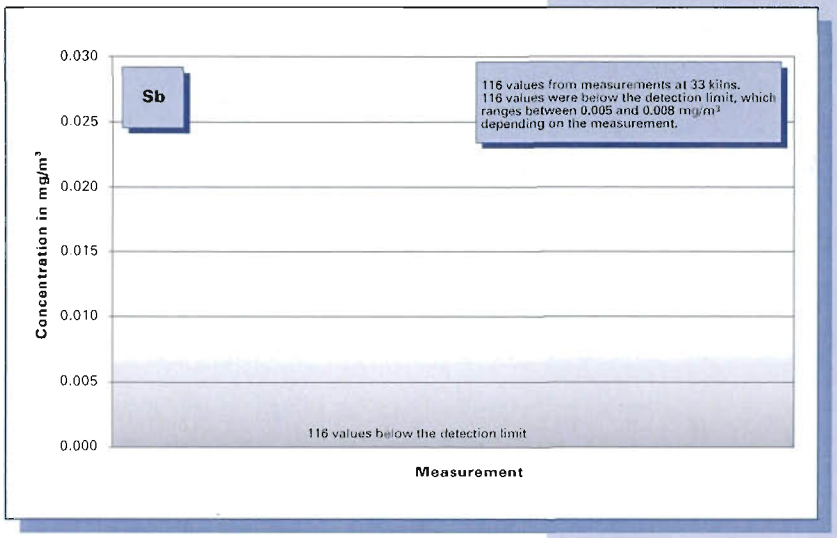


Fig. 5-31: Antimony concentration values (year 2001) measured in the clean gas of 33 rotary kilns.

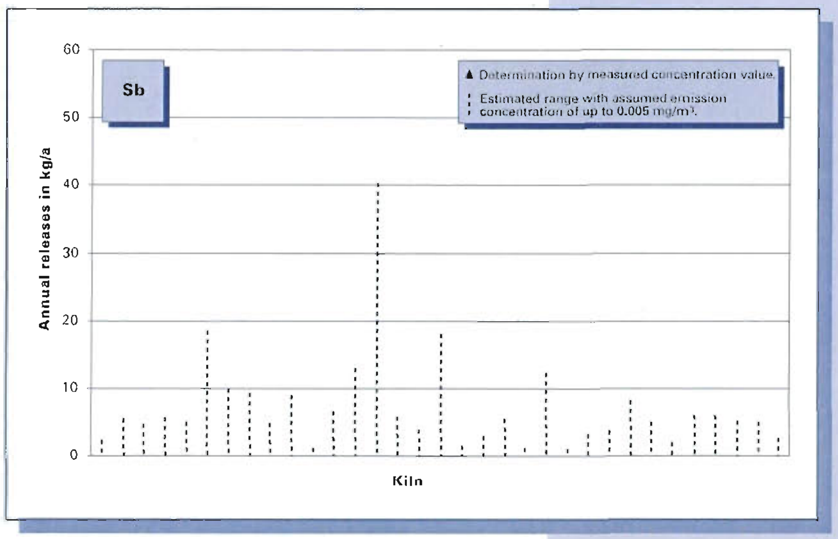


Fig. 5-32: Antimony emissions (annual releases in 2001) of 33 rotary kilns.
If the values measured are below the detection limit, the releases can only be estimated. In these cases, the range of possible emissions is represented by a broken line, the upper limit of which was calculated using a concentration of 0.005 mg/m³.

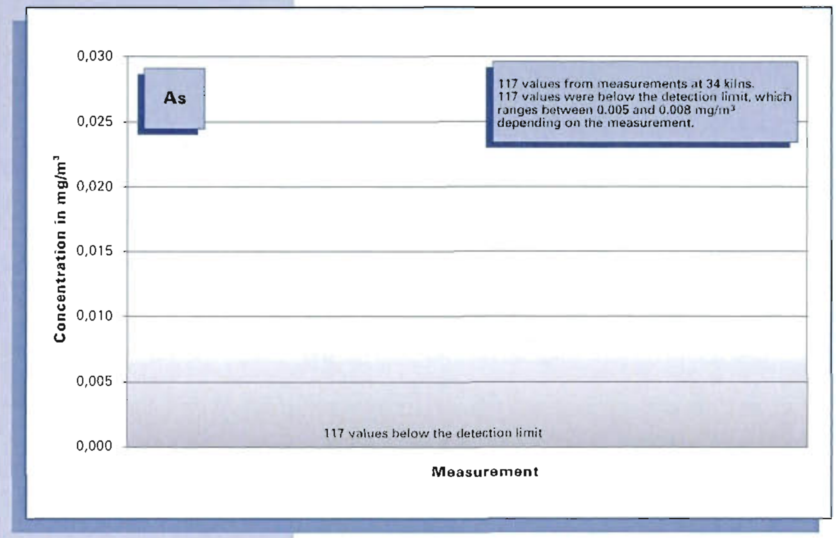


Fig. 5-33: Arsenic concentration values (year 2001) measured in the clean gas of 34 rotary kilns.

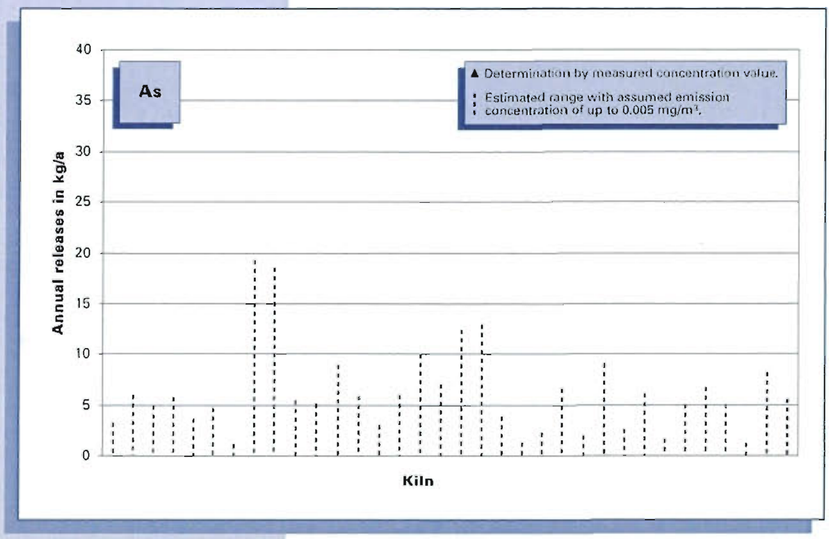


Fig. 5-34: Arsenic emissions (annual releases in 2001) of 34 rotary kilns.
If the values measured are below the detection limit, the releases can only be estimated. In these cases, the range of possible emissions is represented by a broken line, the upper limit of which was calculated using a concentration of 0.005 mg/m³.

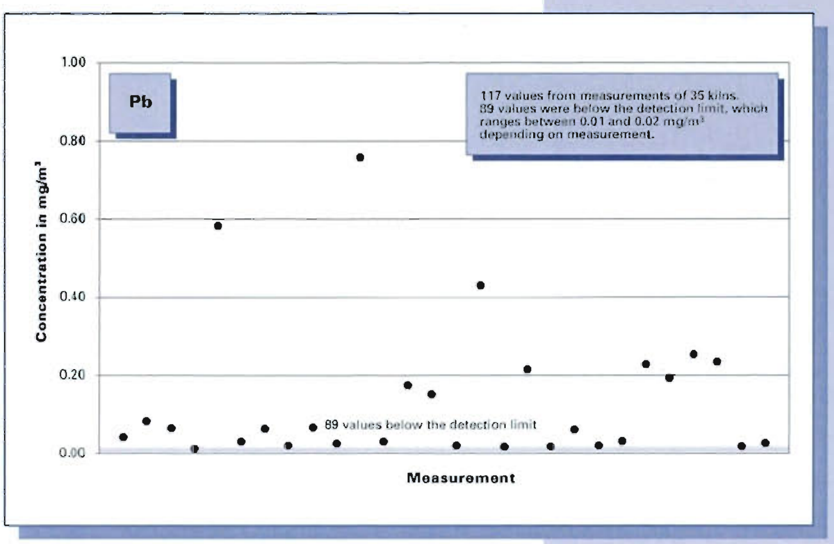


Fig. 5-35: Lead concentration values (year 2001) measured in the clean gas of 35 rotary kilns.

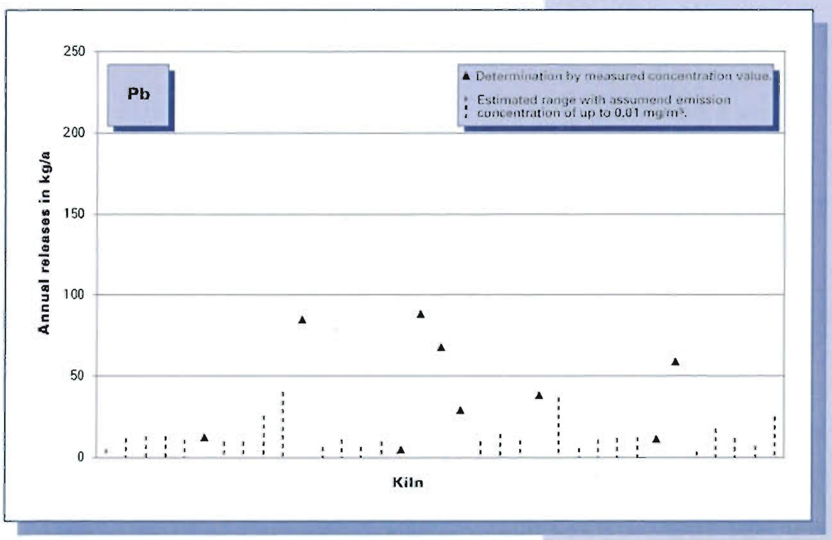


Fig. 5-36: Lead emissions (annual releases in 2001) of 35 rotary kilns.
If the values measured are below the detection limit, the releases can only be estimated. In these cases, the range of possible emissions is represented by a broken line, the upper limit of which was calculated using a concentration of 0.01 mg/m³.

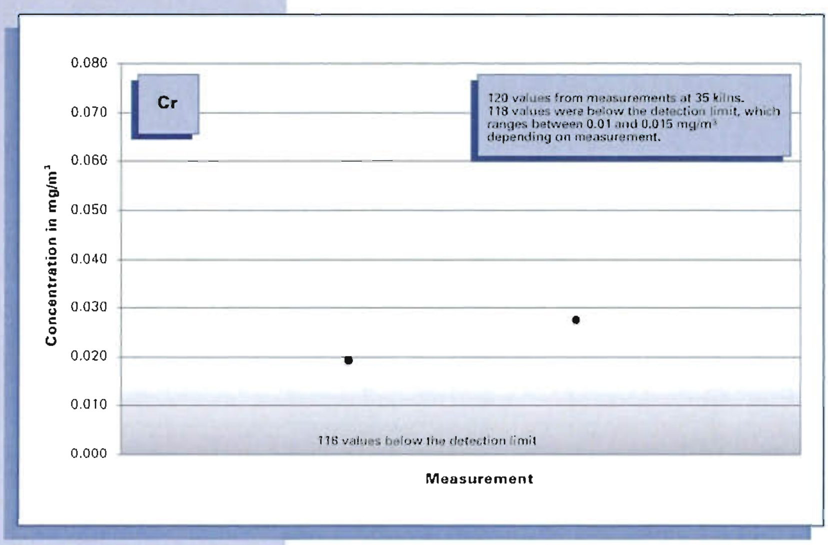


Fig. 5-37: Chromium concentration values (year 2001) measured in the clean gas of 35 rotary kilns.

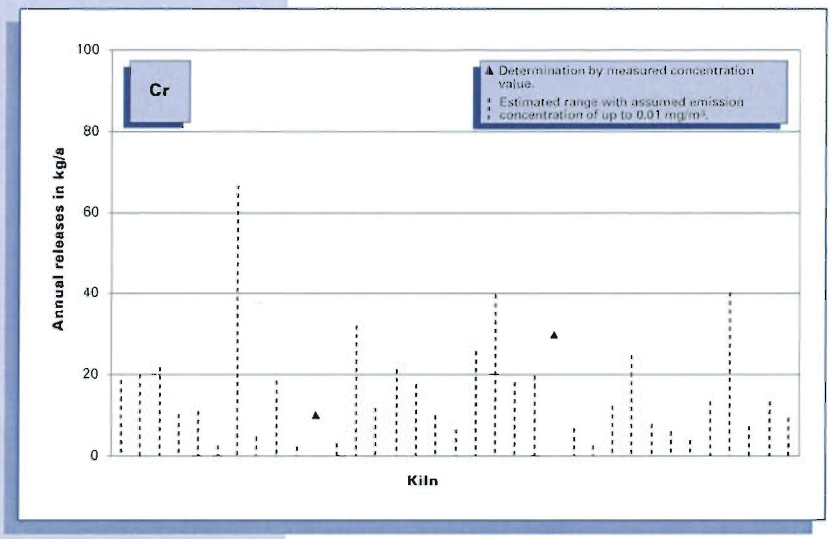


Fig. 5-38: Chromium emissions (annual releases in 2001) of 35 rotary kilns.
If the values measured are below the detection limit, the releases can only be estimated. In these cases, the range of possible emissions is represented by a broken line, the upper limit of which was calculated using a concentration of 0.01 mg/m³.

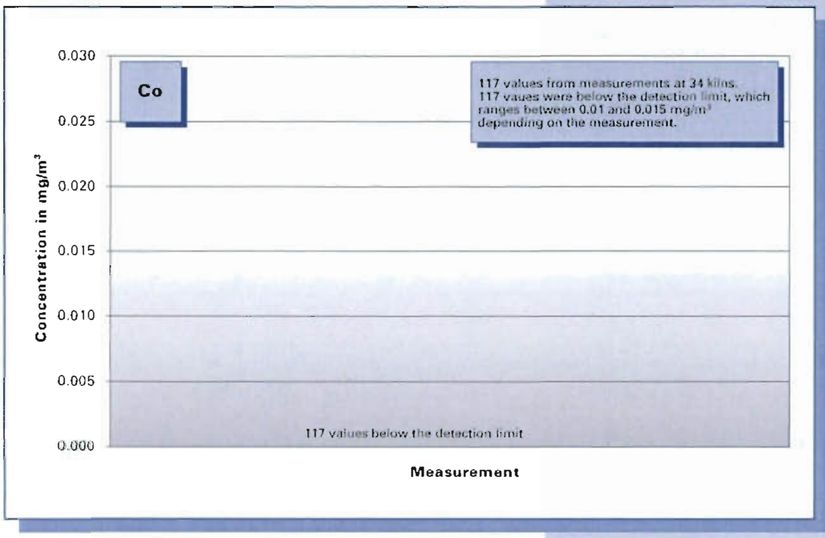


Fig. 5-39: Cobalt concentration values (year 2001) measured in the clean gas of 34 rotary kilns.

Fig. 5-40: Cobalt emissions (annual releases in 2001) of 34 rotary kilns.
If the values measured are below the detection limit, the releases can only be estimated. In these cases, the range of possible emissions is represented by a broken line, the upper limit of which was calculated using a concentration of 0.01 mg/m³.

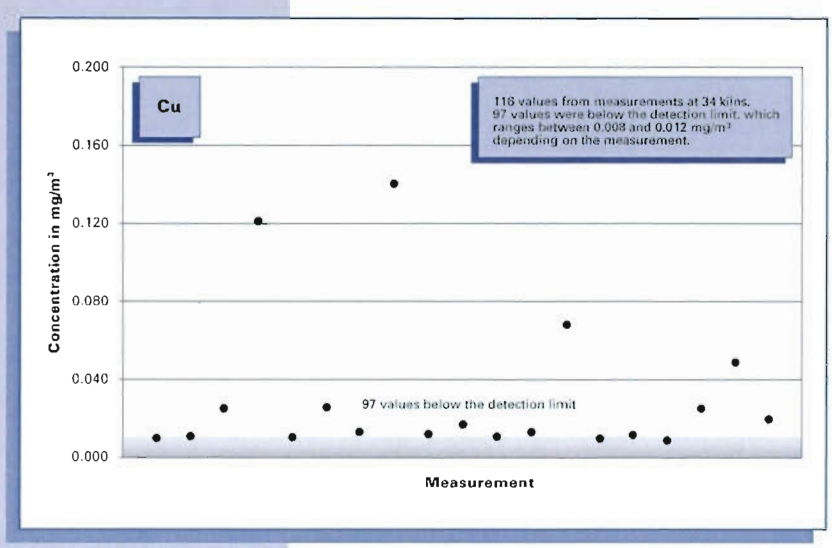


Fig. 5-41: Copper concentration values (year 2001) measured in the clean gas of 34 rotary kilns.

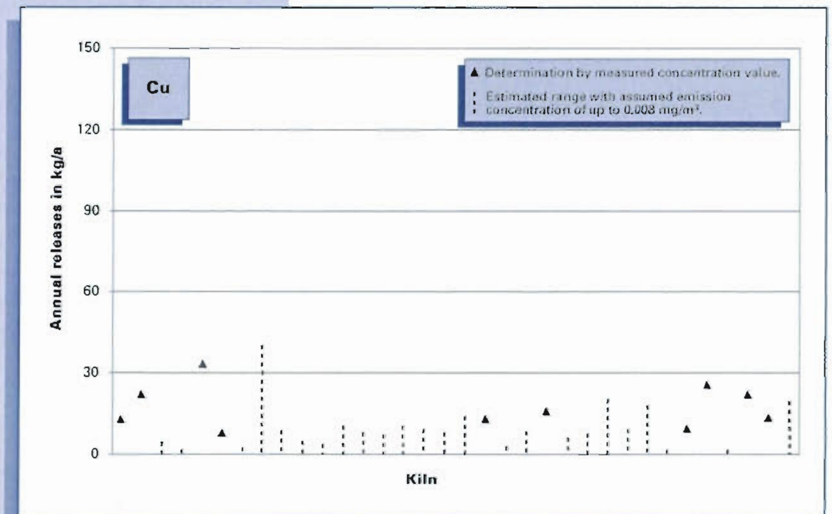


Fig. 5-42: Copper emissions (annual releases in 2001) of 34 rotary kilns.
If the values measured are below the detection limit, the releases can only be estimated. In these cases, the range of possible emissions is represented by a broken line, the upper limit of which was calculated using a concentration of 0.008 mg/m³.

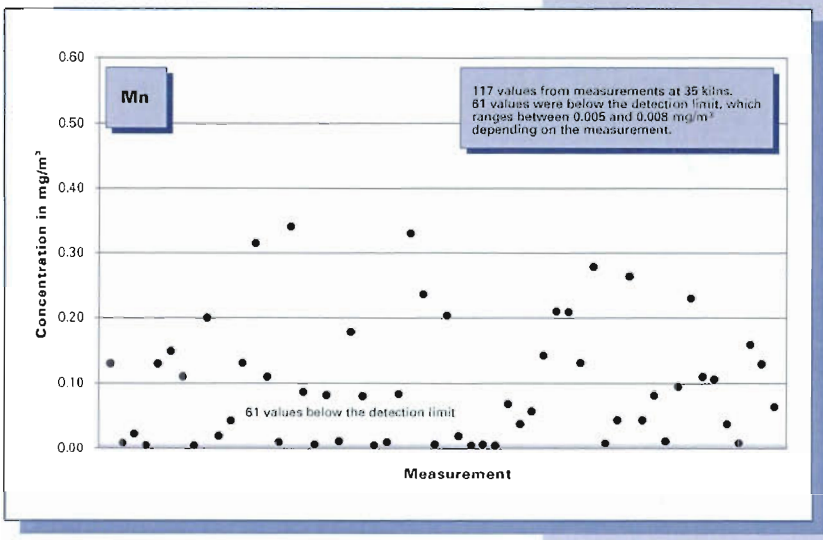


Fig. 5-43: Manganese concentration values (year 2001) measured in the clean gas of 35 rotary kilns.

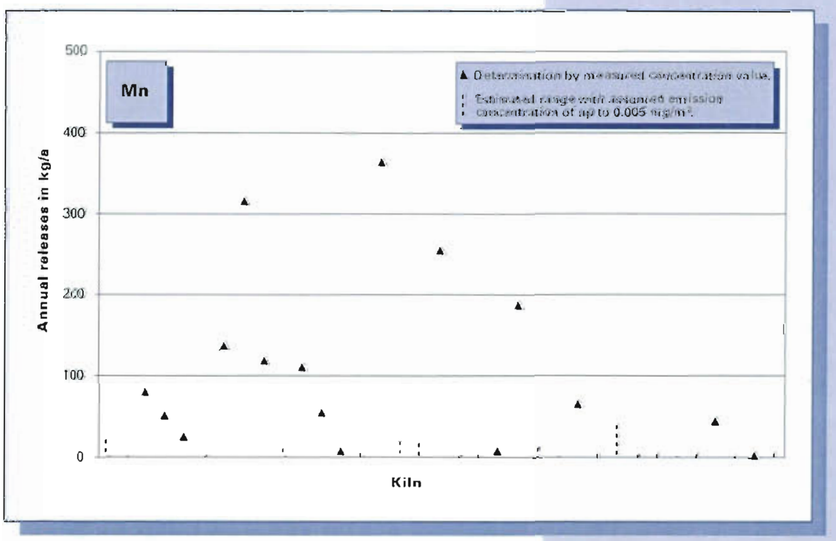


Fig. 5-44: Manganese emissions (annual releases in 2001) of 35 rotary kilns.
If the values measured are below the detection limit, the releases can only be estimated. In these cases, the range of possible emissions is represented by a broken line, the upper limit of which was calculated using a concentration of 0.005 mg/m³.

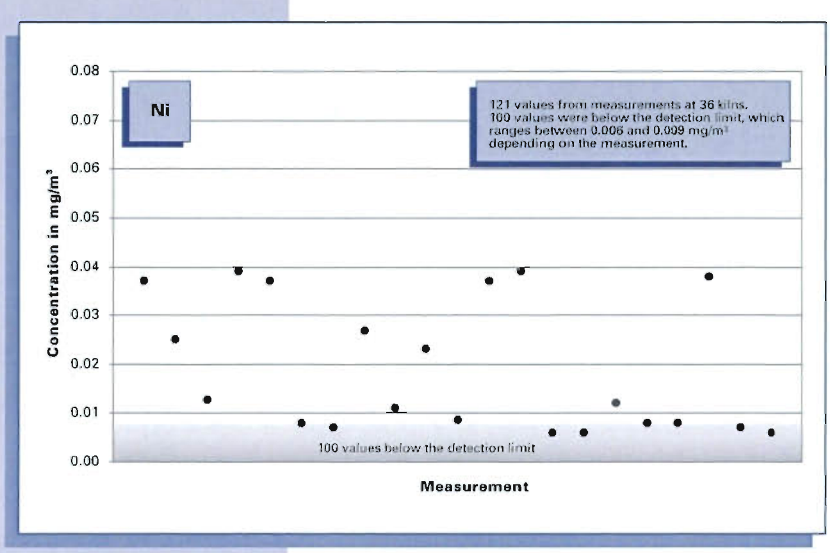


Fig. 5-45: Nickel concentration values (year 2001) measured in the clean gas of 36 rotary kilns.

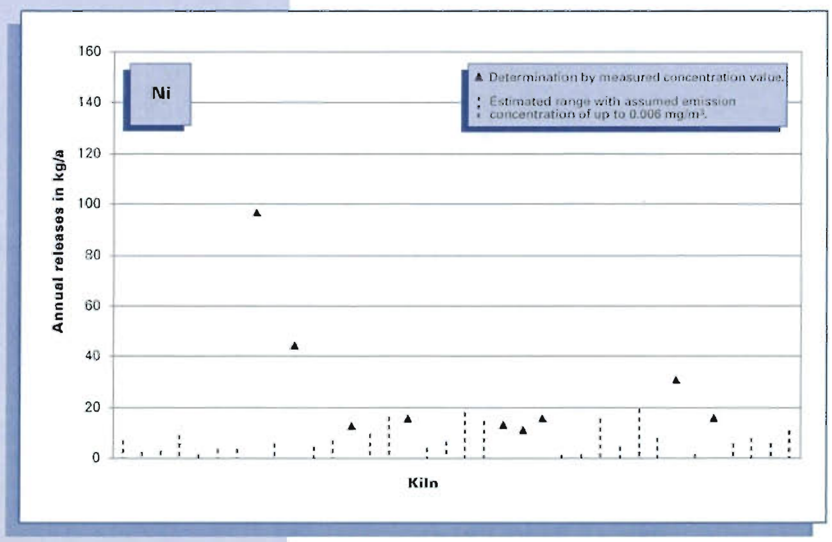


Fig. 5-46: Nickel emissions (annual releases in 2001) of 36 rotary kilns.
If the values measured are below the detection limit, the releases can only be estimated. In these cases, the range of possible emissions is represented by a broken line, the upper limit of which was calculated using a concentration of 0.006 mg/m³.

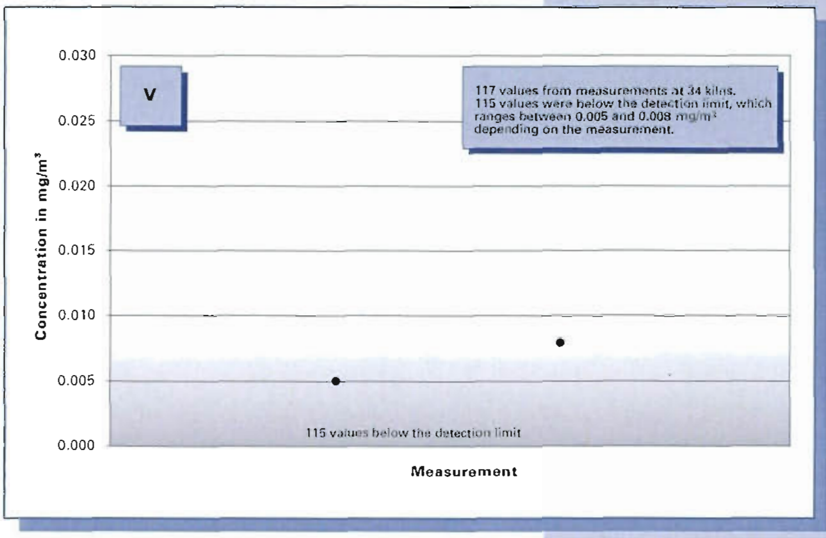


Fig. 5-47: Vanadium concentration values (year 2001) measured in the clean gas of 34 rotary kilns.

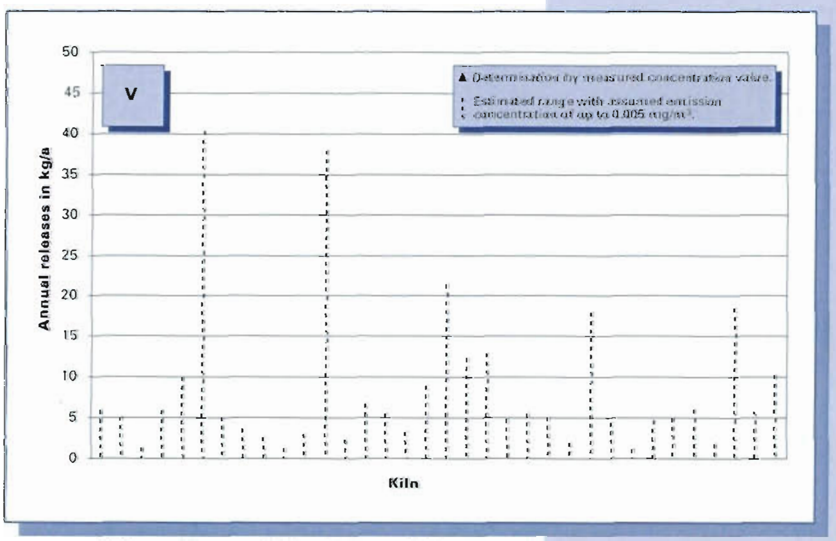


Fig. 5-48: Vanadium emissions (annual releases in 2001) of 34 rotary kilns.
If the values measured are below the detection limit, the releases can only be estimated. In these cases, the range of possible emissions is represented by a broken line, the upper limit of which was calculated using a concentration of 0.005 mg/m³.

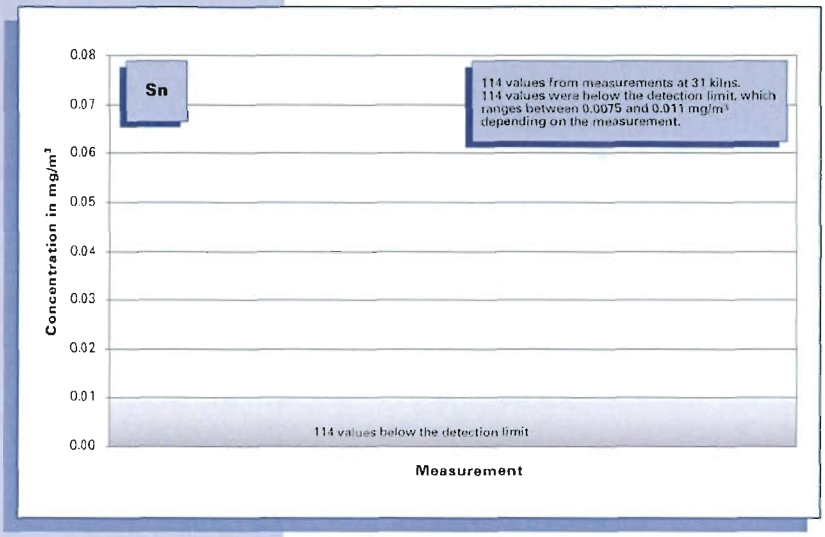


Fig. 5-49: Tin concentration values (year 2001) measured in the clean gas of 31 rotary kilns.

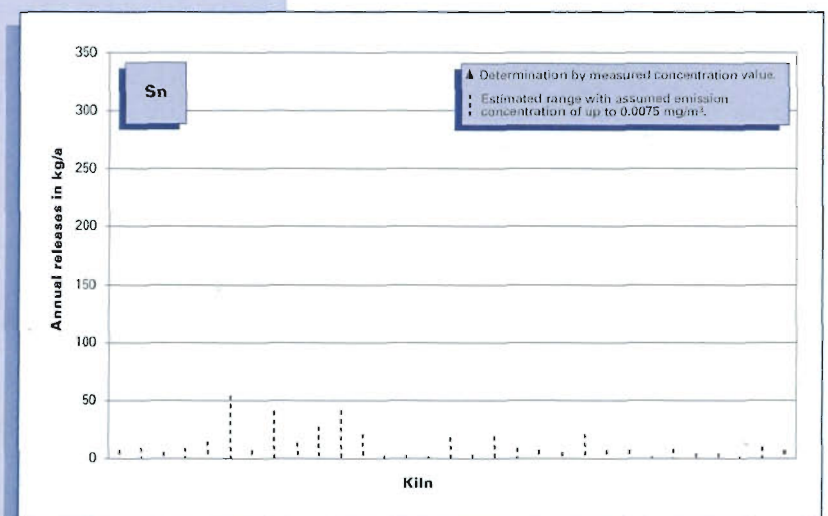


Fig. 5-50: Tin emissions (annual releases in 2001) of 31 rotary kilns.
If the values measured are below the detection limit, the releases can only be estimated. In these cases, the range of possible emissions is represented by a broken line, the upper limit of which was calculated using a concentration of 0.0075 mg/m³.

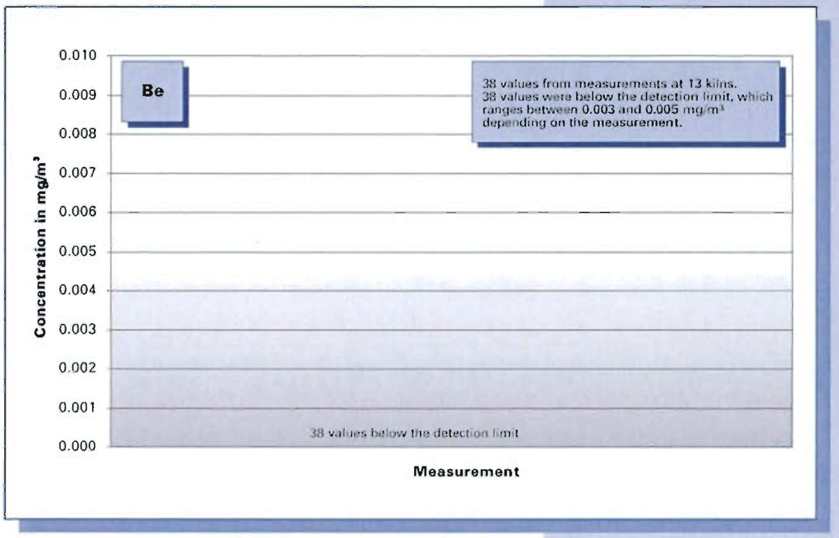


Fig. 5-51: Beryllium concentration values (year 2001) measured in the clean gas of 13 rotary kilns.

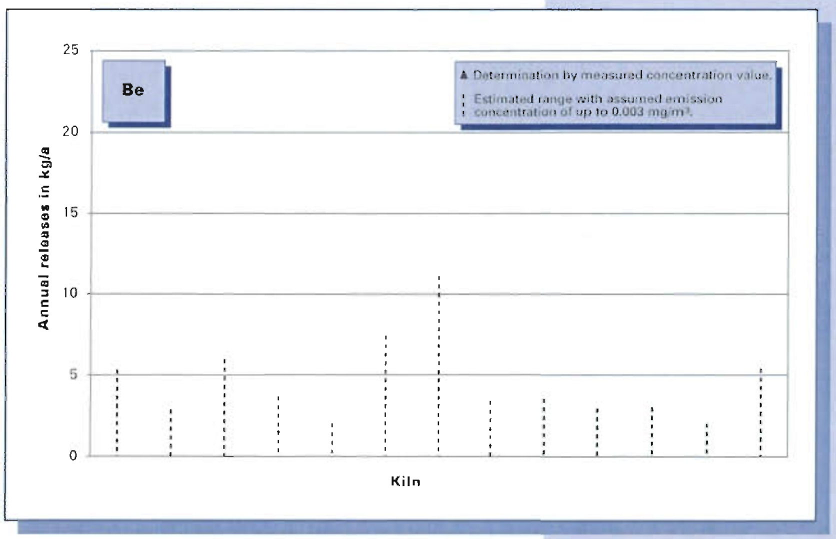


Fig. 5-52: Beryllium emissions (annual releases in 2001) of 13 rotary kilns.
If the values measured are below the detection limit, the releases can only be estimated. In these cases, the range of possible emissions is represented by a broken line, the upper limit of which was calculated using a concentration of 0.003 mg/m³.

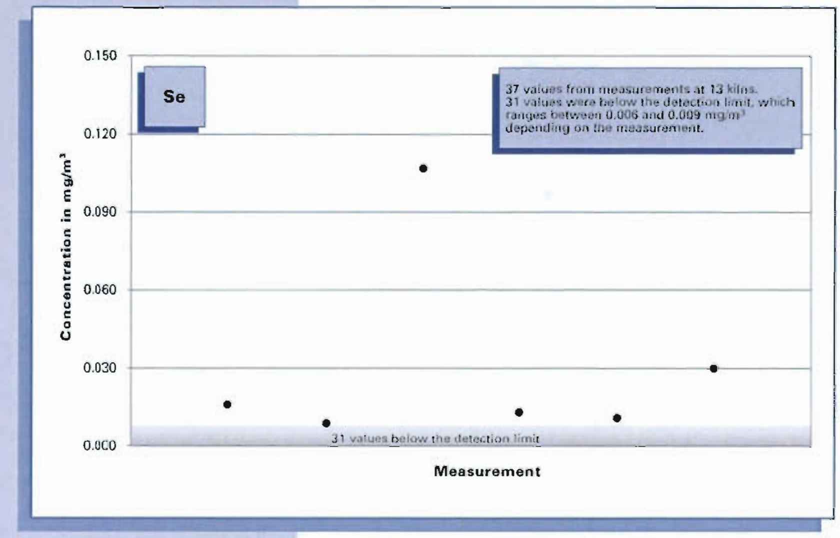


Fig. 5-53: Selenium concentration values (year 2001) measured in the clean gas of 13 rotary kilns.

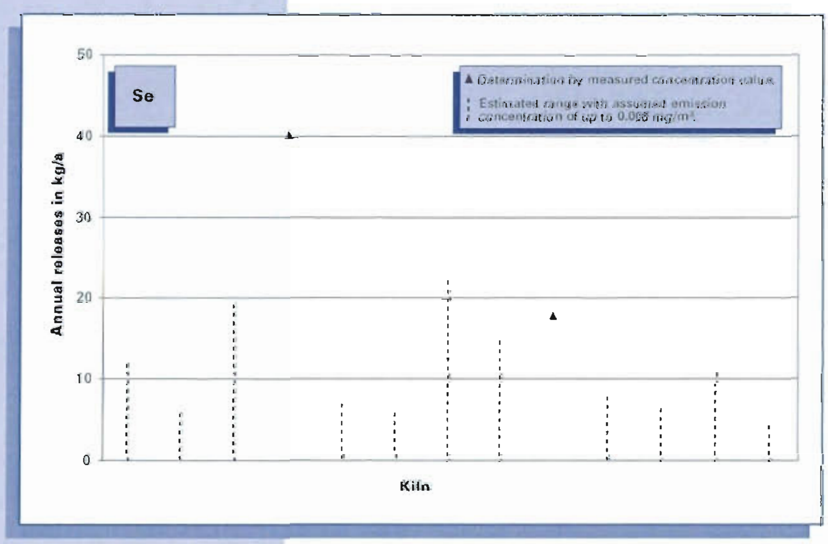


Fig. 5-54: Selenium emissions (annual releases in 2001) of 13 rotary kilns.
If the values measured are below the detection limit, the releases can only be estimated. In these cases, the range of possible emissions is represented by a broken line, the upper limit of which was calculated using a concentration of 0.006 mg/m³.

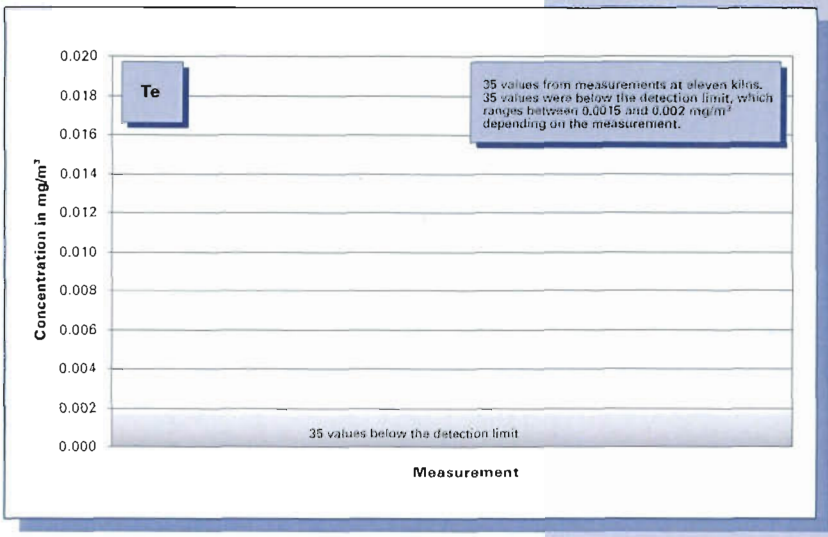


Fig. 5-55: Tellurium concentration values (year 2001) measured in the clean gas of eleven rotary kilns.

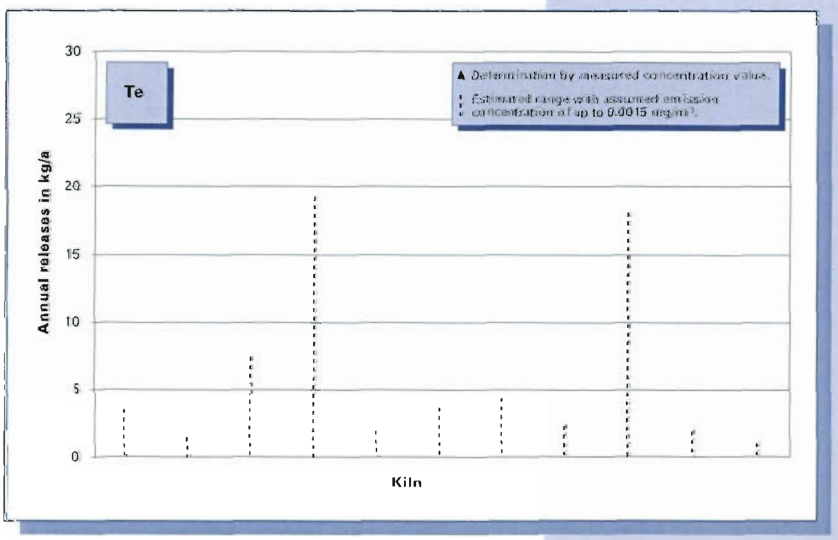


Fig. 5-56: Tellurium emissions (annual releases in 2001) of eleven rotary kilns.
If the values measured are below the detection limit, the releases can only be estimated. In these cases, the range of possible emissions is represented by a broken line, the upper limit of which was calculated using a concentration of 0.0015 mg/m³.

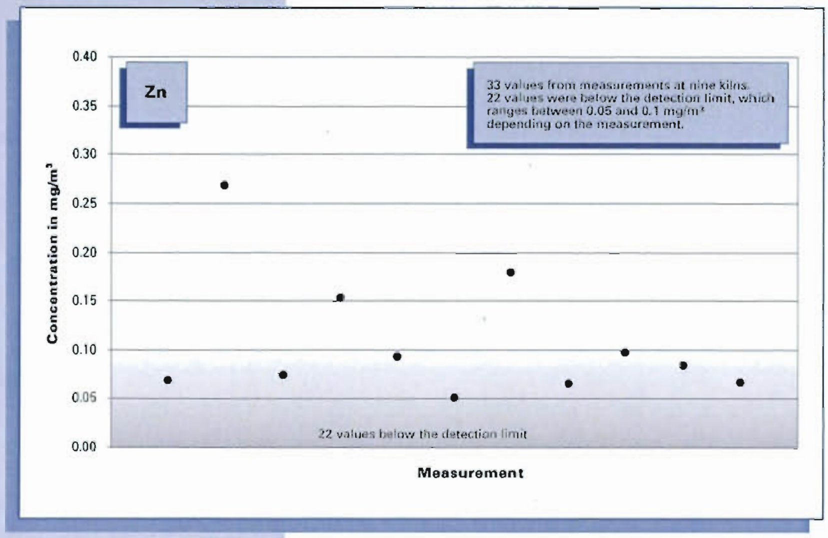


Fig. 5-57: Zinc concentration values (year 2001) measured in the clean gas of nine rotary kilns.

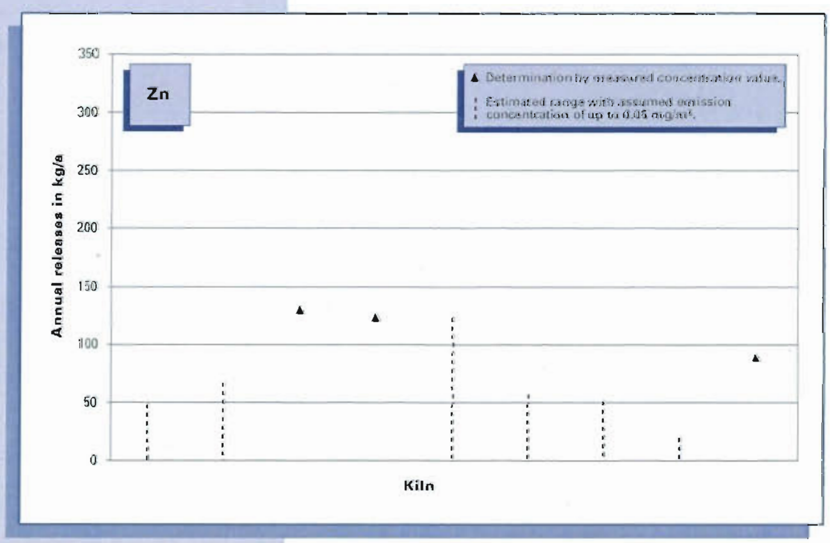


Fig. 5-58: Zinc emissions (annual releases in 2001) of nine rotary kilns.
If the values measured are below the detection limit, the releases can only be estimated. In these cases, the range of possible emissions is represented by a broken line, the upper limit of which was calculated using a concentration of 0.05 mg/m³.

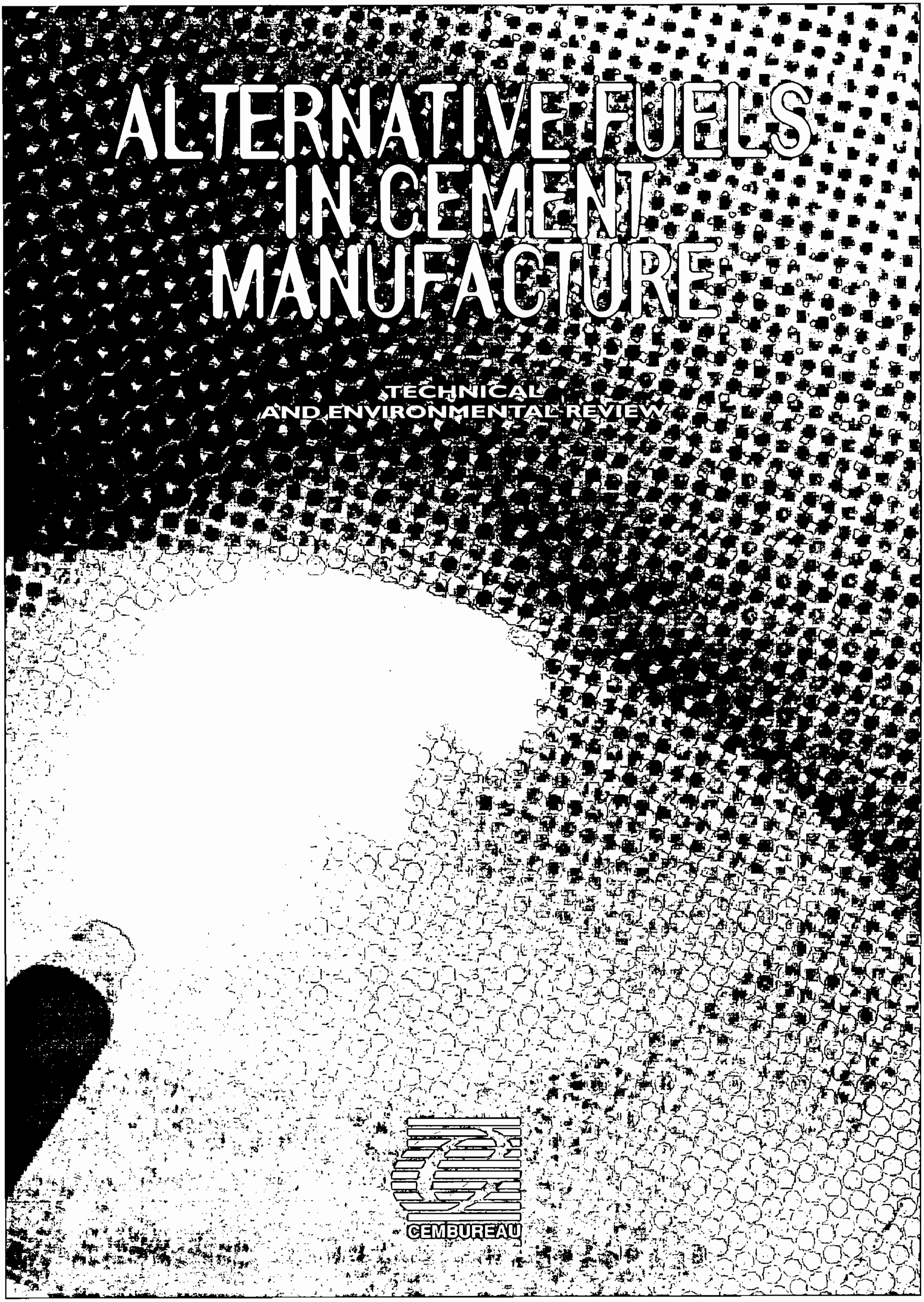
ATTACHMENT 3

ALTERNATIVE FUELS IN CEMENT MANUFACTURE
TECHNICAL AND ENVIRONMENTAL REVIEW

CEMBUREAU

ALTERNATIVE FUELS IN CEMENT MANUFACTURE

TECHNICAL AND ENVIRONMENTAL REVIEW



CEMBUREAU

CEMBUREAU PRESENTATION

CEMBUREAU – the European Cement Association, based in Brussels, is the representative organisation for the cement industry in Europe. Its Full Members are the national cement industry associations and cement companies of the European Union and the European Economic Area countries plus Switzerland and Turkey. Associate Members include the national cement associations of the Czech and Slovak Republics, Hungary and Poland.

The Association acts as spokesman for the cement sector towards the European Union institutions and other authorities, and communicates the industry's views on all issues and policy developments likely to have an effect on the cement market in the technical, environmental, energy and promotion areas. Permanent dialogue is maintained with the European and international authorities and with other International Associations as appropriate.

Serviced by a multi-national staff in Brussels, Standing Committees and issue-related Project Groups, established as required, enable CEMBUREAU to keep abreast of all developments affecting the industry.

CEMBUREAU also plays a significant role in the world-wide promotion of cement and concrete in co-operation with member associations, and the ready-mix and precast concrete industries. The Association regularly co-hosts conferences on specific issues aimed at improving the image of concrete and promoting the use of cement and concrete products.

Since its foundation in 1947, CEMBUREAU has developed into the major centre for the dissemination of technical data, statistics and general information on the cement industry world-wide. Its publications serve as the principal source of information on the cement industry throughout the world. It is the editor of the "World Cement Directory" providing data on cement companies and works based in some 150 countries.

CEMBUREAU
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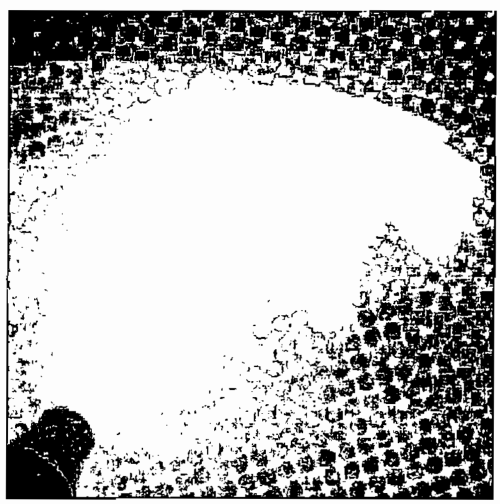
ALTERNATIVE FUELS IN CEMENT MANUFACTURE

TECHNICAL AND ENVIRONMENTAL REVIEW



CONTENTS

EXECUTIVE SUMMARY

The use of cement has long been the basis for development of society and for the welfare of the people. For generations concrete, which is made from cement, has been the ultimate material for construction of harbours, roads, bridges, dams, houses, schools, hospitals.

The cement industry in the European Union produces about 170 million tonnes of cement each year. It contributes significantly to local and regional economies through more than 300 plants spread all over Europe and often in rural areas.

The cement industry recognises its responsibility to manage the environmental impact associated with the manufacture of its products. Over the past 20 years specific energy consumption has been reduced by about 30%, equivalent to approximately 11 million tonnes of coal per year. Dust emissions have been reduced by 90% as the industry has invested heavily in various emission abatement techniques.

Cement is produced in accordance with European and national legislation as well as internal procedures. Strict regulations are applied and plants are operated on the basis of permits from national authorities. Emissions are regularly checked by the authorities.

The cement industry is able to use waste as alternative fuels and raw materials to reinforce its competitiveness and at the same time contribute to solutions to some of society's waste problems in a way which valorises the waste and is beneficial to the environment. The use of alternative fuels today substitutes approximately 2.5 million tonnes of coal every year.

The use of waste as alternative fuels in the cement industry has numerous environmental benefits such as:

- The use of waste as alternative fuels reduces the use of non-renewable fossil fuels such as coal as well as the environmental impacts associated with coal mining.
- The use of waste as alternative fuels also contributes towards a lowering of emissions such as greenhouse gases by replacing the use of fossil fuels with materials that would otherwise have to be incinerated with corresponding emissions and final residues.
- The use of alternative fuels in cement kilns maximises the recovery of energy from waste. All the energy is used directly in the kiln for clinker production. It also maximises the recovery of the non-combustible part of the waste and eliminates the need for disposal of slag or ash, as the inorganic part substitutes raw material in the cement.

The use of waste as alternative fuels is a safe way of valorising waste. The organic constituents are completely destroyed due to the high temperatures, long residence time and oxidising conditions in a cement kiln. The inorganic constituents combine with the raw materials in the kiln and leave the process as part of the cement. Heavy metals in the cement end up bound in the concrete. Concrete made from cement manufactured using alternative fuels has the same construction and environmental properties as concrete made from cement manufactured using fossil fuels.

INTRODUCTION

The primary objective of a cement company is to produce and sell high quality cement. Valorisation of waste provides environmental benefits and reinforces the competitiveness of the cement industry.

This publication was prepared by CEMBUREAU with the assistance of ERM (Environmental Resources Management) to provide information on the usage of selected waste materials in the European cement industry and in particular the usage of organic materials as substitutes for fossil fuels.

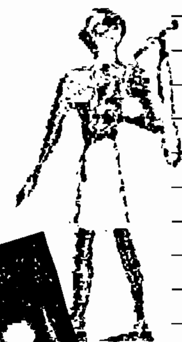
The primary objective of a cement company is to produce and sell high quality cement. Whilst respecting this purpose, the use of waste materials can bring a number of benefits both to the cement industry and to society in general. This publication gives background information concerning the manufacture of cement and the regulatory framework, and describes the special characteristics of cement plants which provide for the safe and effective use of alternative fuels. Competitiveness can be reinforced and at the same time some of society's waste problems can be solved in a way which valorises the waste and is beneficial to the environment.

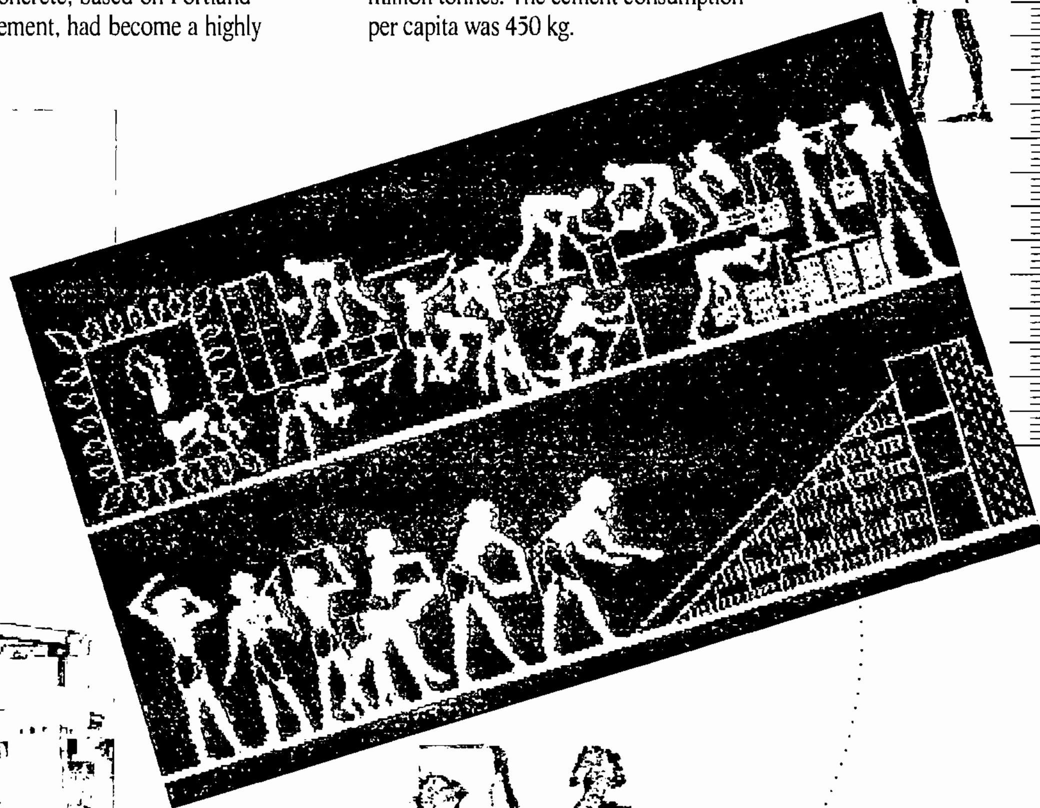
Bernburg plant - 5000 t/day capacity

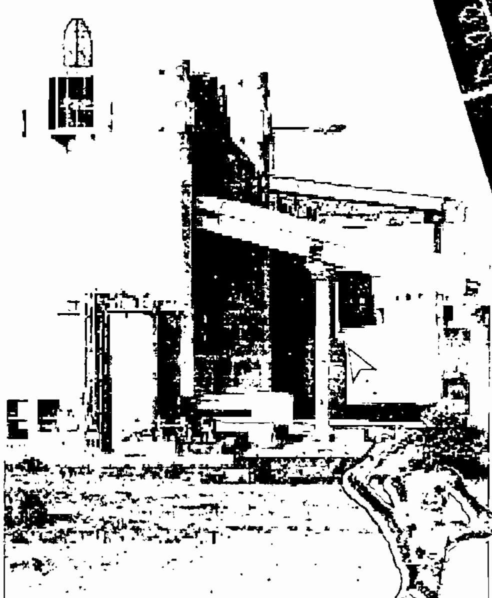
The European cement industry

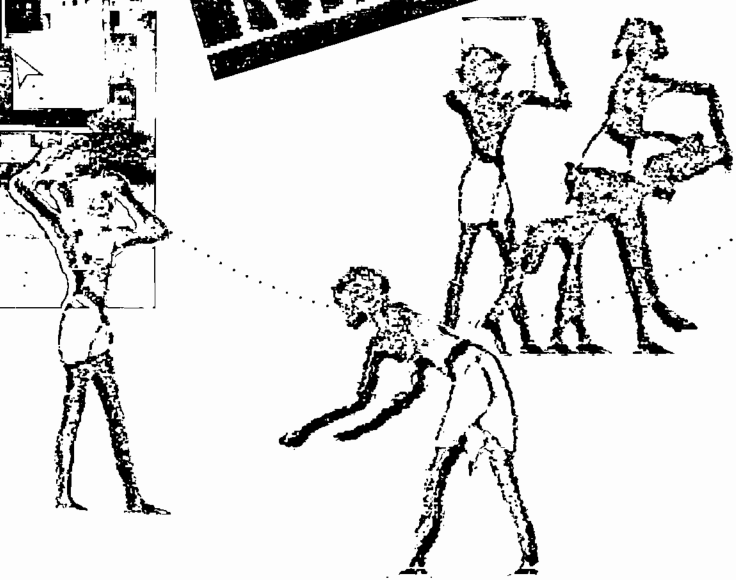
Cement has played a key role as a construction material throughout the history of civilisation. In Europe the use of cement and concrete in large civic works can be traced from antiquity through modern times. Portland cement was patented in 1824 and by the end of the 19th century concrete, based on Portland cement, had become a highly appreciated construction material throughout Europe.

Cement manufacturing is a major mineral commodity industry. In 1995 the world production of cement was 1420 million tonnes. In the European Union cement is produced in more than 300 plants. The total cement production in the European Union amounted to 172 million tonnes in 1995 and the consumption was 168 million tonnes. The cement consumption per capita was 450 kg.









The use of cement has contributed

to the welfare of society

for generations.

The cement industry

contributes significantly to local

and regional economies.

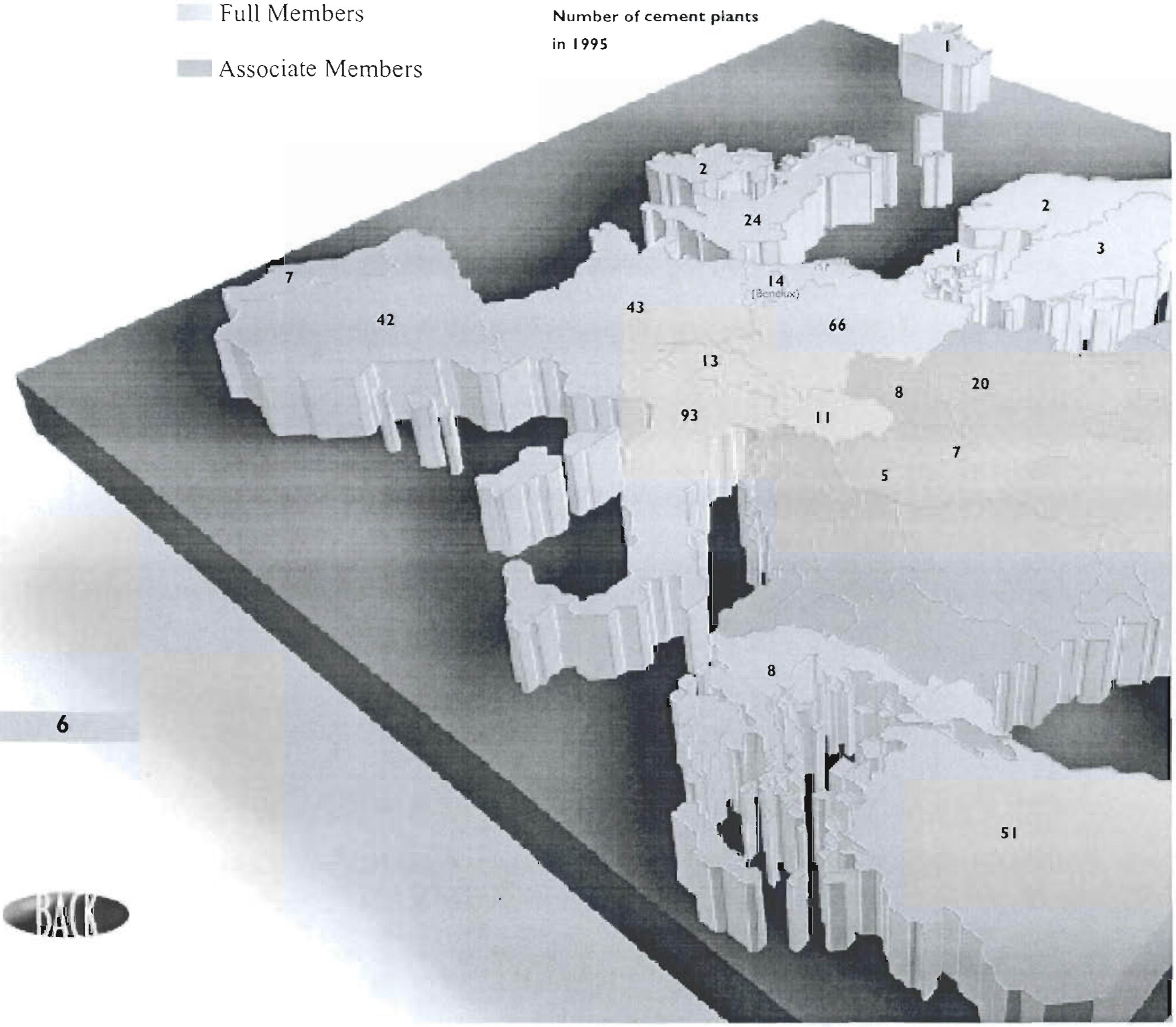
From water supply to waste water systems, from roads and bridges to air transport infrastructure and harbours, from residential houses to commercial and industrial structures, from schools to hospitals, concrete is the essential material in providing for development of man's activities.

The cement industry is a highly capital intensive industry, with yearly capital investments in CEMBUREAU member countries in the order of ECU 1 billion.

Full Members

Associate Members

Number of cement plants in 1995

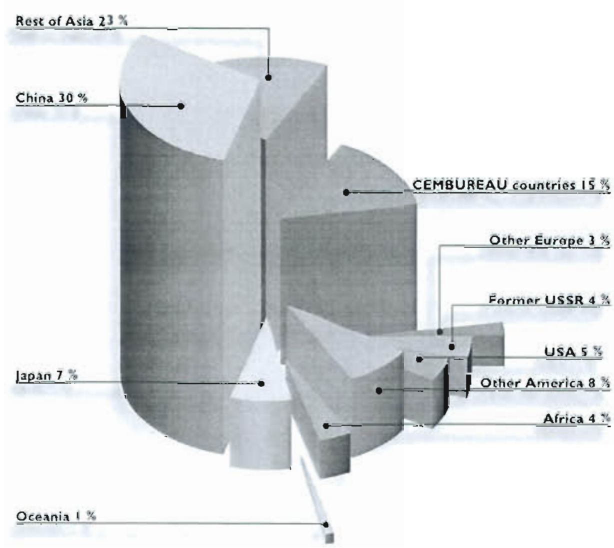


BACK

The huge investments and long pay-back periods for process modifications make the cement industry very careful in selecting and developing new technologies.

The use of cement has contributed to the welfare of society for generations. The cement industry significantly contributes to local and regional economies through the wide geographic spread of its plants which are mainly located in rural areas.

World cement production 1995

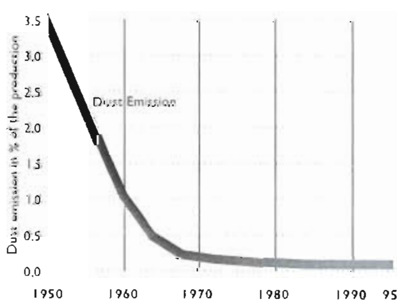


Responsible environmental management by the cement industry

The cement industry recognises its responsibility to manage the environmental impact associated with the manufacture of its products. Over the past few decades the European cement industry has demonstrated an impressive record in continual environmental improvement within the context of the sustainable manufacture and use of cement. A few examples of these achievements and their resulting benefits to the wider environment are as follows:

- Dust emissions have been reduced by 90% over the last 20 years, as a result of refinements in the production process and substantial investment in modern product handling methods and air pollution control equipment.

Reduction of dust emission

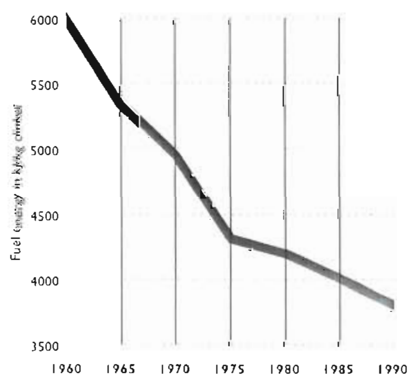


- The industry has been at the forefront of developing and applying quarry restoration methods to return depleted quarries to productive, scenic or recreational use.

- The specific energy consumption for the production of cement clinker has been reduced by approximately 30% since the 1970s. This reduction in primary energy requirements is equivalent to approximately 11 million tonnes of coal per year with corresponding benefits in reduction of CO_2 emissions.

- Research into improved cement products has resulted in increased

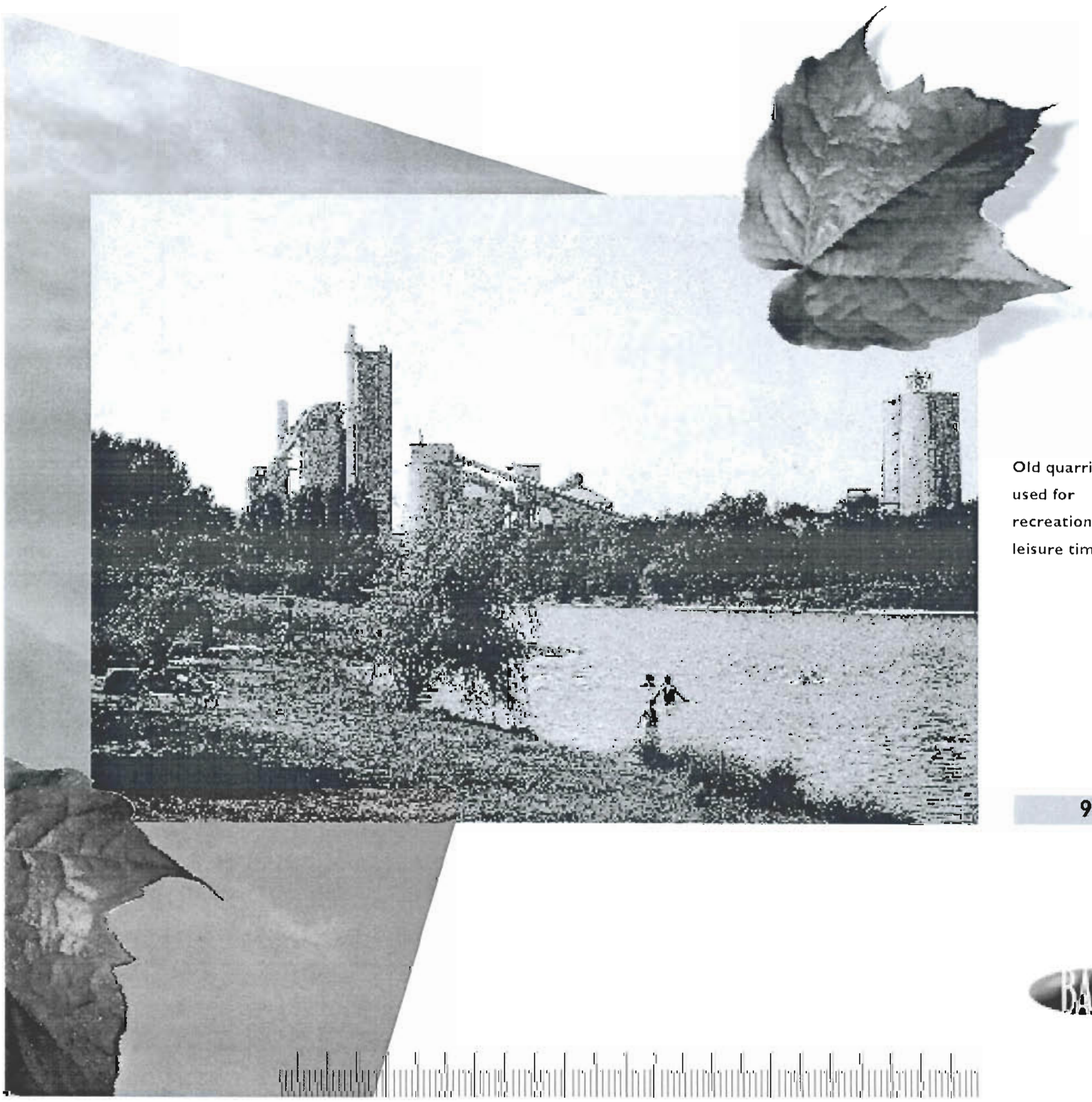
Reduction of specific energy
Development of the specific fuel energy consumption in CEMBUREAU countries since 1960



strength performance and more efficient use of cement.

- Conservation of natural non-renewable resources has been obtained through the valorisation of wastes as raw materials for clinker production and as alternative fuels. Through this valorisation the cement industry contributes to solving society's waste problems by reducing the amount of waste to be disposed of (with additional benefits in emission of CO_2).

- The use of blended cements in which blastfurnace slag, power station fly ash, natural pozzolana or limestone is used together with cement clinker is contributing further to the conservation of primary natural mineral resources and fossil fuels, and to the reduction of atmospheric emissions, especially of CO_2.



Old quarries used for recreational leisure time

REGULATORY FRAMEWORK

The cement industry, like other industrial sectors, is strictly regulated.

The cement industry, like other industrial sectors, is strictly regulated via national and international legislation regarding environmental protection, health and safety and quality of products.

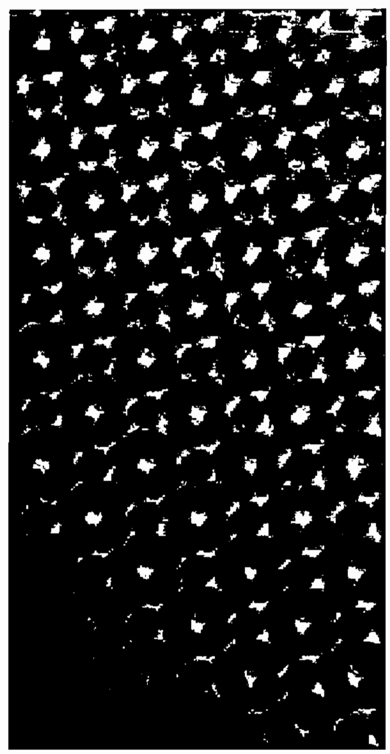
The manufacture of cement is a mature industrial activity and the emission control regulations currently applied to the industry are the result of extensive review and refinement over a number of years. Legislation regarding emissions from cement plants exists in all EU countries and the cement plants measure emissions under the control of regulatory authorities. These national systems have proved effective in regulating the use of ordinary fuels as well as alternative fuels in cement kilns to the overall benefit of the environment.

The rules for national regulation of cement plants are laid down at European level in the European Community Directive on the combating of air pollution from industrial plants (84/360/EEC). These rules are being replaced by those in the new Directive on Integrated Pollution Prevention and Control (96/61/EC) – the "IPPC" Directive. This new important environmental legislation aims at achieving a high level of protection for the environment as a whole by means of measures "designed to prevent or, where that is not practicable, to reduce emissions" to air, water and land.

The use of hazardous waste as an alternative fuel in cement kilns is regulated at EU level by Directive 94/67/EC. While the Directive sets out rules for the burning of hazardous wastes in dedicated plants for incineration of waste, it also recognises and provides for the procedure of co-combustion or co-incineration, that is the burning of wastes in industrial furnaces (such as cement kilns) not exclusively designed for such purposes. The Directive also accepts the need to take account of emissions from raw materials and fuels other than hazardous fuels in setting emission controls on exhaust gases from cement kilns.

The same strict standards that are applied to dedicated hazardous waste incinerators are also applied in cement

IPPC Directive covers procedures for granting operation permits. Permits shall include emission limits for dust, SO_x, NO_x, heavy metals and organic compounds.
These limits shall be set by national Authorities based on "Best Available Techniques".



National permit systems effectively control the use of ordinary fuels as well as alternative fuels to the benefit of the environment.

kilns to the emissions which result from the combustion of hazardous waste.

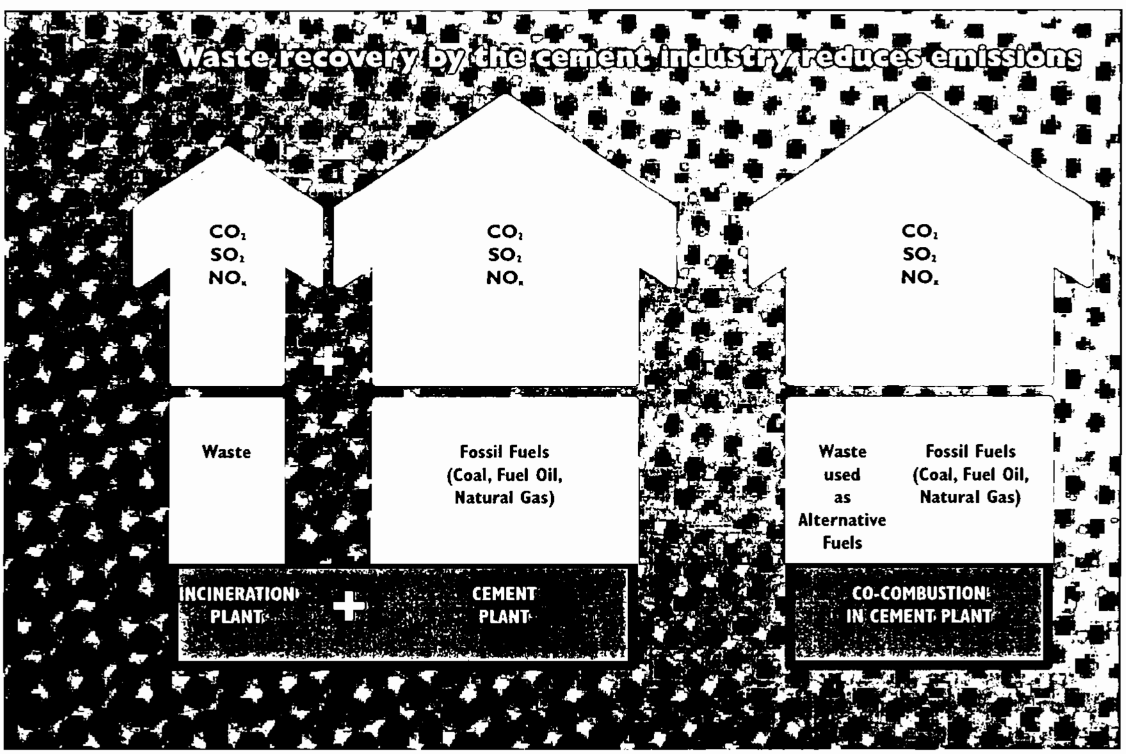
The European Commission, the Parliament and the Council have recently published their reviews of the Community Strategy for Waste Management originally established in 1989. All three documents have a certain flexibility regarding the application of the waste management hierarchy. The utilisation of alternative fuels in the cement industry is supported by the general principles of waste management at both European Union and national levels.

The wastes used as alternative fuels in cement kilns would alternatively either have been landfilled or destroyed in dedicated incinerators with additional emissions as a consequence. Their use in cement kilns replaces fossil fuels and maximises the recovery of energy.

Employing alternative fuels in cement plants is an important element of a sound waste management policy. This practice promotes a vigorous and thriving materials recovery and recycling industry, in line with the essential principles of the EU's waste management hierarchy.

Waste Management Hierarchy

- prevention
- recovery
- disposal

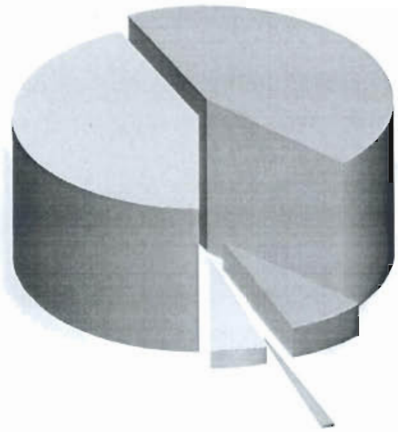


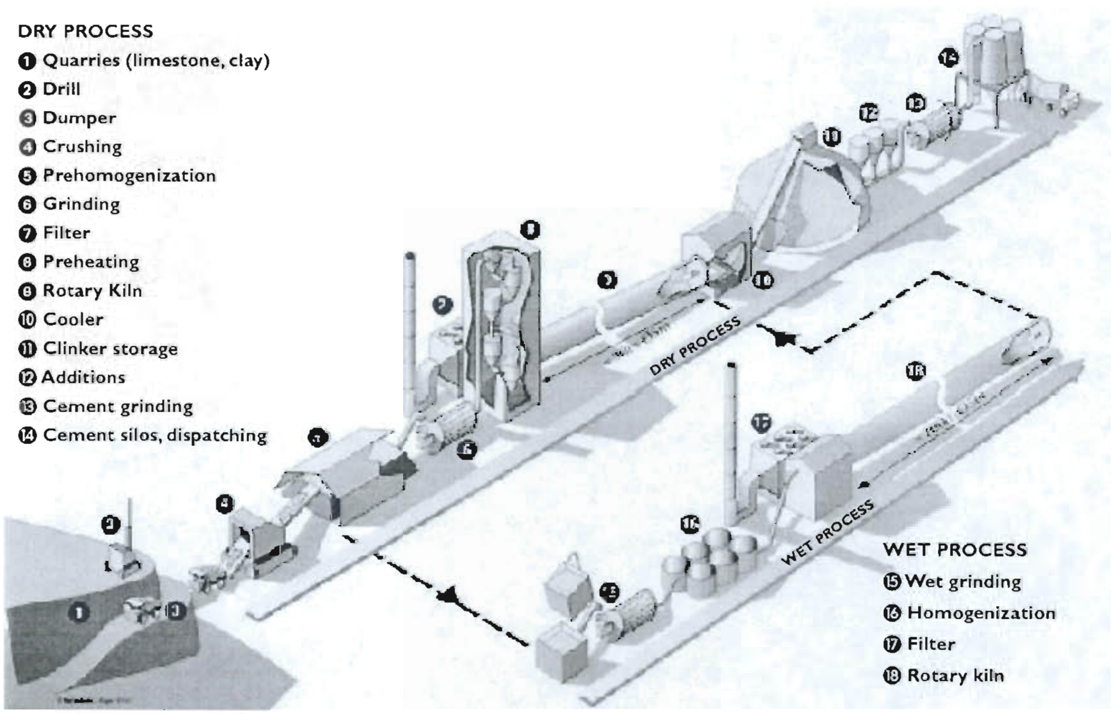
HOW CEMENT IS MADE

The process

Cement production involves the heating, calcining and sintering of blended and ground raw materials, typically limestone and clay or shale and other materials to form clinker. This clinker burning takes place at a material temperature of 1450 °C in kilns, which are inclined rotating cylinders lined with heat-resistant bricks. Afterwards, the clinker is ground with a small amount of gypsum to give Portland cement, which is the most common variety of cement manufactured in Europe. In addition, blended cements are produced by intergrinding cement clinker, small amounts of gypsum as well as materials like fly ash, granulated blast furnace slag, limestone, natural or artificial pozzolanas.

Deliveries of cement types
in EU and EFTA





Large cement plants produce of the order of 4,000 tonnes of cement per day.

Depending on how the raw material is handled before being fed to the kiln, basically three different types of processes can be distinguished: the dry, semi-dry/semi-wet and wet process. The technology applied depends on the origin of the raw materials. The origin/type of limestone/clay and the water content (ranging from 3% for hard limestone to above 20% for chalk), are particularly important.

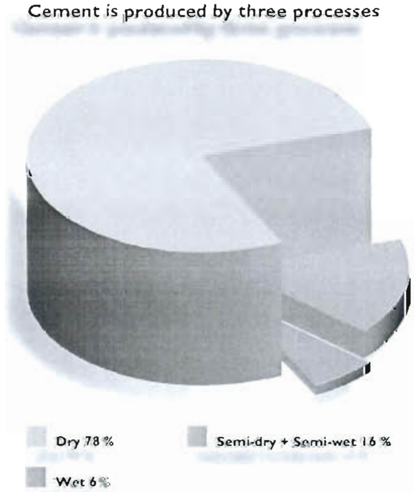
In the dry process the feed material enters the kiln in a dry, powdered form. The kiln systems comprise a tower of heat exchange cyclones in which the dry feed is preheated ("preheater kiln") by the rotary kiln's hot exit gases prior to entering the actual kiln. The calcination process can almost be completed before the raw material enters the kiln if part of the fuel is added in a special combustion chamber ("precalciner kiln").

In the wet process, which is often used for raw materials with a high moisture content, the feed material is made by wet grinding and the resulting slurry, which contains typically 30-40% water, is fed directly into the upper end of the inclined kiln.

In the semi-dry or semi-wet process 10-20% water is either added to the ground dry feed material or removed from a slurry for instance by filter presses resulting in a feed material containing about 15-20% moisture. Pellets of feed material are loaded onto a travelling grate where they are preheated by the rotary kiln's hot exit gases. By the time the feed material reaches the kiln entrance the water has evaporated and calcination has begun.

Over the past few decades the European cement industry has invested heavily in a planned move from the wet process to the more energy-efficient dry process, where the raw materials allow. Presently, about 78% of Europe's cement production is from dry process kilns, a further 16% of production is accounted for by semi-dry and semi-wet process kilns, and about 6% of European production now comes from wet process kilns due to lack of suitable raw materials for other processes.

Cement is produced by three processes



ENVIRONMENTAL ASPECTS OF CEMENT MANUFACTURE

Raw materials

In the cement kiln new minerals are formed giving cement its specific properties. The main components are the oxides of calcium, silicon, aluminium and iron.

Natural raw materials and coal ash used to produce cement contain a wide range of trace elements in addition to calcium, silicon, aluminium and iron.

Calcium is provided mainly by raw materials such as limestone, marl or chalk. The silicon, aluminium and iron components as well as other elements are provided by clay, shale and other materials. All the natural materials mentioned also contain a wide variety of other elements in small quantities.

Significant quantities of limestone, clay and other primary raw materials are quarried to service the demand for cement. In line with its commitment to sustainable development, the European cement industry has increasingly sourced alternative materials to substitute for the traditional natural raw materials. The industry currently uses large quantities of blast furnace slag, power station fly ash, silica fume, natural pozzolanas and limestone fines, mainly to substitute for clinker in cement. Some of these are also used as raw materials in the clinker production process.

The use of these alternative materials has significant positive environmental benefits. The need for quarrying of primary raw materials is reduced, energy consumption in producing cement is reduced and overall reductions in emissions of dust, CO_2 and acid gases are attained. In some applications, the performance of concrete can be enhanced when Portland cement clinker is complemented by these materials.

Energy

Depending on the raw materials and the process, a cement plant consumes fuel amounting to about 3200 to 5500 MJ/t clinker. Electrical energy consumption is about 90 to 120 kWh/t cement.

Historically, the primary fuel used is coal. A wide range of other primary fuels are also used, including petroleum coke, natural gas and oil. The average European energy requirement to produce one tonne of cement is equivalent to the combustion of approximately 120 kg of coal.

The main constituents of fuel ash are silica and alumina compounds which combine with the raw materials to become part of the clinker. Like other natural products fuel ashes contain a wide range of trace elements which are also incorporated in the cement clinker.

With energy typically accounting for 30-40% of the production cost of cement, the cement industry throughout Europe has successfully concentrated significant efforts on improving energy efficiency in recent decades. In 1993 a study by the European Commission estimated that the real remaining potential energy saving in the cement manufacturing process was approximately 2.2% for the entire sector in the European Union.

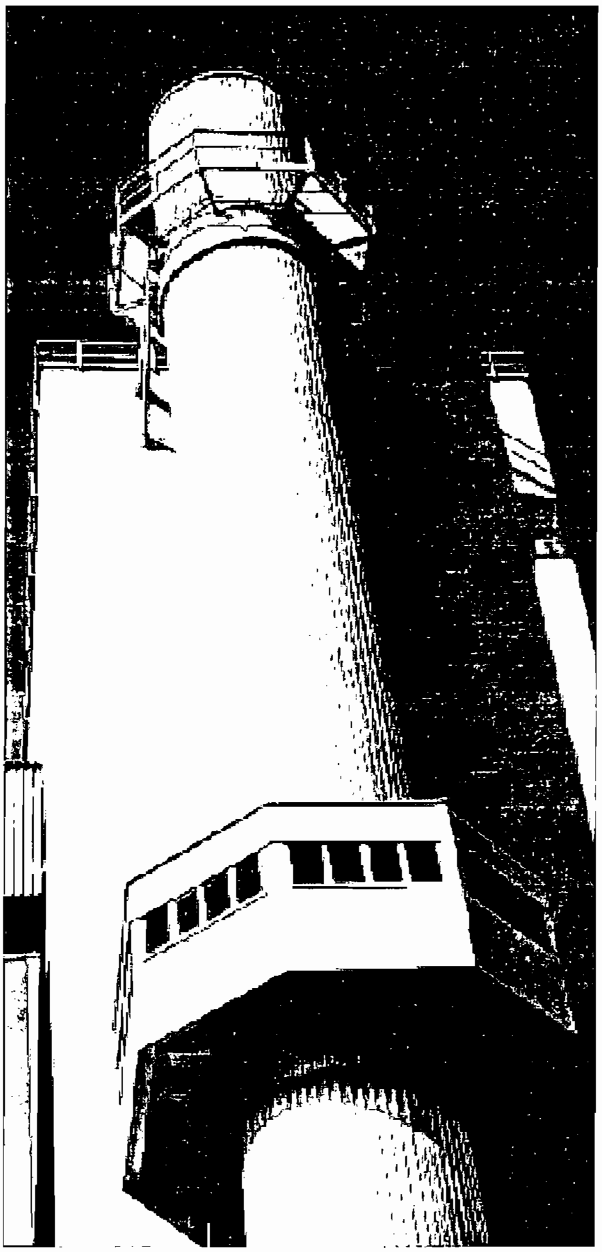
Emissions

Releases from the cement kiln come from the physical and chemical reactions of the raw materials and from the combustion of fuels.

The main constituents of the exit gases from a cement kiln are nitrogen from the combustion air, CO_2 from calcination and combustion, water from the combustion process and the raw materials, and excess oxygen.

Emissions are controlled

The exit gases also contain small quantities of dust, chlorides, fluorides, sulphur dioxide, NOx, carbon monoxide, and still smaller quantities of organic compounds and heavy metals.



Composition of exhaust gases

	%
N_2	45-66
CO_2	11-29
H_2O	10-39
O_2 (stack)	3-10
Remainder	< 1

The exit gases from cement kilns are dedusted in filters (normally electrostatic precipitators) and the dust is normally returned to the process.

Cement plants are usually liquid effluent-free, since any water used in the process is evaporated within the kiln. If the air pollution control device uses a wet cleaning system, then the resulting effluent is generally returned to the start of the production process for use as makeup water, while the sludge is also returned to the kiln as feed material.

THE USE OF ALTERNATIVE FUELS

The benefits of using alternative fuels

Annually, the energy equivalent of about 25 million tonnes of coal is required by CEMBUREAU Members to service the demand for cement in Europe. This is a significant use of non-renewable primary fossil fuel, and therefore the industry is committed to seeking out more energy efficient ways of producing cement as well as alternative, more sustainable energy sources.

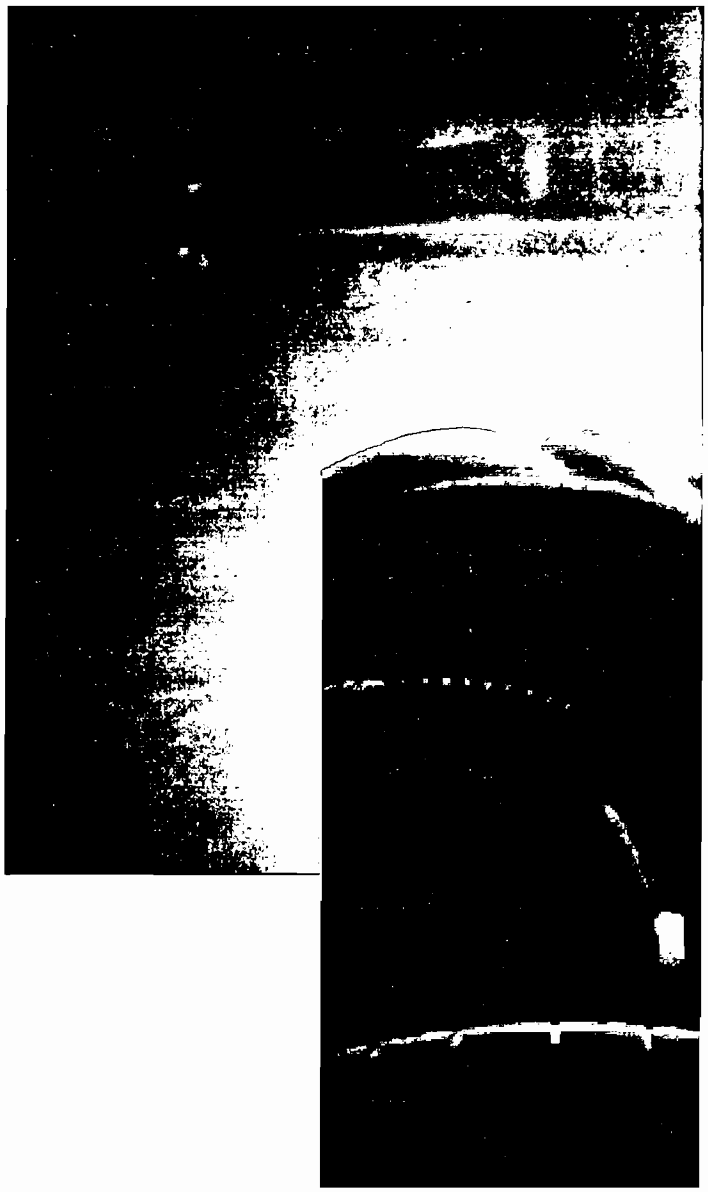
The use of alternative fuels is a well proven and well established technology in most of the European cement industry and this has been the case for more than 10 years. In 1995 about 10% of the thermal energy consumption in the European cement industry originated from alternative fuels. This is equivalent to 2.5 million tonnes of coal. The proportion is gradually increasing and figures above 50% are already achieved in certain regions.

Waste materials which the cement industry has utilised as alternative fuels include used tyres, rubber, paper waste, waste oils, waste wood, paper sludge, sewage sludge, plastics and spent solvents.

The use of waste as alternative fuels in the cement industry has numerous environmental benefits such as:

- Reduction of the use of non-renewable fossil fuels such as coal as well as the environmental impacts associated with coal mining.
- Contribution towards a lowering of emissions such as greenhouse gases by replacing the use of fossil fuels with materials that would otherwise have to be incinerated with corresponding emissions and final residues.
- Maximisation of the recovery of energy from waste. All the energy is used directly in the kiln for clinker production.

Use of waste as fuels in cement kilns saves fossil fuels, reduces emissions to air and eliminates the need for disposal of slag and ash.



- Maximisation of the recovery of the non-combustible part of the waste and elimination of the need for disposal of slag or ash, as the inorganic part substitutes raw material in the cement.

Safe valorisation in cement kilns

The use of waste as alternative fuels is technically sound as the organic part is destroyed and the inorganic part, including heavy metals, is trapped and combined in the product. Cement kilns have a number of characteristics which make them ideal installations in which alternative fuels can be valorised and burnt in safety, such as:

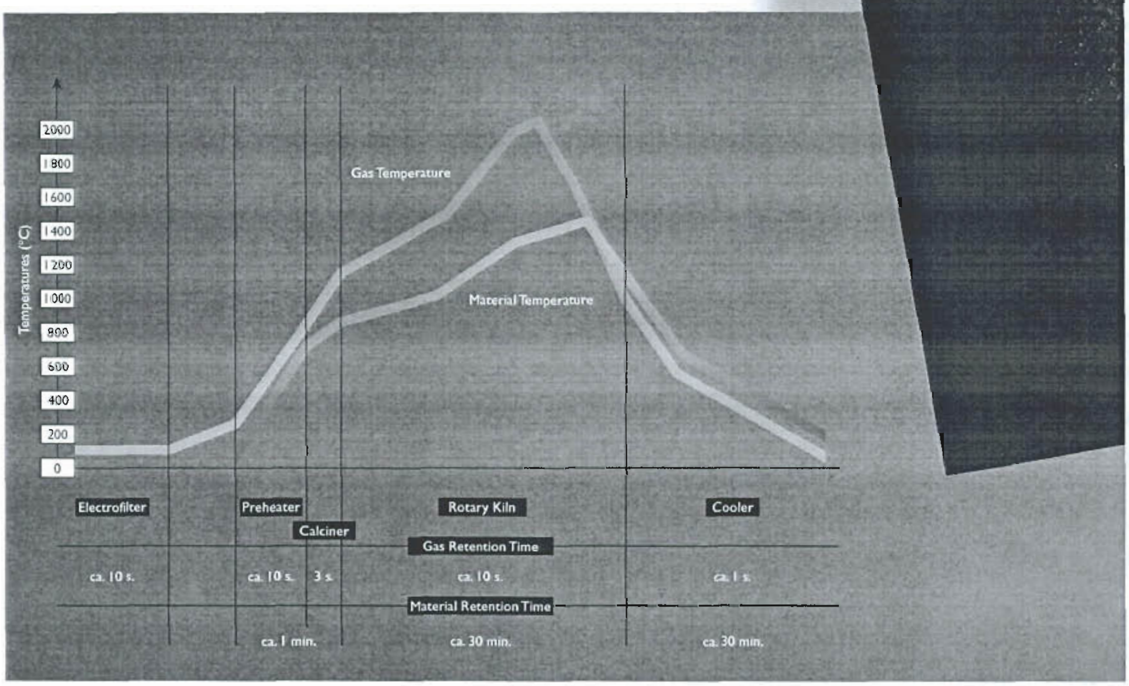
- High temperatures
- Long residence time
- Oxidising atmosphere
- High thermal inertia
- Alkaline environment
- Ash retention in clinker
- Continuous fuel supply

BACK

Two characteristics in particular are of importance for the use of waste as alternative fuel in cement kilns: burning conditions (high temperature with long residence time and oxidising atmosphere) and a natural alkaline environment.

Organic constituents
Normal operation of cement kilns provides combustion conditions which are more than adequate for the destruction of even the most difficult-to-destroy organic substances. This is primarily due to the very high temperatures of the kiln gases (2000 °C in the combustion gas from the main burners and 1100 °C in the gas from the burners in the precalciner). The gas residence time at high temperature in the rotary kiln is of the order of 5-10 seconds and in the precalciner more than 3 seconds.

Because a cement kiln is a large manufacturing unit operating as a continuous process and with a high heat capacity and thermal inertia, a



significant change in kiln temperature in a brief period of time is not possible. The cement kiln can readily switch back to conventional

fuel. The cement kiln therefore offers an intrinsically safe thermal environment for the use of alternative fuels.

Complete combustion of an organic compound composed only of carbon and hydrogen produces CO_2 and water. Additionally, if the organic compound (conventional fuel or alternative fuel) contains chlorine or sulphur, then acid gases such as hydrogen chloride and sulphur dioxide are also produced. These gases are absorbed and neutralised by the freshly formed lime and other alkaline materials within the kiln.

A number of studies evaluating organic emissions from combustion installations have focused on the family of chemicals known as "dioxins". Directive 94/67/EC on the incineration of hazardous waste stipulates an emission limit of 0.1 nanogram of dioxins per cubic metre of gas emitted, the dioxins being measured in units of "toxic equivalents". Cement kilns fired with conventional fossil fuel or with alternative fuels of all types can meet this emission limit.

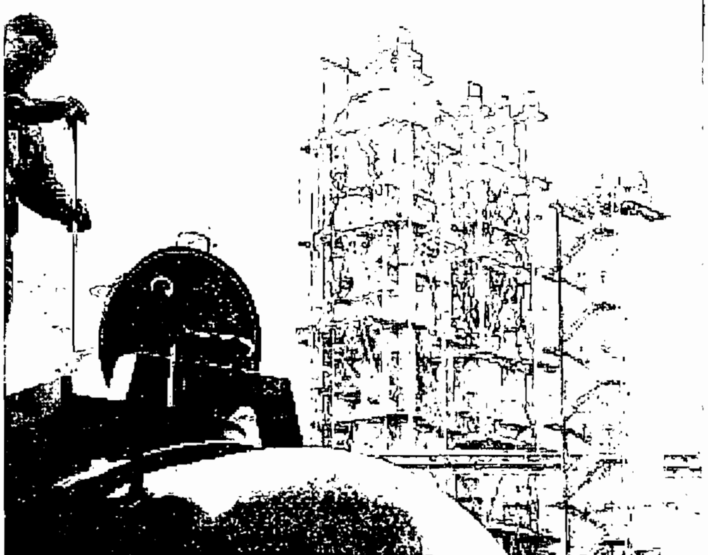
Inorganic constituents
Alternative fuel ash can provide important constituents which contribute towards building the clinker phases in the same way as coal ash does. Used tyres, for instance, provide iron which is required as a clinker constituent as well as energy. If this iron is not provided by tyres, it has to be added to the process using other materials.

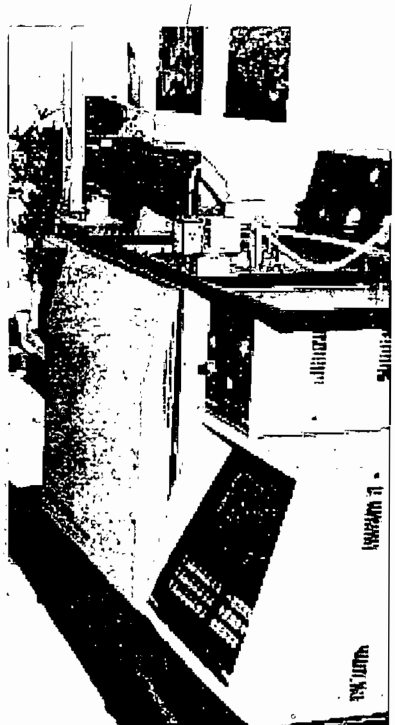
Metals, like any other elements, are not destroyed in an industrial furnace. Metals introduced into the cement kiln through the raw materials or the fuel will be present in either the releases or in the clinker. Extensive studies investigating the behaviour of metals in cement kilns have shown that the vast majority are retained in the clinker. For example, studies on antimony, arsenic, barium, beryllium, cadmium, chromium, copper, lead, nickel, selenium, vanadium and zinc have established that near 100% of these metals are retained in the solids. Extremely volatile metals such as mercury and thallium are not incorporated into the clinker to the same degree and these metals are, therefore, carefully controlled in the alternative fuel.

Specifications and control procedures
The European cement industry is subject to strict controls on every aspect of its activities, from quarrying to cement production and product quality. All cement manufacturing plants have installed appropriate abatement techniques and control and management systems which are subject to regular audit and review. As a result of this, and the inherent suitability of cement plants to handle organic and inorganic constituents of alternative fuels, the industry is in a position to ensure that there is no net increase in emissions when alternative fuels are used. Monitoring of kiln operations and of the quality of stack discharges is becoming increasingly sophisticated. Equipment has become automated as sites continue to invest in modern, upgraded systems.

The cement process is fully controlled

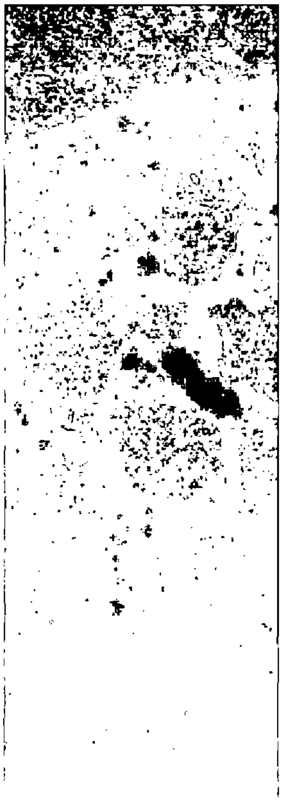
Control room - Bernburg plant





Alternative fuels are regularly analysed

ENVIRONMENTAL PERFORMANCE OF CONCRETE



Concrete looked at through a microscope - it is a dense material

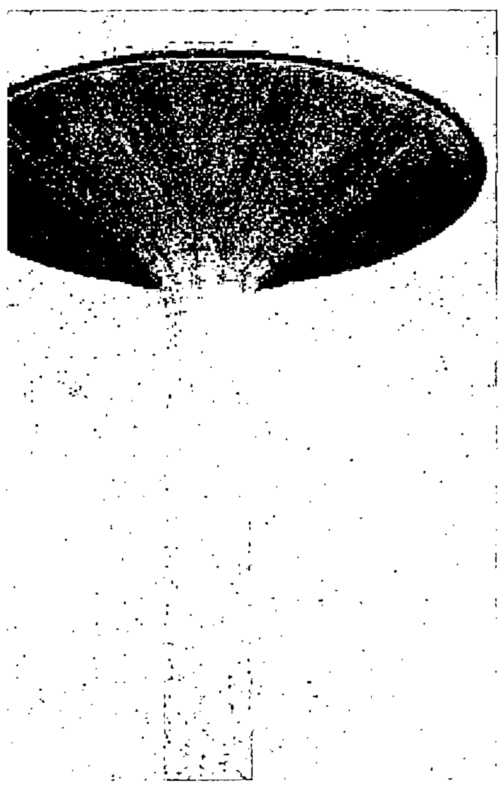
Cement is used to produce concrete. Concrete is an artificial stone made of cement, aggregates, sand and water.

Concrete is known for its high environmental performance. This performance is not impaired when alternative fuels are used for cement production. Concrete made from cement manufactured using alternative fuels has the same properties as concrete made from cement manufactured using fossil fuels.

One aspect of the environmental performance of concrete is the behaviour of heavy metals in concrete. These trace elements are found in various concentrations in the materials used for cement and concrete production, and ultimately determine the respective concentration in the concrete.

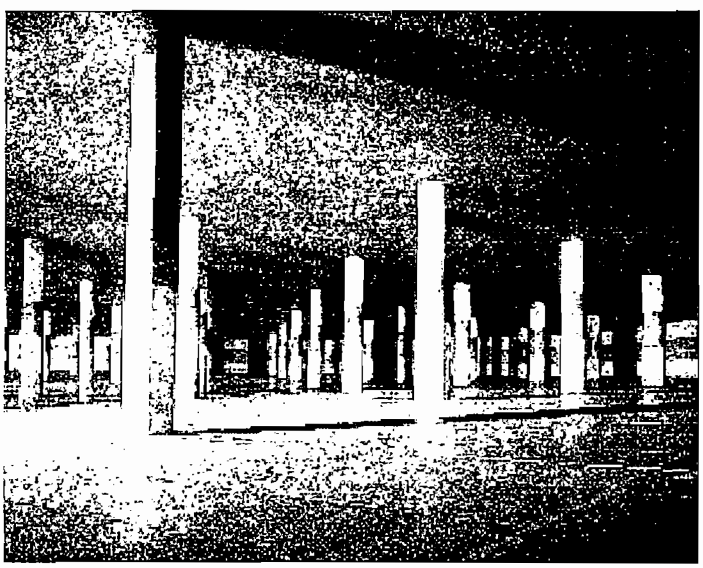
Inorganic constituents of alternative fuels like heavy metals are combined in the cement clinker. The use of alternative fuels for cement production may result in higher or lower concentrations of heavy metals in concrete as compared to when ordinary fuels are used. However, in practice the heavy metal concentrations in concrete are not significantly changed by the use of alternative fuels for cement production.

The heavy metals in the cement are bound in the clinker components, and they are chemically bound in the alkaline reaction products formed when cement reacts with water to give the concrete its strength. This fixation as well as the high denseness and low permeability of concrete result in a very



low potential for heavy metals to be released.

The leaching of heavy metals from concrete has been examined in a number of investigations. They all show that the release is very low, independently of the kind of fuels used for cement clinker production. The leached quantities have always been found to be either not measurable or significantly below levels allowed for drinking water.



Concrete is used for water storage constructions as there is no harmful leaching from concrete

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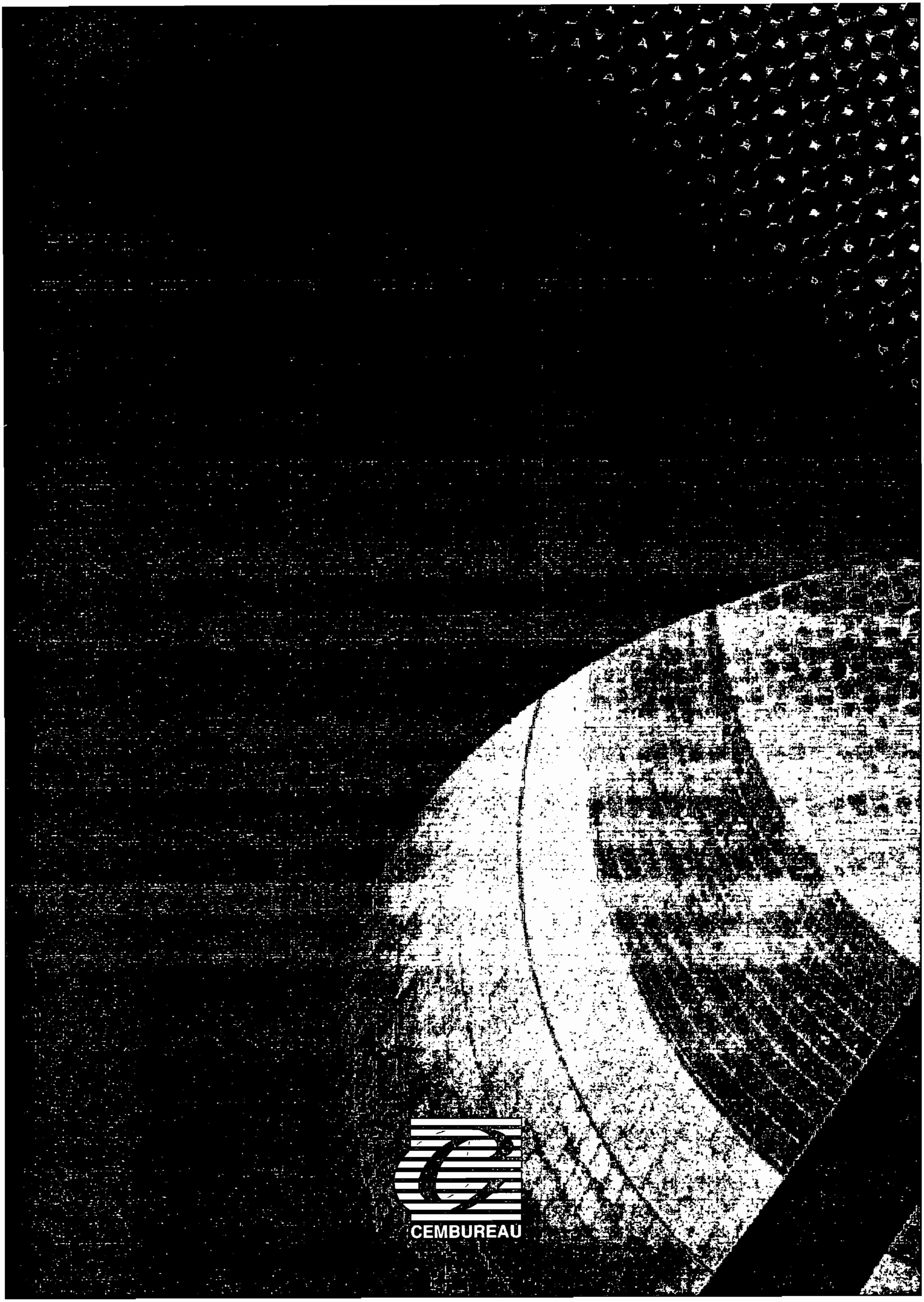


CEMBUREAU

ATTACHMENT 4

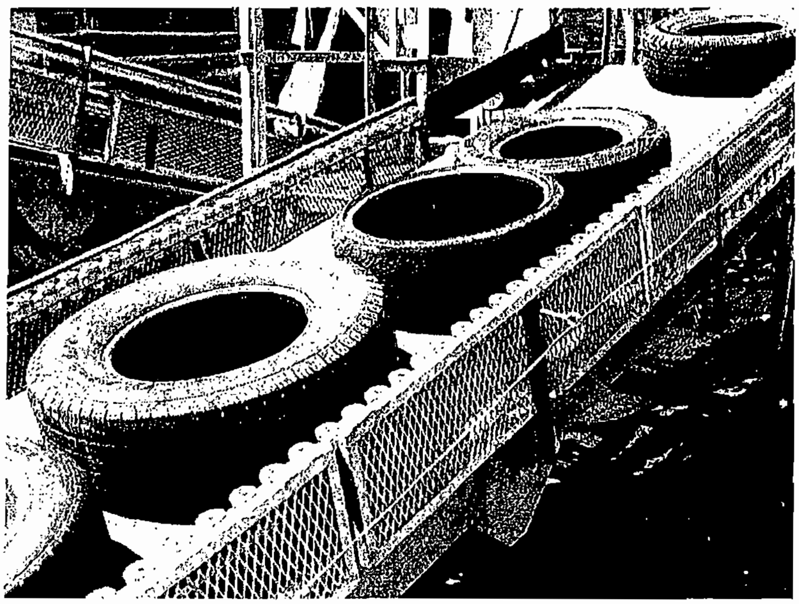
Cement Sector
Trends in Beneficial Use of
Alternative Fuels and Raw Materials

United States Environmental Protection Agency
Revised Draft
October 2008

U.S. Environmental Protection Agency

Cement Sector

Trends in Beneficial Use of Alternative Fuels and Raw Materials



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Executive Summary

Objective

This report analyzes recent trends in beneficial use of alternative fuels and raw materials (AFR) in cement production. The overall objective of the study is to promote increased utilization of beneficial use materials in cement kilns by identifying trends and cost, technical, supply/logistics, and regulatory barriers to increased utilization of these materials. Alternative fuels considered in this study include petroleum refinery spent catalyst and clarified slurry oil sediments (CSOS), scrap paper/wood, construction and demolition (C&D) debris, scrap tires, wastewater treatment sludge (biosolids), plastics, and emerging materials including scrap carpet and automobile shredder residue (ASR). Alternative raw materials considered in this study include spent foundry sand and steel slag used as a cement kiln raw material. Slag used as a clinker additive is outside the scope of this report.

Alternative Fuels and Raw Materials Included in this Report

- Automobile shredder residue
- Plastics
- Refinery waste/clarified slurry oil sediment/refinery spent catalyst
- Scrap carpet
- Scrap paper / wood
- Construction/demolition debris
- Scrap tires
- Spent foundry sand
- Steel slag
- Wastewater treatment sludge

Approach

To analyze trends in beneficial use of alternative fuels and raw materials, EPA Sector Strategies Program (SSP) interviewed cement plant contacts, regulatory agency contacts, and AFR suppliers concerning use of AFR in cement kilns. Initial contacts were identified through discussions with the Portland Cement Association (PCA). PCA and EPA also coordinated a meeting with API representatives to discuss technical and regulatory issues related to clarified slurry oil sediments issues. State and local regulatory agency contacts were identified through the telephone interviews with cement plant contacts and petroleum refinery contacts. Cement plant contacts and regulatory agency contacts identified suppliers of AFR, including contacts at the cement companies' wholly-owned subsidiaries and independent alternative fuel suppliers.

SSP developed topics of discussion to address the initially prioritized beneficial use materials of spent foundry sand, steel slag, scrap paper/wood, C&D debris, and refinery spent catalyst and clarified slurry oil sediment. The interview guides aided in telephone interviews with cement plant, regulatory agency, and AFR supplier contacts. Specific areas of discussion included the types of beneficial use materials utilized by the plant, the sources of those materials, past and anticipated trends in the supply of materials and the plant's utilization of materials, and the technical and regulatory issues associated with the utilization of materials. Agency contacts discussed state and local regulatory issues, permitting and performance testing issues, public perception issues, economic programs in the states, and other issues that arose during discussions.

The topics of discussion expanded as the telephone interviews progressed. In some cases follow-up calls were made to specific cement plant contacts to obtain additional information concerning issues that arose in other interviews or to obtain additional cement plant contacts, regulatory agency contacts, or AFR supplier contacts. These discussions led to the identification of "emerging issues," concerning alternative fuels that are either in use or being investigated by the cement plants. For these additional alternative fuel materials, SSP developed material-specific analysis and "emerging issue" case studies based on interviews with cement plant contacts and state and local regulatory agency contacts. These "emerging" materials include:

- Wastewater Treatment Sludge (biosolids)
- Plastics
- Automobile Shredder Residue (ASR)

Emerging issues concerning utilization of scrap tires in cement kilns were also identified by cement plant and regulatory agency contacts. Therefore, additional analysis of scrap tires was conducted for this report, and case studies were developed for utilization of scrap tires.

SSP also conducted research into specific regulatory issues concerning alternative fuels and conducted meetings with SSP counterparts for other Industry Sectors to obtain additional perspective on sector-specific issues.

On the usage of the Term "Waste"

Beneficial use of industrial materials (referred to in the cement sector as coprocessing) involves transferring industrial byproducts from one industrial sector to another. Such transfers can reveal differences in perspectives between industry sectors concerning the definition of the industrial byproducts involved. Industrial byproducts have historically been referred to as "wastes," even in cases where such products are recovered, rather than disposed of, and used as alternative fuels or alternative raw materials. "Waste oil," which may be burned for energy recovery, is one example of such terminology. Both the cement industry and other industry sectors have adopted the terminology "alternative fuels and raw materials" (AFRs) to refer to industrial byproducts used as alternative fuels and as alternative raw materials, however these materials are still referred to as "wastes" in cement sector and other industry sector documents. For example, the Portland Cement Association (PCA) Annual Labor and Energy Report [1] refers to "waste, oil," "waste, solvents," and "waste, other solids" as fuel type categories, and the U.S. Geological Survey Minerals Yearbook for Cement refers to "liquid waste" as a fuel type category. [2] Other key documents that use the term "waste" in this context include EU Directive 94/67/EC, and the World Business Council for Sustainable Development (WBCSD) Cement Sustainability Initiative (CSI) "Guidelines for the Selection and Use of Fuels and Raw Materials in the Cement Manufacturing Process Cement Sustainability Initiative" (December 2005).[3]

The generators of industrial byproducts (e.g., petroleum refineries) may be more inclined to refer to these industrial byproducts as "raw materials," "feedstocks," or "products" than are the users of the industrial byproducts (e.g., cement kilns). This is in part because the cement sector and other industry sectors have historically been paid fees to accept such "wastes" from generators, while the petroleum refineries and other industrial byproduct generators have been paid to deliver their facilities "products" to customers. More recently, suppliers of alternative fuel to cement kilns, including cement company wholly-owned subsidiaries and private companies, have adopted terms such as "engineered fuel" when referring to fuels derived from many different industrial byproduct streams. The preparation process used to produce this fuel adjusts for the technical and administrative specifications of cement, and guarantees that environmental standards are met independent of the specific industrial byproduct streams used in its production.[4]

Also note that the terminology of "waste" and specific regulatory definitions of "waste" (e.g., "hazardous waste;" "solid waste;" "municipal solid waste") date back several decades. The term "waste" has therefore come into general usage as applied to industrial byproducts even in cases where the material is not defined by regulation as a waste.

EPA generally has regulated units that process materials (waste or otherwise) for energy recovery under the Clean Air Act (CAA) Section 112, Maximum Achievable Control Technology (MACT) standards, such as the Portland Cement Kiln MACT, Industrial Boiler MACT, and the Pulp and Paper MACT. However, the DC Circuit recently vacated and remanded two EPA rules promulgated under the CAA – the Commercial and Industrial Solid Waste Incineration (CISWI) definitions rule, issued under section 129 of the Act, and the Boiler MACT, issued under section 112 of the Act. The court concluded that EPA erred by excluding units that combust solid waste for purposes of energy recovery from the CISWI rule and including such units in the Boiler rule.

In response to the court's decision, EPA is currently examining the use of various materials by industries, including the cement industry, and is in the process of conducting a rulemaking to determine which materials are solid wastes under RCRA, subtitle D. EPA also is establishing new standards under both 112 and 129 for the various units subject to each section, as the community of units regulated under each section will change as a result of the ruling. A separate MACT Standard for hazardous waste combustors (HWCs) applies to cement kilns that burn hazardous waste. In general, cement kilns operate under Title V Operating Permits issued by state regulatory agencies implementing Clean Air Act programs.

Specific types of "waste" are defined in the Resource Conservation and Recovery Act (RCRA) and other statues and regulations. For example, RCRA Hazardous Waste Code K170 waste is defined as: Clarified Slurry Oil (CSO) storage tank sediment and/or in-line filter/separation solids from petroleum refining operations. [5] This material is referred to in this document as Clarified Slurry Oil Sediments (CSOS). This material is categorized as a "RCRA hazardous waste."

Lastly, EPA's Office of Solid Waste and Emergency Response (OSWER) is currently considering organizational changes that, among other things, reflect the growing trend to view waste management as resource recovery and reuse opportunities, as appropriate. The cement and other industries are finding new ways to use materials that have historically been discarded or treated as wastes. Industrial facilities are reusing byproducts or waste materials in their own operations or sending them elsewhere for reuse as a substitute fuel or raw material. EPA values such beneficial reuse, and recognizes the many opportunities associated with converting waste products into valuable commodities.

The term "waste" in this document is not intended to connote any regulatory classification except when the term "waste" is used in phrases such as "RCRA hazardous waste;" "solid waste;" and "municipal solid waste," which are terms defined in EPA regulations. Other uses of the term "waste" (e.g., "waste oil") in this document are derived directly from the terminology used in the source documents (e.g., the PCA *Labor and Energy Report*; the USGS Cement Minerals Yearbook) and do not and are not intended to connote any regulatory classification of the material.

AFR Utilization in Cement Production

Table ES-1 provides a summary of utilization of conventional and alternative fuels in cement production in the U.S. in 2006. Data are provided in mass units and energy (BTU) units for conventional fuels and in energy units for alternative fuels. Note that available data for utilization of alternative fuels in cement production do not identify the specific type of alternative material (e.g., biosolids, wood) but rather identifies "Waste Oil;" Waste Solvents;" "Waste Other Solids;" and "Waste Miscellaneous" as separate general categories of alternative fuel materials. In general, utilization of alternative fuels other than solvents (including hazardous waste solvents) and scrap tires in cement kilns is relatively low. Alternative fuels other than scrap tires and solvents collectively represented approximately 2.5 percent of the total energy (BTU) input to cement kilns in 2006; scrap tires represented approximately 3.6 percent of the total energy input to cement kilns in 2006. According to USGS data, approximately 400,000 metric tons of scrap tires were used as alternative fuel in cement production in 2005. Tire derived fuel represents 52 percent of scrap tires generated.[1] The cement sector represents 38 percent of the market for tire-derived fuel, according to the Rubber Manufacturers Association (RMA).

Table ES-1 Energy Derived from Fuels Used in Cement Production			
Fuel Type	Quantity Used in Cement Production	Btus (billions) Used in Cement Production	
Coal	9,997,231 tons	226,539.64	64.05%
Petroleum Coke	2,560,737 tons	74,900.71	21.18%
Natural Gas	12,723 million cu. ft.	12,939.29	3.66%
Middle Distillates	20,766,405 gallons	2,875.66	0.81%
Residual Oil	3,534,995 gallons	523.99	0.15%
Gasoline	1,485,385 gallons	185.61	0.05%
LPG	950,379 gallons	81.81	0.02%
Waste Oil	--	1,008.72	0.29%
Waste Solvents	--	14,026.48	3.97%
Tire Derived Fuel	--	12,622.12	3.57%
Other Solids	--	2,686.92	0.76%
Waste - Miscellaneous		5,311.63	1.50%

[1] For 2005, the Rubber Manufacturers Association reports that 728,000 metric tons of scrap tires were used as alternative fuel in cement production in 2005, representing 18% of total quantity generation, and 37% of total quantity used for fuel.

Total		353,702.58	100.00%
Source: PCA, U.S. and Canadian Labor-Energy Input Survey 2006			

Table ES-2 summarizes generation, and onsite and offsite management of CSOS. In 2005, only 24 short tons of CSOS were reported to be sent to cement kilns for energy recovery, representing only 0.15 percent of the approximately 16,000 short tons of CSOS generated by petroleum refineries managed offsite. This is as compared to approximately 5,000 short tons of CSOS sent to cement kilns for energy recovery in 2001 (16 percent of total) and 700 short tons (2 percent of total) in 2003.

Table ES-2 Beneficial Use of CSOS in Cement Production			
Year	**CSOS sent to cement kilns (Short Tons)**	**Total CSOS Managed Offsite (Short Tons)**	**Percent of Total**
2001	4,949.60	30,909	16.01%
2003	698.10	32,408	2.15%
2005	24.31	16,376	0.15%
Source: EPA Hazardous Waste Reporting System (2006)			

Utilization of alternative raw materials (i.e., spent foundry sand, steel slag) in cement production is also relatively low. As shown in Table ES-3, utilization of spent foundry sand in "other" beneficial use applications, which includes use as a raw material in cement production, represented only approximately 11 percent of beneficial use. Utilization of steel slag and other slag as raw material in cement production represented approximately 5 percent of overall sales of slag for beneficial use.

Table ES-3 Beneficial Use of Raw Materials in Cement Production		
Material Type	**Beneficial Use Metric tons (2005)**	**Percent of Total Beneficial Use**
Spent Foundry Sand		
Not specified/Other (including use as a raw material in cement production)	292,928	11.07%
Total Beneficial Use	2,645,427	100%
Steel Slag and Other Slag		
Steel Slag	500,000	2.5%
Other Types of Slag	500,000	2.5%
Total Slag used as raw material in cement production	1,000,000	5.0%
Total Beneficial Use	20,300,000	100%
Source: American Foundry Society Bench Marking Survey (2007)		

Conventional and Alternative Fuel Characteristics

Table ES-4 summarizes the energy content of conventional and alternative fuels used in cement production. Many alternative fuels used in cement production have lower energy content than coal, the primary conventional fuel used in cement production, or require further processing to increase the energy content to the approximate energy content of coal. This means that for some types of alternative fuels, e.g., biosolids, 1.5 tons or 2 tons of the alternative fuel may be needed to replace one ton of coal. This is a factor in both the operation of the cement kiln and in the transportation cost of the alternative fuel. Also, use of alternative fuels for energy recovery, replacing conventional fuels, reduces emissions of greenhouse gases (specifically carbon dioxide) from cement production, particularly where the alternative fuel is a "carbon neutral" material such as biosolids or scrap paper/wood.

Table ES-4: Lower Heating Value (LHV) of Conventional/Alternative Fuels

Fuel Type	Btu/Pound	Notes
Coal	11,300	
Petroleum Coke	14,600	
Paint Residues	7,000	
Plastics	18,700	Polyethylene
	12,000	Mixed non-chlorinated
Refuse-derived Fuel	6,500-7,000	Post-processing
Scrap Carpet	7,300 – 12,000	Nylon; Polypropylene
	12,000 – 15,000	Post-processing
Scrap Tires	14,000	Tire-derived fuel
Automobile Shredder Residue	7,000	Pre-processing
	10,000	Post-processing
Clarified Slurry Oil Sediments	8,000 - 9,000	Centrifuged
Biosolids	7,000-8,000	Class A Dry
Paper/Cardboard	8,500	Dry
Sawdust	7,000	Dry
Wood	6,500 – 7,500	Dry
Engineered Fuel	10,000	[processed Wet Kiln Fuel]
	6,500-8,000	[processed Dry Kiln Fuel]
Sources: Cement Industry Contacts; Murray, A.E., and Price, L., 2008.		

Pros and Cons of Alternative Fuel and Raw Material Use in Cement Kilns

Table ES-5 summarizes the benefits, barriers, technical drawbacks, and other issues related to AFRs included in this report.

Table ES-5. Summary of Alternative Fuel and Raw Material Benefits, Barriers, Technical Drawbacks, and Other Issues				
AFR	**Benefits**	**Barriers**	**Technical Drawbacks**	**Other Issues**
Automobile shredder residue (ASR)	High calorific value; after processing, energy content similar to coal. ASR has raw material value; silicates, calcium, aluminum, and iron content would replace the need for mined material High availability because almost all ASR is landfilled. Lowers landfill demand.	TSCA regulations categorize ASR as a "PCB Waste." This represents a regulatory barrier to use of ASR for energy recovery, therefore most ASR is landfilled. ASR can contain mercury (within mercury switches), lead, and copper from content of scrap automobiles; these elements can affect cement kiln air emissions.	Technologies to upgrade the quality of ASR for suitable use within a cement kiln may not be cost effective. Treatment technologies that separate ASR into higher value high-purity plastics may compete with ASR use as alternative fuel, depending upon waste management hierarchy	Modification of regulatory TSCA waste classification applicable to ASR may facilitate the use of ASR as an alternative fuel in cement kilns. According to cement sector contacts, EPA Region VI is interpreting EPA regulation "Disposal of PCB bulk product waste" in a way that automobile shredders that generate ASR cannot certify compliance. Performance testing and air permit modifications generally required; continuous emissions monitoring system (CEMS) installation may also be required prior to initiating AFR use; these represent added cost
Plastics	High calorific value; energy content similar to coal. Recycling reduces landfill gas emissions. Represents new use for unrecyclable plastics categories (b and c) that would otherwise go to landfill.	Difficult to generate consistent quantities of material; plastics waste from multiple generators may need to be consolidated. Recyclable plastics are often sent to post-consumer plastic recyclers; cement plants do not want to compete with recyclers or conflict with waste management hierarchy. Use of chlorinated plastics can	Difficult to manage the quality of the material if commingled with general MSW stream, other non-plastic materials, and chlorinated plastics. Segregation of materials requires additional capital and labor costs. Generators (local governments) may need to install equipment and establish procedures to adequately segregate plastics in	Performance testing and air permit modifications are generally required for plants to initiate AFR use; CEMS installation may also be required prior to initiating AFR use. These represent additional cost.

Table ES-5. Summary of Alternative Fuel and Raw Material Benefits, Barriers, Technical Drawbacks, and Other Issues				
AFR	**Benefits**	**Barriers**	**Technical Drawbacks**	**Other Issues**
	Lowers landfill demand.	increase emissions of PCDD/PCDFs and also affect clinker quality.	the MSW and supply the plastic for use in cement kilns.	
Refinery spent catalyst / clarified slurry oil sediments (CSOS)	Calorific value of CSOS; after processing, somewhat lower than coal CSOS has raw material value; CSOS alumina and silica content would replace the need for mined material Most CSOS is treated onsite by refineries or treated offsite for disposal; beneficial use would recover energy and raw material value. Refinery spent catalyst has raw material value, replacing the need for mined material.	CSOS can only be managed by offsite facilities with hazardous waste facility permits; utilization is constrained by the logistics and geographic relationship of CSOS generators and RCRA permitted cement kilns and other facilities. CSOS is not generated on a continuous basis; one refinery would not generate sufficient material to continuously supply a cement kiln; material from several refineries may need consolidation.		Refineries pursing reclassification of CSOS so the material would be regulated as a refinery product rather than a hazardous waste. The number of cement kilns permitted to combust hazardous waste has decreased nationwide because of public perception issues, EPA enforcement and regulatory requirements, and related costs. Onsite management/reuse of CSOS by refineries avoids regulatory classification as hazardous waste or TRI reporting as an offsite transfer, but use as AFR material at cement kilns would be a more optimal disposition.
Scrap carpet	Calorific value; after processing, scrap carpet energy content is similar to that of coal. Scrap carpet has raw material value; calcium carbonate would reduce demand for mined material. High potential availability	Difficult to generate consistent quantities of material; scrap carpet from multiple generators may need to be consolidated. Centralized collection of material is difficult, as there are large numbers of small generators of scrap carpet. Using scrap carpet as an AFR has the potential to affect cement kiln	Preprocessing is needed to make alternative fuel from scrap carpet. Carpet is made to be highly durable, making scrap carpet difficult to shred. Separating scrap carpet from other debris at point of generation involves labor costs; small scale carpet installers require training in preventing	Permit modifications and performance testing are generally required prior to initiating AFR use; CEMS installation may also be required prior to initiating AFR use. These represent additional cost.

Table ES-5. Summary of Alternative Fuel and Raw Material Benefits, Barriers, Technical Drawbacks, and Other Issues				
AFR	**Benefits**	**Barriers**	**Technical Drawbacks**	**Other Issues**
	because almost all scrap carpet is landfilled. Lowers landfill demand.	NO_x emissions because of nitrogen content of the scrap carpet.	contamination with materials such as scrap wood, nails.	
Scrap paper / wood	Calorific value, but relatively low as compared to coal. Quantities are available because some material is currently landfilled. Lowers landfill demand. Use of "CO_2 neutral" alternative fuels lowers greenhouse gas emissions from cement production.	Difficult to generate consistent quantities of materials; wood and scrap paper from multiple generators may need to be consolidated. Recyclable scrap paper is often sent to post-consumer paper recyclers; cement plants do not want to compete with recyclers, and plants do not want to conflict with waste management hierarchy for paper.	Feasibility of processing material into consistent physical condition for conveyance into kiln. Capital cost for equipment to prevent sawdust from becoming wet and prevent fugitive dust emissions.	Permit modifications and performance testing generally required prior to initiating AFR use; CEMS installation may also be required prior to initiating AFR use. These represent additional cost.
Construction and demolition debris	Calorific value, but relatively low as compared to coal. Lowers landfill demand	C&D debris is not generated on a continuous basis; difficult to ensure a consistent supply of C&D debris for use in making alternative fuel. Logistics and transportation of C&D debris use are more difficult than relatively homogenous wood waste material generated by a lumber mill or a landscape services provider.	Variable quality of the C&D debris as generated requires segregation of material to produce C&D debris of consistent quality to make alternative fuel. Onsite segregation of C&D debris involves capital and labor costs. Feasibility of processing C&D debris into consistent physical condition for conveyance into kiln depends on quality of the material as generated.	Several states (including MA, NY) have recently banned disposal of C&D debris in landfills, increasing the potential supply of C&D debris for use in making alternative fuel.
Scrap tires	Calorific value of scrap tires	Increasing competition for scrap	Some cement kiln designs are	Performance testing and air permit

Table ES-5. Summary of Alternative Fuel and Raw Material Benefits, Barriers, Technical Drawbacks, and Other Issues				
AFR	**Benefits**	**Barriers**	**Technical Drawbacks**	**Other Issues**
	similar to coal; scrap tires also have raw material (iron) value Use of scrap tires can reduce cement kiln NO_x emissions. Iron recovered from tires reduces the quantity of iron needed from mined sources. Use of scrap tires reduces landfilling, and reduces health and environmental concerns from piled scrap tires; this can be integral part of state government scrap tire programs.	tires from other beneficial users. Waste management hierarchy interpretation may affect the perception of use of scrap tires for energy recovery as opposed to recycling scrap tires into other uses. Some state and local regulations allow scrap tires to be disposed in non-hazardous solid waste landfills; this affects the available supply of scrap tires. Potential public perception and communications issues associated with scrap tire use in cement kilns.	not able to use whole scrap tires and would need to use chipped tires; chipping tires is costly and is not always cost effective.	modifications are generally required for plants to initiate AFR use; CEMS installation may also be required prior to initiating AFR use. These represent additional cost.
Spent foundry sand	Spent foundry sand has raw material value; specifically silica. Silica content of spent foundry sand substitutes for mined raw material. Lowers landfill demand	In some states this material is being stockpiled or landfilled; this affects the available supply of the material. Cost and technical issues related to quality of the material as generated. Cement plants (or generators) must screen lower quality spent foundry sand to remove metal and other extraneous materials, making lower quality spent foundry sand not as desirable as mined raw material. Spent foundry sand can be used as a	Phenolic resin binder content of the spent foundry sand may not be compatible with preheater/precalciner kiln design and can affect carbon monoxide emissions from cement kilns. Spent foundry sand can be more difficult to grind that mined sand; extraneous material can damage grinding equipment. Some cement plants have an inexpensive supply of mined raw	Some states do not have active regulatory management programs for spent foundry sand, permitting the material to be landfilled.

Table ES-5. Summary of Alternative Fuel and Raw Material Benefits, Barriers, Technical Drawbacks, and Other Issues				
AFR	**Benefits**	**Barriers**	**Technical Drawbacks**	**Other Issues**
		construction material; competing uses for spent foundry sand, including construction fill, are less sensitive to the material's quality.	material containing silica and therefore would not need to use spent foundry sand, even if the material was readily available.	
Steel slag	Steel slag has raw material value; specifically silicates. Silicate content of steel slag would substitute for mined material; reducing demand for mined material.	Competition from concrete batch plants using steel slag as an additive in cement production may affect the market for steel slag use as a cement kiln raw material.	Requires particular quality of slag for use in kiln. Some cement plants have an inexpensive supply of mined raw material containing silica and therefore would not need to use steel slag, even if the material was readily available.	
Wastewater treatment sludge	Calorific value, but relatively low as compared to coal even after drying the material. Lowers landfill demand. Material is potentially widely available in metropolitan areas; large supply and continuously available. Use of "CO_2 neutral" alternative fuels lowers greenhouse gas emissions from cement production.	Potential public perception and communications issues associated with biosolids use in cement kilns. Existing infrastructure for biosolids management is largely based on land application of the biosolids. Requires drying the biosolids material before use in kiln.	Biosolids as generated contain pathogens. Classification of biosolids is based on pathogenic organisms content of material; some jurisdictions limit cement plants' use of the material to Class A material that has been heat processed to remove pathogens; this can effectively reduce the net amount of energy recovered from the material.	Performance testing and air permit modifications are generally required for plants to initiate AFR use; CEMS installation may also be required prior to initiating AFR use. These represent additional cost.

Key Findings

This analysis produced the following key findings:

- Primarily driven by cost considerations, the principal focus of cement plants' beneficial use of alternative fuels rather than on the beneficial use of alternative raw materials.

- Most cement plants noted that use of alternative fuels is important to the continued competitiveness of their plants.

- Technical considerations regarding materials handling arose frequently during interviews, and affected key decisions on plants' uses of materials. Often, for instance, a decision to use one alternative fuel or raw material precludes the use of another material because of materials handling system limitations.

- State agency contacts generally indicated that agencies are promoting beneficial use at a relatively low level; cement plant and state agency contacts indicated that the market has been more efficient than state agencies at matching alternative fuel and raw material suppliers and users.

- There is a growing commercial market for brokers that may consolidate quantities of materials into larger shipments to cement plants and may process the material prior to shipment.

- Significant differences exist in the corporate management of beneficial use of materials. Some corporations set benchmarks for their cement plants and the plants may work on pilot projects, while other companies contain plants acting more autonomously.

Key Opportunities and Options

Much of AFR being used in cement kilns provide natural synergies between the cement sector and other SSP sectors, including:

- Automobile Manufacturing: Automobile Shredder Residue
- Automobile Parts Manufacturing: Plastics
- Oil and Gas: CSOS, Refinery Spent Catalyst
- Metal Casting: Spent Foundry Sand

Partnerships between the cement sector and other SSP sectors could leverage the strong interest expressed in interviews in collaboratively examining the issues associated with distribution and use of alternative fuels and raw materials. Also, partnerships between sectors and state agencies with active beneficial use promotion programs could promote establishment and expansion of such programs. Note that regional differences, as well as state and local regulatory frameworks, play a key role in the factors of cost, quantity, and quality of AFR. Approaches to further actions would be most efficient when informed by such differences.

Recommendations for further actions are based on conclusions (observations) concerning beneficial use materials supply and demand and cost, technical, and regulatory issues; potential health effects of beneficial use of materials is outside of the scope of this report; however, the use of AFR at cement kilns would be subject to the full suite of safety, health, environmental, and transportation regulations applicable to any commercial fuels and raw materials used at those locations. Potential public perception and associated public communications issues related to beneficial use of materials are also outside of the scope of this report. The potential for health effects and public perception/communications will need to be considered in evaluating and implementing recommendations for further actions.

1. Introduction

The overall objective of the study is to promote increased utilization of beneficial use materials in cement kilns. These include alternative fuels (e.g., scrap paper/wood, petroleum refinery spent catalyst and CSOS) and alternative raw materials (e.g., spent foundry sand, steel slag) used in cement clinker production. These materials are generally termed "alternative fuels and raw materials" (AFR).[b] The benefits of using alternative fuels in the cement industry include:

- Reduces the use of non-renewable fossil fuels such as coal as well as the environmental impacts associated with coal mining;
- Contributes towards a lowering of emissions such as greenhouse gases by replacing the use of fossil fuels with materials that would otherwise have to be incinerated with corresponding emissions and final residues;
- Maximizes the recovery of energy from the alternative fuel material. All the energy is used directly in the kiln for clinker production. It also maximizes the recovery of the non-combustible part of the alternative fuel material and eliminates the need for disposal of slag or ash, as the inorganic part substitutes raw material in the cement.[6]

The benefits of using alternative raw materials in the cement industry include the elimination of the need to dispose of the materials in landfills and avoidance of air emissions and other environmental impacts of production and transport of virgin (mined) raw materials.

Industrialized countries have utilized AFR successfully for more than 20 years. However, the cement industry in the U.S. lags behind several countries in the percentage of thermal energy substituted by AFR, as shown in Table 1.

Table 1: Share of AFR in Total Fuel Demand in the Cement Industry of Selected Countries

Country	Percentage of thermal energy substituted by AFR	Year
France	32%	2003
Germany	42%	2004
Norway	45%	2003
Switzerland	47%	2002
United States	25%	2003

Source: CEMBRUREAU, SINTEF, as presented in The GTZ-Holcim Private Partnership, *Guidelines on Co-Processing Waste Materials in Cement Production*, p4, 2006.

[b] The term "co-processing" is also use when discussing alternative fuels. Co-processing means the substitution of primary fuel and raw material by alternative fuels and raw materials in industrial processes.

The study was conducted to refine our understanding of the challenges and opportunities for use of these materials by conducting material-specific analyses.[c] The study focused on the following:

- Technical Issues
- Cost Issues
- Regulatory Issues
- Supply/Logistics Issues
- Trends Analysis
- Emerging Issues/Materials

This report is the more detailed follow-up to the SSP report, *Beneficial Reuse of Industrial Byproducts in the Gulf Coast Region*, February 2008; see p. 15. Section 3.1 of that report discussed coal combustion byproducts, iron and steel manufacturing byproducts, and use of alternative fuels from other industries within cement production. The report noted a 10 year trend in increased AFR use, and found that development of innovative and proprietary technologies "can lower barriers to beneficial reuse for technology owners, but may create barriers to beneficial reuse by other facilities" in the Gulf Coast Region (p. 26). This finding is specific to the Gulf Coast Region and may be less of an issue in other regions of the U.S.

The scope of the study was limited because of budget constraints. Therefore a limited number of materials (initially four) were selected for analysis in the study and a limited number of contacts were made with cement plant contacts, regulatory agency contacts, and beneficial use material suppliers. These initial contacts identified substantive issues related to other materials and identified a number of emerging issues, so the scope of the study expanded from the initial four prioritized materials to a larger number of materials.

An initial objective of the study was to conduct comparative cost analyses of the use of beneficial use materials. However, research conducted for this study did not produce sufficient economic data set to conduct detailed economic analysis for any of the materials. Cement plant contacts and beneficial use material suppliers were reluctant to provide detailed cost and economic data, even with assurance of Confidential Business Information (CBI) protection.

The case study summaries provide a general overview of the issues surrounding each beneficial use material without identifying specific cement plants. Appendix A contains a more detailed discussion of the case studies.

Recommendations for further actions are based on conclusions and observations concerning beneficial use materials supply and demand and cost, technical, and regulatory issues. Potential health effects of beneficial use of materials is outside of the scope of this report; however, the use of AFR at cement kilns would be subject to the full suite of safety, health, environmental, and transportation regulations applicable to any commercial fuels

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[c] This report also serves as a continuation of the EPA, SSP report, *Beneficial Reuse of Industrial Byproducts in the Gulf Coast Region*, February 2008. Section 3.1 of that report discusses trends, drivers, and barriers to beneficial reuse in the Cement Manufacturing sector.

and raw materials used at those locations. The potential for health effects will need to be considered in evaluating and implementing recommendations for further actions. Potential public perception and associated public communications issues related to beneficial use of materials are also outside of the scope of this report.

The major sections of this report are organized as follows:

- Section 2 provides the background for the study;
- Section 3 outlines the beneficial use materials prioritization methodology, criteria, and results, and study methodology;
- Section 4 provides case study summations;
- Section 5 provides conclusions;
- Section 6 provides recommendations and potentials for further actions by cement plants, suppliers, and federal and state regulatory agencies;
- Appendix A includes the detailed case studies for the beneficial use materials; and
- Appendix B provides information for the cement plant contacts, regulatory agency contacts, and other contacts for the study.
- Appendix C provides a description of cement kiln types.

2. Background

This section provides the background for the study and an overview of cement kiln technology and beneficial use materials. Kilns produce cement clinker, which is used to produce Portland cement, a binding agent that when mixed with water, sand, and gravel or crushed stone forms the rock-like mass known as concrete. Concrete, in turn, serves highway, commercial, and residential construction projects. Limestone and other ingredients, including material that is aluminous, ferrous, and siliceous, are placed into a kiln where a thermochemical process occurs to make cement clinker. The cement clinker is mixed with additives (e.g., gypsum) to make Portland cement.

The U.S. Cement Manufacturing sector is concentrated among a relatively small number of companies; many U.S. cement plants are owned by, or are subsidiaries of, foreign companies. Together, 10 companies accounted for about 80 percent of total U.S. cement production in 2005.[7] California, Texas, Pennsylvania, Florida, and Alabama are the five leading cement-producing states and accounted for about 48 percent of recent U.S. production.[8] In 2007, about 91 million tons of Portland cement and about 4 million tons of masonry cement were produced at 113 plants in 37 States; total cement production capacity was about 127 million tons. Cement also was produced at two plants in Puerto Rico.[9]

2.1 Study Overview

The scope of this study is to identify potential barriers to increased use of AFR in cement kilns and to develop recommendations/further actions to address such barriers. Note that the scope of this study is limited to assessing the cost, regulatory, technical, and logistics and supply issues associated with use of AFR in cement kilns.

Cement kilns use AFR to reduce operating costs and to reduce emissions of criteria air pollutants and greenhouse gases. The use of alternative raw materials by cement kilns further avoids the need to mine and extract such materials and associated environmental and economic costs of mining and extraction. Alternative raw materials used as cement manufacturing ingredients (e.g., petroleum refinery spent catalyst, steel slag, spent foundry sand) supplies specific necessary elements (e.g., iron, silica) to the raw mix, replacing the need for virgin fuels or mined materials. The need for alternative raw materials depends upon the composition of the primary raw materials (e.g., limestone chemistry) available to the cement kiln. In some cases, if the readily available raw materials are deficient in one or more elements, an alternative raw material may be needed to achieve the needed composition of the cement manufacture raw ingredient mix.

Landfill issues are also important with respect to beneficial use of raw materials, for example, spent foundry sand and steel slag, in cement kilns. These alternative materials are used to replace mined (virgin) materials. Disposal of alternative raw materials in landfills does not represent effective management of the potential raw material value of the materials, does not reduce the consumption of mined materials, and results in the unnecessary utilization of landfill capacity.

An important component of the beneficial use of AFR as alternative fuels in cement kilns is the management of the energy content of the materials. Some of the materials addressed in this study, for example, scrap tires and biosolids, have substantial energy content and can be processed for energy recovery in cement kilns, but these materials can also be disposed of in landfills. These alternative fuels are used by cement kilns to replace conventional fossil fuels (e.g., coal, petroleum coke). Disposal of materials having calorific value in landfills does not represent effective management of the energy content of the materials, and reflects a lack of recognition that these materials have calorific value (BTU per pound). Conversely, use of alternative fuels in cement kilns avoids utilization of landfill capacity, and also represents effective management of the energy content of the materials and reduces the consumption of conventional fossil fuels. Use of alternative fuel materials also reduces emissions of greenhouse gases (carbon dioxide,) particularly where the alternative fuel material is a "carbon neutral" material such as biosolids. Also, utilization of alternative fuels in cement production results in the destruction of the materials in the manufacture of the clinker. Disposal of materials in landfills does not result in the destruction of the material, and therefore landfilling of materials may pose future liabilities that would not exist if the materials were destroyed in a cement kiln.

2.2 Cement Kiln Technology

Rotary kilns are designed to produce clinker through the intense heating of raw materials, as described above. There are four basic types of cement kilns: (1) long wet kiln process, (2) long dry kiln process, (3) preheater kilns, and (4) preheater/precalciner kilns.

The two primary kiln designs are the wet and dry processes. The number of wet process and dry process kilns operating in the U.S. is shown in Table 2. The primary difference between the various processes involves the state of the materials when entering the kiln. For instance, a kiln in a wet process plant must provide enough energy to evaporate the extra water used in the process. Additional discussion of cement kiln design and cement production technology is included in Appendix C.

Table 2. Wet and Dry Kilns in the U.S.			
Year	Wet Kilns	Dry Kilns	Both
1998	34	74	2
1999	34	75	2
2000	32	77	2
2001	28	77	6
2002	27	80	3
2003	26	80	4
2004	24	80	5
2005	23	81	4

Note: Wet Kiln and Dry Kiln counts do not include kilns that are identified as "both" wet and dry in the USGS Mineral Yearbook.
Source: USGS Mineral Yearbook – Cement, 1998-2006

In long wet process kilns, raw materials are conveyed into the kiln in the form of a slurry with water. The water is evaporated in the kiln using heat from combustion of fuels. Heat to promote the chemical reaction of the raw materials to produce cement clinker is also provided by fuel combustion. Because evaporating the water in the raw material slurry requires energy, wet process kilns use more energy per ton of cement clinker produced than other kiln designs, and wet process kilns are typically longer than dry process kilns.

In long dry process kilns, raw materials are introduced into the kiln with less water than wet kilns, but the device continues to rely upon convection heating in a horizontal cylinder which is less energy efficient than heating in a tower. A preheater kiln introduces raw materials with much less water than wet kilns and uses a vertical tower to transfer heat to raw materials taking advantage of heats tendency to rise to more effectively transfer energy. A precalciner kiln introduces raw material with much less water than wet kilns, uses a vertical tower to transfer heat to raw material, and uses a direct fuel to raw material heat transfer in the vertical tower to further improve heat transfer.

All of these systems may use variations on the placement of burners and the recycle of waste heat to improve energy transfer to the raw materials. A typical preheater/precalciner type dry process kiln uses approximately one-third as much thermal energy as a typical wet process kiln (approximately 3.0 MMBTU per ton of clinker produced). Cement companies have been replacing their wet process kilns with dry process kilns. As of 2008, approximately 80 percent of all cement kilns operating in the U.S. were dry process kilns (of all types).

Raw materials that are conveyed into kilns to produce clinker include:

- Clay
- Granulated (and other) blast furnace slags
- Ferrous materials
- Fly ash (and other ash)
- Lime
- Limestone
- Natural rock (and other) pozzolans
- Sand
- Sandstone
- Shale
- Steel (and other) slags

2.2.1 Cement Production

While various processes exist, the kilns are generally horizontal, inclined rotating cylinders that are internally fired. The cylinder's diameter can be up to 25 feet, is installed at a 3 to 4 degree angle, and rotates 1 to 3 times per minute. Rotary kilns run 24 hours a day, and are typically stopped only for a few weeks per year for essential maintenance.

The raw material always enters into the upper end of the kiln, moves down the cylinder against a flow of hot gases and toward the lower end of the cylinder containing a flame. The dry, calcined material then enters a sintering zone where combustion gas reaches a temperature of 1800° to 1980° Celsius (C), and becomes clinker.[10]

A kiln serves several purposes, acting as a chamber for fuel combustion, a flue for gases, a conveyor for solids, a calciner (driving off carbon dioxide from the calcium carbonate), a mixer for the raw feed, and a host for chemically transforming feed into clinker.

Cement clinker is the primary ingredient in cement. Cement clinker production data for 1990 through 2006 is shown in Table 3.[11] As shown, U.S. cement clinker production has increased 37 percent from 1990 through 2006.

Table 3 U.S. Clinker Production

Year	Clinker Production (1,000 metric tons)
1990	64,355
1995	71,257
2000	79,656
2001	79,979
2002	82,959
2003	83,315
2004	88,190
2005	88,783
2006	88,453
Source: USGS Mineral Yearbook – Cement, 1992-2006	

2.3 *Alternative Fuels and Raw Materials (AFR)*

Cement manufacturers using AFR in kilns can achieve reduced energy costs and reduce criteria pollutant and greenhouse gas emissions. Considering the increasing cost of coal, petroleum coke, and other conventional fuels used in cement production, there is an increasing incentive for cement companies to identify new sources of alternative fuels. Data for the utilization of conventional and alternative fuels in cement production are shown in Table 4 in mass units and heat (BTU) units. Table 5 provides data for the calorific value of conventional and alternative fuels.[d]

There are important differences between cement manufacturing processes with respect to the beneficial use of AFR that are related to materials handling. For wet process kilns, and long dry kiln systems, for example, the primary means of introducing fuels into the process is directly into the front or lower end of the horizontal rotary kiln, at approximately the same location as the primary fuels (e.g., coal, petroleum coke). Some AFR may be introduced by penetrating the rotary kiln shell with introduction systems, but these locations can only supply a portion of the systems inputs. For example, alternative fuels introduced into the cement kiln at replacement rates greater than 50 percent would need to be conveyed into the kiln in the same general manner as the primary fuels are conveyed into the kiln, and would need to be in a physical form compatible with the kiln fuel handling system. An example of a system that penetrates the rotary kiln shell is a scrap tire burner or solid waste container burner. Whole scrap tires or containerized or bundled energy bearing waste can be dropped into a horizontal rotary kiln through a chute and gate mechanism installed in the midpoint of the kiln (mid-kiln entry).

For a preheater/precalciner-type dry process kiln, however, alternative fuel can be introduced either into the front end (lower end), and back end (upper feed shelve end) of the horizontal rotary kiln or into the systems vertical tower. This enables a broader range of alternative fuel characteristics to be introduced into the process.

Care must be taken to introduce AFR at a locations in the system where complete combustion will occur or where appropriate chemical reactions will occur. The introduction location's temperature, turbulence, oxygen, and time at conditions must be adequate to completely combust organic compounds, whether in the fuel, or contained in the raw materials (e.g., spent foundry sand). For raw materials the introduction location must allow adequate time for the materials chemical species to react in the manufacture process. For example a particular introduction point in a kiln system may allow too short a residence time to facilitate a fuel or raw material reaction. As such some dry kilns may require the use of tire chips, rather than whole tires because the chip has more surface area per mass and can react more quickly.

Table 4: Energy Derived from Fuels Used in Cement Production

Fuel Type	Quantity Used in Cement Production	Btus (billions) Used in Cement Production	
Coal	9,997,231 tons	226,539.64	64.05%
Petroleum Coke	2,560,737 tons	74,900.71	21.18%
Natural Gas	12,723 million cu. ft.	12,939.29	3.66%
Middle Distillates	20,766,405 gallons	2,875.66	0.81%
Residual Oil	3,534,995 gallons	523.99	0.15%

[d] Note: The terminology used in this section and in Table 3 reflects the terminology used in the Portland Cement Association U.S. and Canadian Labor-Energy Input Survey (2006).

Gasoline	1,485,385 gallons	185.61	0.05%
LPG	950,379 gallons	81.81	0.02%
Waste Oil	--	1,008.72	0.29%
Waste Solvents	--	14,026.48	3.97%
Tire Derived Fuel	--	12,622.12	3.57%
Other Solids	--	2,686.92	0.76%
Waste - Miscellaneous		5,311.63	1.50%
Source: PCA, U.S. and Canadian Labor-Energy Input Survey 2006[c]			

Table 5: Lower Heating Value (LHV) of Conventional and Alternative Fuels		
Fuel Type	**Btu per Pound**	**Notes**
Coal	11,300	
Petroleum Coke	14,600	
Paint Residues	7,000	
Plastics	18,700	Polyethylene
	12,000	Mixed non-chlorinated
Refuse-derived Fuel	6,500-7,000	Post-processing
Scrap Carpet	7,300 – 12,000	Nylon; Polypropylene
	12,000 – 15,000	Post-processing
Scrap Tires	14,000	Tire-derived fuel
Automobile Shredder Residue	7,000	Pre-processing
	10,000	Post-processing
CSOS	8,000 - 9,000	Centrifuged
Biosolids	7,000-8,000	Class A Dry
Paper/Cardboard	8,500	Dry
Sawdust	7,000	Dry
Wood	6,500 - 7,500	Dry
Engineered Fuel	10,000	[Wet Kiln Fuel]
	6,500-8,000	[Dry Kiln Fuel]
Sources: Cement Industry Contacts; Murray, A.E., and Price, L., 2008.[12]		

2.4 On the usage of the Term "Waste"

Beneficial use of industrial materials (referred to in the cement sector as coprocessing) involves transferring industrial byproducts from one industrial sector to another. Such transfers can reveal differences in perspectives between industry sectors concerning the definition of the industrial byproducts involved. Industrial byproducts have historically been referred to as "wastes," even in cases where such products are recovered, rather than disposed of, and used as alternative fuels or alternative raw materials. "Waste oil," which may be burned for energy recovery, is one example of such terminology. Both the cement industry and other industry sectors have adopted the terminology "alternative fuels and raw materials" (AFRs) to refer to industrial byproducts used as alternative fuels and as

[c] This table contains the terminology of fuels used in the PCA U.S. and Canadian Labor-Energy Input Survey, 2006.

alternative raw materials, however these materials are still referred to as "wastes" in cement sector and other industry sector documents. For example, the Portland Cement Association (PCA) Annual Labor and Energy Report [13] refers to "waste, oil," "waste, solvents," and "waste, other solids" as fuel type categories, and the U.S. Geological Survey Minerals Yearbook for Cement refers to "liquid waste" as a fuel type category. [14] Other key documents that use the term "waste" in this context include EU Directive 94/67/EC, and WBCSD Cement Sustainability Initiative (CSI) "Guidelines for the Selection and Use of Fuels and Raw Materials in the Cement Manufacturing Process Cement Sustainability Initiative" (December 2005).

The generators of industrial byproducts (e.g., petroleum refineries) may be more inclined to refer to these industrial byproducts as "raw materials," "feedstocks," or "products" than are the users of the industrial byproducts (e.g., cement kilns). This is in part because the cement sector and other industry sectors have historically been paid fees to accept such "wastes" from generators, while the petroleum refineries and other industrial byproduct generators have been paid a fee to deliver their facilities "products" to customers. More recently, suppliers of alternative fuel to cement kilns, including cement company wholly-owned subsidiaries and private companies, have adopted terms such as "engineered fuel" when referring to fuels derived from many different industrial byproduct streams. The preparation process used to produce this fuel adjusts for the technical and administrative specifications of cement, and guarantees that environmental standards are met independent of the specific industrial byproduct streams used in its production.[15]

Also note that the terminology of "waste" and specific regulatory definitions of "waste" (e.g., "hazardous waste;" "solid waste;" "municipal solid waste") date back several decades. The term "waste" has therefore come into general usage as applied to industrial byproducts even in cases where the material is not defined by regulation as a waste.

EPA generally has regulated units that process materials (waste or otherwise) for energy recovery under CAA 112 MACT standards, such as the Portland Cement Kiln MACT, Industrial Boiler MACT, and the Pulp and Paper MACT. However, the DC Circuit recently vacated and remanded two EPA rules promulgated under the CAA – the Commercial and Industrial Solid Waste Incineration (CISWI) definitions rule, issued under section 129 of the Act, and the Boiler MACT, issued under section 112 of the Act. The court concluded that EPA erred by excluding units that combust solid waste for purposes of energy recovery from the CISWI rule and including such units in the Boiler rule.

In response to the court's decision, EPA is currently examining the use of various materials by industries, including the cement industry, and is in the process of conducting a rulemaking to determine which materials are solid wastes under RCRA, subtitle D. EPA also is establishing new standards under both 112 and 129 for the various units subject to each section, as the community of units regulated under each section will change as a result of the ruling. A separate MACT Standard for hazardous waste combustors (HWCs) applies to cement kilns that burn hazardous waste. In general, cement kilns operate under Title V Operating Permits issued by state regulatory agencies implementing Clean Air Act programs.

Specific types of "waste" are defined in the Resource Conservation and Recovery Act (RCRA) and other statues and regulations. For example, RCRA Hazardous Waste Code K170 waste is defined as: Clarified Slurry Oil (CSO) storage tank sediment and/or in-line filter/separation solids from petroleum refining operations.[16] This material is referred to in this document as Clarified Slurry Oil Sediments (CSOS). This material is categorized as a "RCRA hazardous waste."

Lastly, EPA's Office of Solid Waste and Emergency Response (OSWER) is currently considering organizational changes that, among other things, reflect the growing trend to view waste management as resource recovery and reuse opportunities, as appropriate. The cement and other industries are finding new ways to use materials that have historically been discarded or treated as wastes. Industrial facilities are reusing byproducts or waste materials in their own operations or sending them elsewhere for reuse as a substitute fuel or raw material. EPA values such beneficial reuse, and recognizes the many opportunities associated with converting waste products into valuable commodities.

The term "waste" in this document is not intended to connote any regulatory classification except when the term "waste" is used in phrases such as "RCRA hazardous waste;" "solid waste;" and "municipal solid waste," which are terms defined in EPA regulations. Other uses of the term "waste" (e.g., "waste oil") in this document are derived directly from the terminology used in the source documents (e.g., the PCA *Labor and Energy Report*; the USGS Cement Minerals Yearbook) and do not and are not intended to connote any regulatory classification of the material.

3. Beneficial Use Materials Prioritization

This section describes the beneficial use material prioritization, selection criteria, and results, and provides the methodology and rationale for selecting beneficial use materials for further material-specific analysis.

3.1 Development of Materials Prioritization List and Criteria

The study that gave rise to this initiative was the *Beneficial Use of Industrial By-Products in Cement Kilns: Analysis of Utilization Trends and Regulatory Requirements*, April 2005. This study was prepared to support the *EPA/PCA Beneficial Use of Alternative Fuels and Materials Workshop* organized by SSP and PCA and conducted in July 2005. The objective of the EPA/PCA Workshop was to initiate a discussion of regulatory and economic drivers and barriers among cement kiln operators, beneficial use material generators, and regulators. Ten beneficial use materials were evaluated in the ICF International April 2005 *Draft Beneficial Use Report* and discussed at the July 2005 EPA/PCA Workshop.[17] These include:

- Steel Slag;
- Spent Foundry Sand;
- Coal Combustion Products (fly ash);
- Scrap Tires;
- Scrap Paper/Wood;
- Construction and demolition (C&D) Debris;

- Waste/Off-Specification Paint and used non-hazardous used oil;
- Refinery Spent Catalyst and Clarified Slurry Oil Sediment;
- Spent Aluminum Potliners; and
- Animal Meal (rendering plant by-products)

The ten materials evaluated in the *Draft Beneficial Use Report* were prioritized based on the following criteria:

- Amount of the Beneficial Use Material Generated in the U.S.;
- Amount of the Material Beneficially Used in Cement Kilns in the U.S.;
- Anticipated Availability of Economic Data;
- Alternative Beneficial Uses and Likelihood of Disposal; and
- Regulatory Framework and Disposal Methods

In addition, further discussion of the prioritization criteria with the PCA focused on the identification of a subset of materials for further analysis. Specifically, it was agreed that the four materials selected for further analysis should include three that are "commonly used" (i.e., non-hazardous waste) materials and one "challenge material," potentially a listed RCRA hazardous waste material. Also of value in considering materials for study in this report was the SSP report, *Beneficial Reuse of Industrial Byproducts in the Gulf Coast Region*, February 2008.[18]

3.1.2 Study Methodology

Cement plants were selected for this study to provide a range of beneficial use materials being used, a range of kiln types, and a range of geographic location. The types of beneficial use materials that each cement plant uses and the type of cement kiln was identified from the Portland Cement Association U.S. and Canadian Labor and Energy Report (2006).

Data for each cement plant included in the 2006 PCA *Labor and Energy Report* were organized in a spreadsheet by kiln type (wet kiln, dry kiln, preheater, precalciner); and by primary fuels and alternate fuels (coal, petroleum coke, fuel oil, natural gas, and "waste" fuels including "Waste, Oil;" "Waste, Solvents;" "Waste, Other Solids;" and "Waste, Miscellaneous" as separate general categories of "waste); and primary raw materials used (including spent foundry sand, steel slag, and "refinery catalyst," which could include spent FCC catalyst waste, among the raw material subcategories). When citing data from the PCA *Labor and Energy Report*, this study uses the terminology used in the underlying Report. Several of the cement plants that were identified as using "waste" as primary fuel were selected for the study, and several of the cement plants that reported using spent foundry sand, steel slag, or refinery spent catalyst were also selected for the study. No specific data concerning scrap paper/wood was included in the reference (this would be listed under "other" in the data) so preliminary research using public data sources was conducted to investigate utilization of C&D debris by cement kilns. Several of the cement kilns that reported using "other" fuel were selected for the study.

In August 2007, topics for discussion were developed for the initial prioritized beneficial use materials of spent foundry sand; steel slag; scrap paper/wood; C&D debris; and refinery spent catalyst and CSOS. The materials were developed as "interview guides" for conducting telephone interviews with the cement plant and regulatory agency contacts. Specific areas of discussion with the cement plant contacts included the types of beneficial use materials utilized; the sources of the materials; past and anticipated future trends in the available supply of the material and in the cement plant's utilization of the material, and technical and regulatory issues associated with utilization of the material. The technical and regulatory issues addressed included the quality of the available material; materials handling and materials processing requirements; potential effects of utilization of the material on cement clinker quality or on kiln environmental performance; and requirements for environmental permitting and performance testing prior to using the material.

Cement plant contracts were identified in coordination with the principal PCA contact and members of the PCA Energy and Environment (E&E) Committee in September 2007, and the topics for discussion were sent to cement plant contacts. Telephone interviews were conducted with the cement plant contacts using the topics for discussion as interview guides between November 2007 and March 2008. The initial list of cement plants to be contacted for the study expanded as the study was being conducted. In some cases the contact for one cement plant provided contact information for another of that company's cement plants, in order to provide additional information for a specific beneficial use material.

PCA and EPA also coordinated a meeting with API representatives in November 2007 at API Headquarters to discuss technical and regulatory issues related to clarified slurry oil solids issues. Several petroleum refiners represented at the meeting are generating CSOS for beneficial use in cement kilns or other onsite or offsite management. Telephone interviews were conducted with these petroleum refinery contacts in December 2007 and January 2008.

State and local regulatory agency contacts were identified through the telephone interviews with cement plant contacts and petroleum refinery contacts. Telephone interviews with agency contacts were conducted between November 2007 and March 2008. Agency contacts were identified specifically to obtain information concerning the site-specific state and local regulatory issues, permitting and performance testing issues, public perception issues, and related issues surrounding each beneficial use material. Agency contacts were also interviewed to research various state-level and local-level economic programs that have been established to promote the beneficial use of materials.

In addition to the four initially prioritized materials, alternative fuel beneficial use materials were identified for material-specific analysis and development of "emerging issue" case studies based on interviews with cement plant contacts and state and local regulatory agency contacts. These include:

- Wastewater Treatment Sludge (biosolids)
- Plastics
- Scrap Tires
- Automobile Shredder Residue (ASR)

The rationale for including these additional materials is described below.

The interviews conducted identified economic, technical, and regulatory barriers to increased use; this information used to develop material-specific case studies. These case studies are included in Appendix A. The case studies identify specific recommendations and further actions to address identified barriers. The further actions/recommendations are integrated with the further actions and recommendations for the cement sector identified in the SSP *Beneficial Reuse of Industrial Byproducts in the Gulf Coast Region*, February 2008.[19]

3.1.3 Alternative Fuels Methodology

SSP contacted cement plant contacts, regulatory agency contacts, and suppliers concerning use of alternative fuels in cement kilns. EPA initiated research by contacting the cement plant contacts identified through discussions with the PCA. The discussions initially focused on prioritized materials, but led to the identification of "emerging material" alternative fuels, either in use or being investigated by the cement plants. The topics of discussion expanded as the telephone interviews progressed, including areas such as cement companies' business approach towards alternative fuels (e.g., some cement companies have a general policy that their cement plants do not accept hazardous waste) and corporate-wide as well as plant-specific issues and policies. In some cases follow-up calls were made to specific cement plant contacts to obtain additional information concerning issues that arose in other interviews or to obtain additional cement plant contacts to discuss the use of, or investigation of, emerging materials.

Cement plant contacts also identified state or local regulatory agency contacts responsible for permitting for their plants and other regulatory agency contacts (e.g., regulatory agencies responsible for management of state scrap tire management programs or programs to support beneficial use of materials). Cement plant contacts and regulatory agency contacts identified suppliers of alternative fuels, including contacts at the cement companies' wholly-owned subsidiaries responsible for materials sourcing and also independent alternative fuel suppliers.

SSP also conducted research into specific regulatory issues concerning alternative fuels (e.g., the regulatory status of CSOS and ASR) and conducted meetings with SSP counterparts for other Industry Sectors to obtain additional perspective on sector-specific issues.

3.1.4 Alternative Raw Materials Methodology

The methodology for alternative raw materials was similar to that for alternative fuels except that specific third-party materials suppliers were not identified by the cement plant contacts. Therefore, no third-party suppliers were interviewed. The wholly-owned subsidiaries responsible for alternative fuels material sourcing for cement plants also perform sourcing for alternative raw materials.

3.2 Criteria Application and Prioritization Results

The *Preliminary Prioritization of Beneficial Use Materials for Market Analysis* prepared in January 2006 provided an initial prioritization of the beneficial use materials for further analysis. *Portland Cement Association Briefing Materials* were prepared in January 2007, and the materials prioritization process and preliminary selection of four materials was discussed with the principal PCA contact at a meeting in February 2007. The selection of four materials for development of case studies were reviewed and confirmed by PCA's E&E Committee through an informal working group formed in June 2007 of PCA E&E Committee members identified by the principal PCA Contact. The preliminary prioritization analysis was prepared and discussed with the members of the PCA E&E Committee. From the preliminary analysis and subsequent discussions, spent foundry sand, steel slag, scrap paper/wood, C&D debris, and refinery spent catalyst and CSOS were selected for further analysis in this report. Application of the prioritization criteria and selection of materials is described further in this section.

3.2.1 Spent Foundry Sand

Spent foundry sand was selected as a material for further analysis based on the relatively large amount of this material generated and the relatively low amount used as raw material in cement clinker production. The industry consortium, Foundry Industry Recycling Starts Today (FIRST), notes that 6 to 10 million tons of spent foundry sand are discarded annually and are available to be recycled.[20] As shown in Table 6, the American Foundry Society reported in their 2007 survey that almost 50 percent of the spent foundry sand generated is used as construction fill; use in cement production (a subset of the "other" category in the survey data) is relatively low, and use as landfill cover (a category not separately reported by the AFS) is relatively high. An objective of this study is to provide insight into utilization trends for spent foundry sand.

Table 6: Beneficial Reuses of Spent Foundry Sands According to American Foundry Society Bench Marking Survey[21]

Beneficial Use Application	Quantity Beneficially Used (Tons) / Percent	
Construction fill[b]	1,140,914	43.13%
Concrete	303,531	11.47%
Not specified/Other	292,928	11.07%
Road construction	144,288	5.45%
Top soil mix/horticulture	220,949	8.35%
Reuse at another foundry[c]	48,426	1.83%
Asphalt	494,390	18.69%
Total:	2,645,427[d]	100.00%

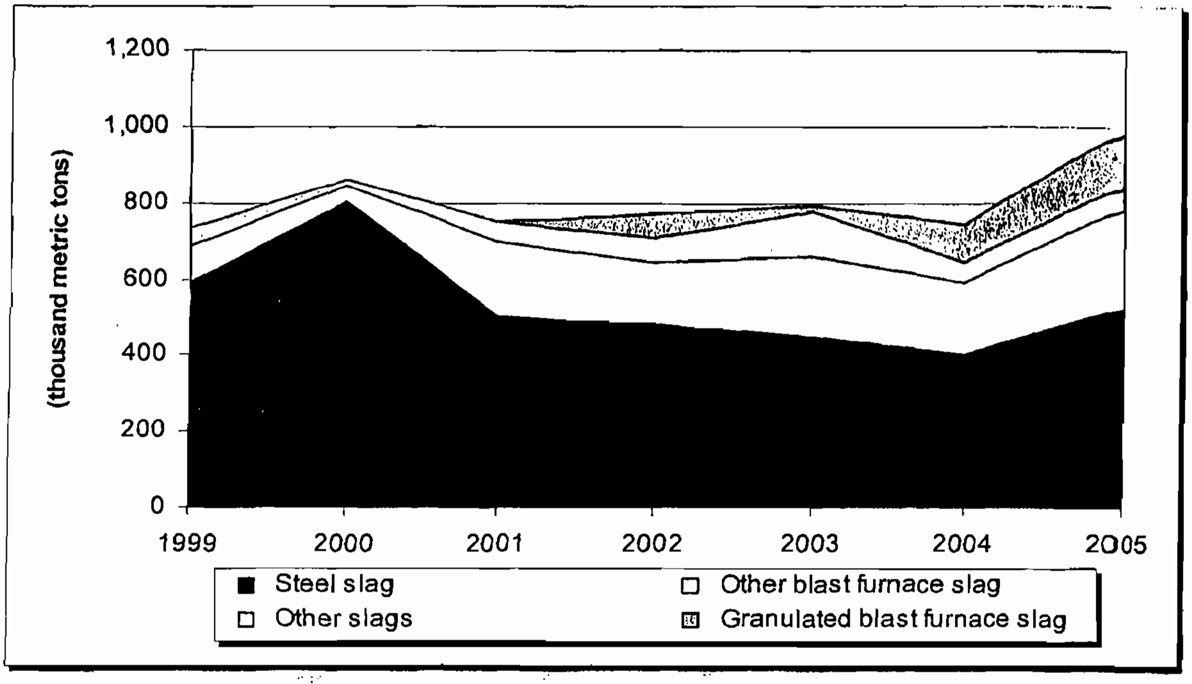
a. Based on 244 total respondents, or a 24 percent completion rate. Survey respondents had the option of selecting more than one beneficial use application. Beneficial use quantities have been extrapolated to reflect beneficial use in the entire metal casting industry.
b. Construction fill includes both structural fill and flowable fill.
c. Spent foundry sand is transferred from one foundry to another for use in on-site construction projects or other application.
d. AFS excludes landfill cover as a beneficial use application from the total beneficial use quantity (2,645,427 tons).

3.2.2 Steel Slag

Steel slag was selected as a material for further analysis based on the relatively large amount of this material generated and recent trends concerning use as a raw material in cement clinker production. In 2006, iron and steel slag sales in the U.S. totaled 20.3

million metric tons.[22] As shown in Figure 1[23], use of steel slag in cement clinker production peaked in 2000 and then declined, showing a slight increase from 2004 to 2005. An objective of this study is to provide insight into utilization trends for steel slag.

Figure 1. *Utilization of Iron and Steel Sector Slag in Cement Clinker Production in the U.S. (1999-2005)*



3.2.3 Scrap paper/wood and C&D debris

Scrap paper and wood and C&D debris were selected as general material categories for further analysis specifically to provide a focus on C&D debris. An objective of this report is to provide insight into the potential for use of C&D debris and also scrap paper/wood in cement clinker production. The February 2008 *Gulf Coast Region Beneficial Reuse Report* specifically focused on the potential for beneficial reuse of C&D debris generated when tropical storms strike the Gulf Coast Region. In 2002, 35.7 MMT of C&D debris wood was generated, with 29.2 MMT potentially available for recovery; but, possibly only 2.7 MMT was being actually recovered in new construction.[24] Significantly larger amounts of C&D debris wood are generated during tropical storm events. C&D debris (i.e., C&D debris containing wood) could be used as an alternative fuel in cement production. While some utilization of scrap paper/wood has been reported, cement plants have not historically used significant quantities of alternative fuels derived from C&D debris in cement clinker production.

One cement plant contact[25] reported that the plant was offered C&D debris generated from Hurricanes Katrina and Rita. However, the C&D debris (containing wood) was so commingled with other types of C&D debris that the cement plant decided that the material could not be feasibly processed into alternative fuel. Therefore they declined to accept the material. Another cement plant contact[26] reported that the plant uses wood, including some segregated wood material from C&D debris yards. This wood material is preprocessed by the C&D debris yard prior to being sent to the cement plant. The cement plant itself does not have equipment to process C&D debris. No other cement plant contacts indicated that the cement plants were using wood or other alternative fuels generated from C&D debris.

3.2.4 Refinery spent catalyst and clarified slurry oil sediments

Refinery spent catalyst and clarified slurry oil sediment (CSOS) were developed and selected as materials for further analysis specifically to provide a focus on CSOS, a RCRA listed hazardous waste generated by petroleum refineries. Clarified slurry oil (CSO) is generated from fluidized catalytic crackers (FCCs) at petroleum refineries. Some of the FCC catalyst is entrained in the CSO. These fines settle out of the CSO as solids, and these solids periodically need to be removed from the CSO storage tanks. These solids, referred to as CSOS, are listed as RCRA hazardous waste (waste code K170). A single petroleum refinery may generate on the order of one million pounds (500 short tons) of CSOS per year from CSO tank cleanouts (but the yearly generation rates can be highly variable and may be significantly higher than that quantity in any given year, depending on tank cleanout schedules); a substantial portion of this CSOS is generated in Texas and elsewhere in the Gulf Coast Region, because of the high concentration of petroleum refineries in the region.[27] The calorific value of CSOS varies depending upon how it is generated and processed. Refineries can process the CSOS to remove more, or less, of the oil contained in it. One refinery contact [28] reported that after processing the CSOS by centrifuge to remove oil, the calorific value of the CSOS is on the order of 8,000 to 9,000 BTU per pound; though, as noted above, it can vary above or below that depending on how it is generated or processed prior to shipment.

Research conducted for this report identified several cement kilns that are using CSOS as an alternative fuel, however use of this material is limited to the relatively small number of cement kilns (18) that have RCRA hazardous waste combustor permits, and therefore this material was categorized as a "challenge material" for this report. An objective of this report is to assess regulatory, technical, and cost barriers associated with generation of CSOS and use as an alternative fuel in cement clinker production.

As shown in Tables 7 and 8, generation and management of K170 waste varies by year and the amount of K170 waste managed by offsite energy recovery decreased from 2001 to 2005 (the most recent data available through the EPA hazardous waste reporting system). In 2005 only 24 tons of K170 waste was reported as being managed through offsite energy recovery at a cement kiln, while approximately 16,000 tons of K170 waste was managed through other methods. Five cement plants accepted K170 waste for energy recovery in 2001, and only one in 2003 and in 2005.

Note that the amount of CSOS that is generated and managed on site at refineries is not reported into the EPA hazardous waste reporting system. Refinery contacts [29] indicated that refineries frequently manage their CSOS on site under an available regulatory exclusion, despite the fact that on site management may be more expensive, in part to enable the refineries to avoid having to classify the materials as hazardous waste when shipped offsite. Therefore, the data in Tables 7 and 8 do not reflect the amount of CSOS that is actually available for beneficial use in any given year. Table 9[30] contains API data with a summary of K170 waste generation that includes only hazardous waste streams with the primary waste code of K170.[f] Some hazardous wastes can be assigned more than one RCRA hazardous waste code.

Table 7: Annual Generation and Management Methods of K170 Hazardous Waste (Clarified Slurry Oil Sediments)				
Reporting Year	Number Generators K170 Waste	Tons of K170 Waste Managed through Energy Recovery	Tons of K170 Waste Managed through Other Methods	Total Tons of K170 Waste Managed
2001	43	5,374	25,535	30,909
2003	37	2,080	30,327	32,408
2005	46	24	16,352	16,376
Source: EPA Hazardous Waste Reporting System, 2008				

Table 8: Annual Disposition of K170 Waste (CSOS) Managed through Energy Recovery				
EPA ID	Waste Management Facility Name	K170 Waste Quantity (in tons) Managed Through Energy Recovery		
		2001	2003	2005
ARD981057870	Rineco Chemical Industries	1.2		
IND005081542	ESSROC Cement Corp	48.5		
KSD980633259	Systech Environmental	2,445.3		
MOD054018288	Continental Cement Co LLC	1,130.8		24.31
MOD981127319	Lone Star Industries Inc	131.0		
SCD003351699	Giant Cement Company		698.1	
TXD007349327	TXI Operations LP	1,194.0		
TXD981053770	Duratherm Inc		1,382.1	
FCCANADA3	Not Available	423.3		
	Total	5,374	2,080	24
Source: EPA Hazardous Waste Reporting System, 2008				

Table 9: NAICS 32411 GM Forms, Management Code H050 and H061, Outlier and Mixed Waste Excluded				
Reporting Year	Number of Generators of K170 Waste	Tons of K170 Waste Managed through Energy Recovery	Tons of K170 Waste Managed through Other Methods	Total Tons of K170 Waste Managed or Shipped
2001	37	9,734	14,330	24,064
2003	26	878	3,248	4,126
2005	35	3,284	5,954	9,238
Source: API (2008)[31]				

3.2.5 Other Prioritization List Materials

The other five materials on the prioritization list were eliminated from initial material prioritization based on various criteria. No cement kilns were identified as using either animal meal or spent aluminum potliners; these materials were eliminated from further

[f] This table excludes a single waste stream of 175,013 tons reported in 2005 because it is an outlier related to soil remediation activities. The waste stream was described as "haz waste soils and sludges generated during RFI remedy" which was disposed in a landfill. According to the facility, this was a one-time event.

consideration based on the anticipated lack of data concerning beneficial use. Similarly, the market for waste/off-specification paint is not well-developed; research conducted for this report identified one cement plant using latex paint solids as a raw material for clinker production. The cement plant mixes cement kiln dust with the latex paint solids to facilitate the introduction of CKD into the kiln; the CKD/latex paint solids mixture is fed into kiln. This material is discussed as an "emerging material."

Non-hazardous used oil, coal combustion products, and scrap tires were not initially selected for further analysis because the infrastructure for collection and utilization of these materials is already well-developed, and because utilization of these materials in cement clinker production is already relatively high. Scrap tires were added back to the report scope for further analysis because many cement sector contacts identified emerging issues related to scrap tire management.[32]

Non-Hazardous Used Oils

In 2006, according to the PCA U.S. and Canadian Labor-Energy Input Survey, 65 of 97 cement plants included in the survey reported using alternative waste fuels (with some plants reporting use of more than one type of alternative waste fuel). These included 48 plants using scrap tires and 16 plants using non-hazardous waste oil.[33] Non-hazardous waste oil includes used motor oil collected from commercial automobile service establishments, and used oils generated by industrial manufacturing facilities and other types of facilities.

Several cement plant contacts reported utilization of used (non-hazardous) oil as an alternative fuel. No trends data are available for used oil; however the overall amount of used oil and other liquid streams being used as alternative fuel in cement kilns, as reported by the USGS is trending up.[8] Liquid alternative fuel utilization in cement production was approximately 745 million liters in 1993, approximately 999 million liters in 2004, and approximately 1,470 million liters in 2005, the latest year for which the USGS has reported data.[34] Note that the category of "liquid waste" as reported by the USGS includes used oils, off-spec oils, liquid hazardous waste, and other liquid alternative fuels. USGS reported that approximately 1 billion liters (approximately 900,000 metric tons) of used oil and other liquids were used as alternative fuels in cement kilns in 2004, while approximately 1.5 billion liters of used oil and other liquids were used in cement kilns in 2005.

Coal Combustion Products

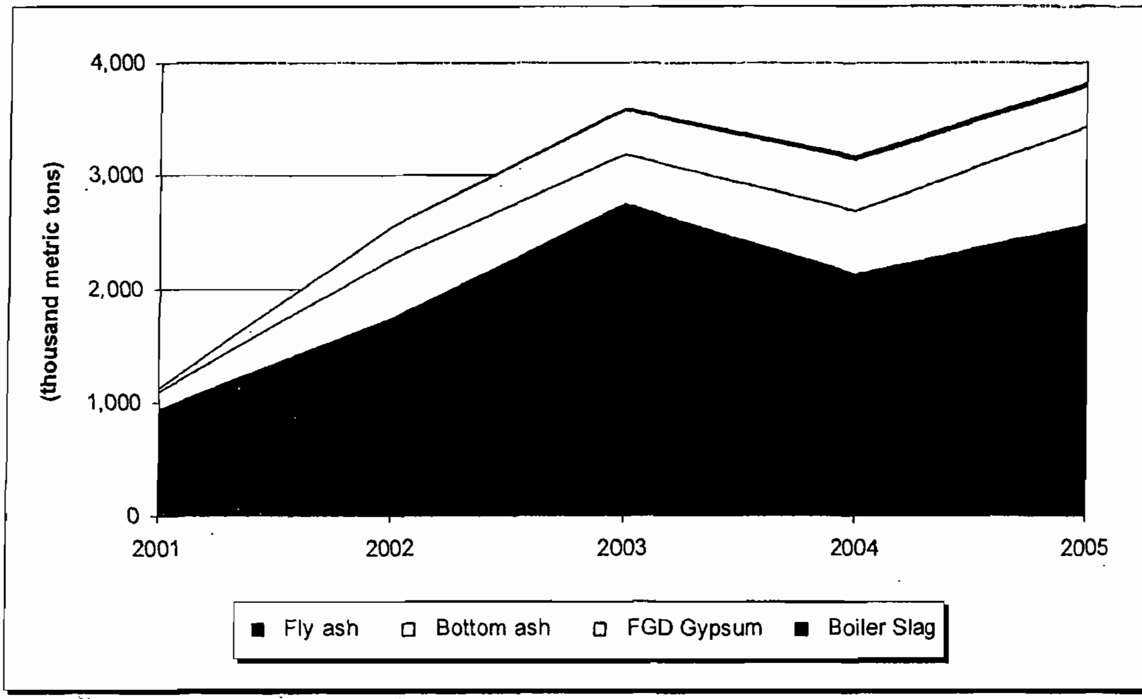
Figure 2[35] illustrates the amounts of coal combustion products used in clinker production and cement production. National data from PCA for 2006 indicated that, of the 115 operating Portland cement plants reporting in the PCA report, more than 50 plants used fly ash or bottom ash generated from electric power plants.[36] This includes use of coal combustion products as a raw material in clinker production and use of coal combustion products as additives in cement production. The scope of this report includes coal

[8] Note: The terminology used in this section reflects the terminology used in the U.S. Geological Survey Minerals Commodity Yearbook, Cement (2006).

combustion products used as a raw material in the cement kiln, but not coal combustion products used as additives in cement production.

In 2006, 124.8 million metric tons of coal combustion products were produced.[37] The amount of bottom ash and fly ash being beneficially reused in cement production has actually been increasing faster than the amount of cement clinker produced. In 2005, according to USGS data, cement plants used 4.2 million metric tons of coal combustion products as raw materials in producing clinker, including fly ash, other ash, and other coal combustion slags.[38]

Figure 2. Coal Combustion Products Used in Producing Clinker and Portland Cement



Note: Includes both raw materials fed into kilns and additives used in producing cement

Scrap Tires

RMA estimates that about 299 million scrap tires were generated in 2005, representing an 8-fold increase in the percentage of scrap tires going into markets annually since 1990,[39] Approximately 400,000 metric tons of scrap tires were used as alternative fuel in cement kilns in 2005, according to USGS data. Table 10 illustrates the amount of scrap tires used as alternative fuel in cement production.[40]

Table 10: Scrap Tires Used as Alternative Fuels in Cement Production			
	Metric Tons of Scrap Tires Used		
Year	Total	Dry Kiln Plants Utilizing Scrap Tires (Out of total Dry Kiln Plants)	Wet Kiln Plants Utilizing Scrap Tires (Out of Total Wet Kiln Plants)
2002	304,000	210,000 (80)	94,000 (27)

2003	387,000	291,000 (80)	97,000 (26)
2004	377,000	312,000 (80)	66,000 (24)
2005	405,000	315,000 (80)	90,000 (23)

The use of scrap tires by cement plants has increased dramatically over recent decades: in 1991 nine plants in the U.S. were using scrap tires and by 2001, 39 plants were using scrap tires for fuel.[41] By 2005, 58 million scrap tires were used in 47 plants in the U.S. [42] In addition to calorific value, scrap tires also provide raw material content to the cement kiln. Iron is a necessary ingredient for clinker manufacturing. When scrap tires are used as an alternative fuel, approximately 250 kg Fe per ton of scrap tires is recovered, reducing the quantity of iron required from mined mineral sources. [43]

Figure 3 illustrates the overall trend in use of scrap tires as tire-derived fuel for energy recovery, including use in cement kilns. [44] Figure 4 illustrates that in 2005 approximately 52 percent of scrap tires generated nationwide were used in energy recovery (including in cement kilns and in other energy recovery processes), and approximately 14 percent were disposed of in landfills.[45] Cement kilns made up 38 percent of the tire-derived fuel market in 2005, according to data published by RMA.[46]

Figure 3. Scrap Tires as Tire-Derived Fuel

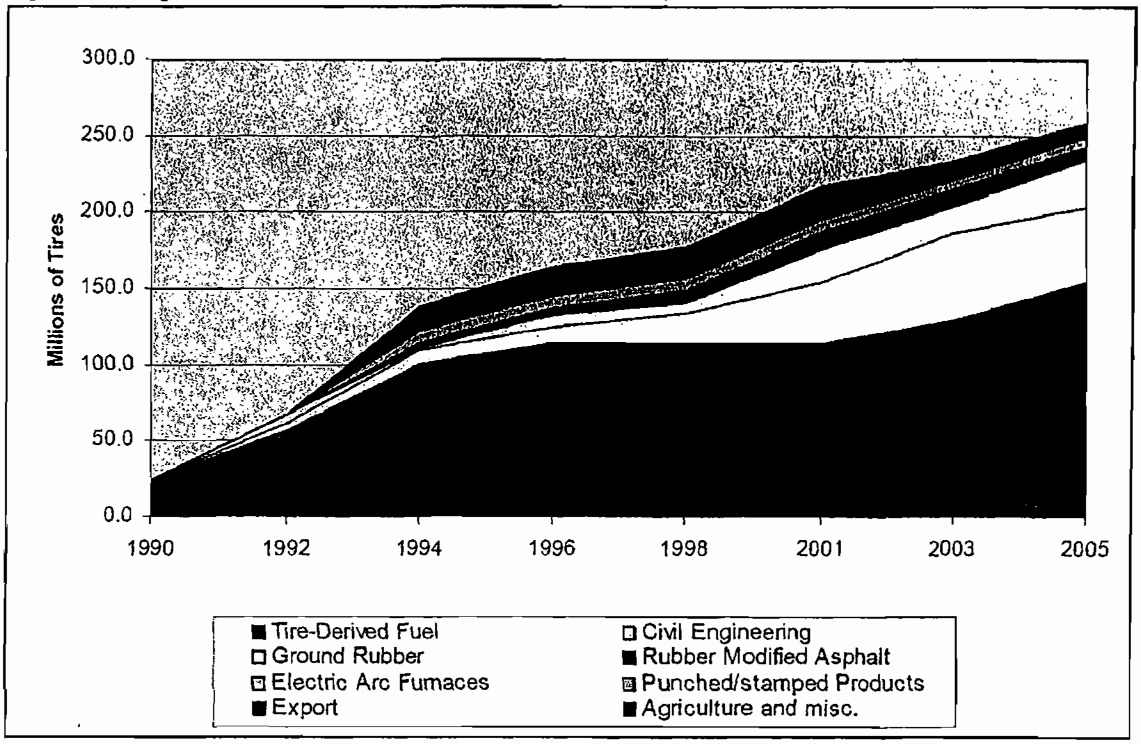
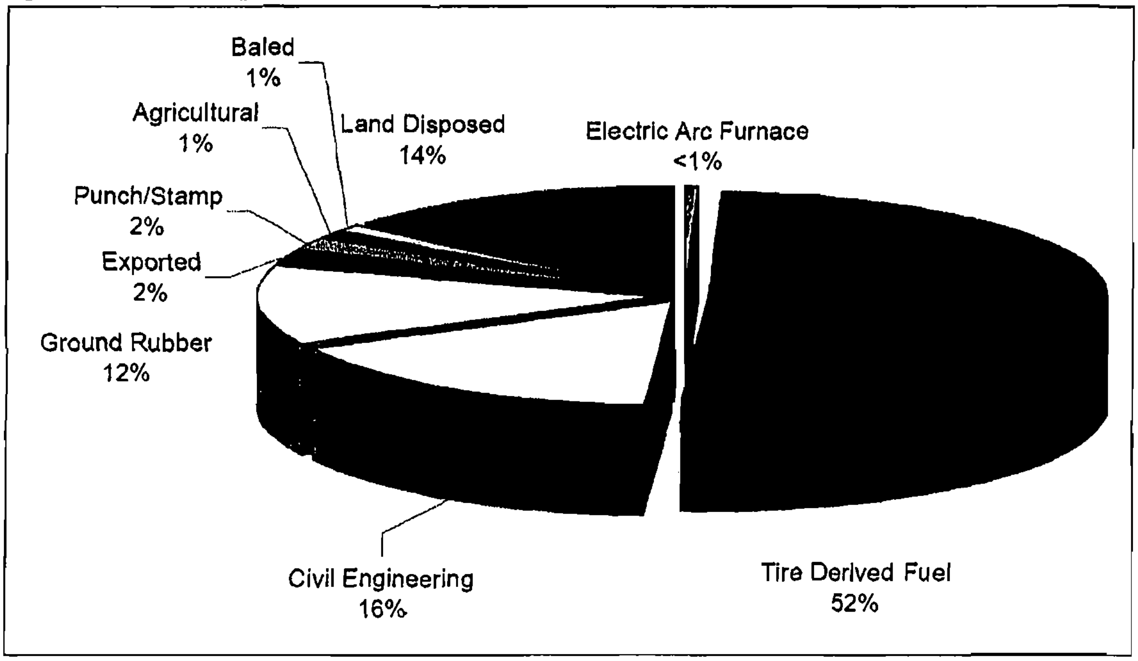


Figure 4. Use of Scrap Tires in 2005



3.3 Emerging Materials

Interviews with cement sector contacts and state and local regulatory agency contacts identified additional study materials for development of "emerging material" case studies. Issues identified for these emerging materials include limitations on supply, technical and logistics limitations, effects on plant air emissions, cost and regulatory issues related to landfill disposal, and other items identified by contacts.

3.3.1 Wastewater treatment sludge (biosolids)

Biosolids are generated primarily from municipal wastewater treatment plants (WWTP). In 40 CFR Part 503, EPA categorized biosolids as Class A or B, depending on the level of pathogenic organisms in the material. The classification of biosolids affects the feasibility of a cement plant to use the biosolids. Cement kilns may be limited to using only Class A biosolids both because of regulatory issues and materials handling issues. 40 CFR Part 503 requires specific treatment processes and treatment conditions that must be met for both A or B classifications. Class A biosolids contain minute levels of pathogens. To achieve Class A certification, biosolids must undergo heating, composting, digestion, or increased pH that reduces pathogens to below detectable levels. "Class B" biosolids "may have low levels of pathogens which rapidly die-off when applied to soils, essentially becoming pathogen-free within a short period following application."[47] Class B biosolids have less stringent standards for treatment. After treatment to reduce moisture content, the calorific value of biosolids may range from 7,000-8,000 BTUs per pound.

The North East Biosolids and Residuals Association (NEBRA) estimates that 16,583 wastewater treatment facilities in the U.S. generate 7,180,000 dry short tons of biosolids that can be beneficially reused or disposed.[48] NEBRA conducted a survey of water treatment facilities and consulted existing data from sources such as EPA. The resulting report estimates that about 3,300 of the largest facilities generate 92 percent of the total quantity of biosolids produced in the U.S.

Several contacts reported that their companies have recognized that there is a large and continuously-generated supply of this material and that in many jurisdictions the material is accumulating on the POTW sites rather than being used. These contacts also indicated that their company's investigation of biosolids as an alternative fuel is a proprietary issue for the company. Details of their investigations were therefore not disclosed.

Most biosolids generated nationwide are applied to land, and are not incinerated or burned for energy recovery in cement kilns. Some municipal wastewater treatment system operators have developed biosolids management programs that focus on land application rather than energy recovery. For example, The Sanitation Districts of Los Angeles County (CSDLAC) system, which operates the Joint Water Pollution Control Plant (JWPCP,) includes seven POTWs linked by a common sewer system serving 5 million people in Los Angeles County and treating 500 million gallons per day of wastewater. Because of the tremendous volume served by JWPCP, the County developed various ways to manage biosolids in the last several years. The four biosolids management practices include: land application, which accounts for 76 percent of the system's biosolids; injection into a cement kiln, which accounts for another 12 percent of the biosolids and helps reduce the levels of nitrogen oxide (NO_x) air emissions from the cement making process; composting, which has been moved off site to two privately operated facilities; and landfilling, which accounts for approximately 12 percent of the system's biosolids.[49]

3.3.2 Plastics

Several cement plant contacts reported recently establishing use of plastics as an alternative fuel[50] and others reported that they are investigating the feasibility of using plastics.[51] In 2006, 29.5 million tons of plastics were generated from MSW and other sources.[52] These materials included either plastic scrap from manufacturing processes or post-consumer plastics generated from MSW recycling programs. Cement plant contacts and regulatory agency contacts indicated that the principal issues associated with the use of plastics include identifying (generating) an adequate long-term supply of the material and ensuring that the material is "clean" and not commingled with the general MSW stream or with other non-plastic materials. The material must be adequately segregated from the general solid waste stream to facilitate material handling and adequately segregated from chlorinated plastics to ensure that chlorinated plastics are not included in the feed stream. Cement kilns need to limit the amount of chlorine feed to the kiln to maintain clinker quality.[53] Cement sector contacts reported that plastics, as generated by suppliers, have a calorific value similar to that of coal (approximately 12,000 BTU per pound).

3.3.3 Automobile shredder residue (ASR)

Automobile shredder residue was identified as an emerging material by the PCA E&E Committee Alternative Fuels and Raw Materials (AFR) subcommittee. Automobile shredder residue (ASR) contains the plastic and other non-metallic materials left after scrap automobiles are shredded, and can have a calorific value on the order of 10,000 BTU per pound after processing to remove residual metals and other non-combustible materials. According to the Argonne National Laboratory, as of 2003, U.S. auto shredders generated about 5 million tons of ASR annually.[54] Because of the lack of a cost-effective technology to recycle ASR, it is mostly landfilled; smaller amounts are incinerated. Scrap Magazine has estimated ASR generation at about 5.4 million tons per year.[55] This is consistent with Steel Recycling Institute automotive recycling rates data. These data show that automotive recycling rates have been relatively consistent from 2003 through 2006.[56]

The PCA E&E subcommittee is investigating the potential use of this material as an alternate fuel in cement kilns. The PCA E&E subcommittee contact indicated that the calorific value of ASR after it is processed is similar to the calorific value of coal, but that because of Toxic Substances Control Act (TSCA) regulations that specifically categorize ASR as a "PCB Waste" most of the ASR generated is landfilled rather than burned for energy recovery.[57] A recent study by the California Department of Toxic Substances Control (DTSC) included test data for ASR generated in California. The test results showed that the PCB content of disposed ASR generated by several California facilities averaged total PCB levels ranging from 16 to 82 ppm. [58] The California DTSC report indicated that modification of the TSCA classification definitions applicable to ASR may be needed to facilitate use of ASR as an alternative fuel in cement kilns. ASR can also contain copper and mercury (from mercury switches contained in scrap automobiles) and therefore ASR has the potential to affect air emissions from the cement kiln. Mercury can be emitted through the cement kiln stack, and copper, in combination with chlorine contained in cement kiln raw materials and fuels, can contribute to the formation of PCDD/PCDF emissions from the cement kiln stack.

Argonne National Laboratory recently developed a "froth flotation" technology to separate ASR into higher value high-purity plastics. The technology is being evaluated by a consortium of automobile manufacturers.[59] A full-scale demonstration project was conducted in Europe. [60, 61] Such treatment technologies may be a potential competitor to use of ASR as an alternative fuel in cement kilns. Boughton (2006) reported that automobile recyclers are also working on developing and applying technologies to improve the separation of materials in ASR and to improve its combustion characteristics with respect to cement kiln operation and environmental impacts. These include application of existing ASR density separation technologies to separate fine material (<1.2 cm) from the ASR. This can reduce effects of the use of ASR on CKD characteristics and on air emissions. Boughton (2006) also reported that ASR has raw material value in addition to its fuel value, and noted that ASR contains silicates, calcium, aluminum, and iron. [62]

3.3.4 Carpet Scrap

One cement plant contact reported using scrap carpet generated from residential and commercial building carpet installers[63] The Carpet America Recovery Effort (CARE) is an organization formed to promote diversion of carpet scrap from landfills to beneficial uses. The CARE 2007 Annual Report provides an overview of the collection and disposition of carpet scrap.[64] In 2007, approximately 2.4 million pounds (1,200 short tons) of carpet scrap were reported utilized as alternative fuel in cement kilns, representing approximately one percent of the total amount of material collected and diverted from landfill disposal. The total amount of material diverted from landfill disposal in 2007 (approximately 296 million pounds) represented approximately 5.3 percent of the approximately 5,590 million pounds of material generated.[65]

Recycling of scrap carpet is technically challenging and energy intensive, because carpet is by design made to be highly durable.[66] One cement sector contact reported using scrap carpet as an alternative fuel, and reported that the material is difficult to process.[67] Scrap carpet may also be difficult to collect because the material may be generated by a large number of relatively small and geographically dispersed carpet installers. Therefore this material is not widely used in cement production. Realff (2005) estimated that approximately 2 million metric tons of scrap carpet are disposed of in landfills, and that the rate of disposal is expected to increase at 3 percent per annum over the next decade.

Scrap carpet provides both energy and raw material value to cement kilns. The lower heating value (LHV) of scrap carpet residues depends on the carpet material: nylon and polypropylene carpet residues have LHVs of approximately 17 and 28 GJ per metric ton, respectively (7,300 – 12,000 BTU per pound). In addition to the calorific value, scrap carpet also has a high fraction of calcium carbonate which would substitute for mined calcium carbonate and be incorporated directly into the clinker.[68]

3.3.5 Other Materials

Cement plant contacts reported several other types of AFR as being used in cement kilns. These include latex paint solids,[69] sandblast grit, storm drain solids (generated from municipal storm drain cleanouts)[70], and agricultural byproducts (e.g., almond shells, rice hulls).[71] Sufficient information is not available for these materials to develop case studies.

4. Case Study Summations

This section provides a summary of the case studies and overarching issues related to the beneficial use of AFR.

4.1 *Alternative Fuels*

4.1.1 Cost Issues

Cost is an overarching issue in selection of alternative fuels in cement production. One cement plant contact summed up the cost analysis methodology for alternative fuels in a simple manner: "Is it cheaper than coal?" As shown in Table 11, the price of coal varies depending upon the region of the country, in part because of transportation costs. For example, as of 2006, coal prices were on the order of $32 per short ton in Texas and $85 per short ton in Florida. Coal costs have been changing relatively rapidly through 2008 due to increasing transportation fuel costs and other factors, as well as exhibiting significant volatility.

Another cement plant contact indicated that the company has an overall corporate policy to move away from using fossil fuels to the extent possible because fossil fuels are increasingly costly.[72] Cement plant contacts that operate wet kilns or long dry kiln reported that their plants pursue alternative fuels more aggressively than do more modern dry process preheater/precalciner. The wet kiln and long dry kiln technologies are not as energy efficient as more modern dry process preheater/precalciner kilns, and therefore the older technology kilns have more of a need to offset fuel costs to remain competitive with newer plants.[73] Alternative fuels s uppliers [74] concurred that the operating costs for wet process and long dry kilns make use of alternative fuels more of a necessity.

Table 11. Cost of Coal in Select States (per short ton)	
State	Price
Alabama	$68.27
California	$57.63
Florida	$84.16
Illinois	$36.95
Kansas	$48.04
Missouri	$45.72
New York	$74.79
Texas	$32.65
Source: DOE, Energy Information Administration Note: The price of coal changes continually; these prices represent the cost of coal in 2006	

There are various aspects to the overall cost of alternative fuels, including the capital costs and operating costs of:

- Kiln and equipment upgrades;
- Performance testing;
- Alternative Fuel conditioning (preprocessing);
- Engineered fuel production;
- Material transportation;
- Continuous Emissions Monitoring Systems (CEMS);
  Sampling and testing materials; and
- Material acquisition.

Kiln and Equipment Upgrades

Cement plant contacts indicated different approaches to management of cost for use of alternative fuels. Some companies [75] have company-wide initiatives to invest in upgrades to kilns or to materials handling equipment to initiate use of alternative fuels, and the company also promotes pilot projects in which different company cement plants conduct studies of different alternative fuels (e.g., biosolids would be tested at one company plant, plastics would be tested at another company plant, and the test results would inform ongoing corporate initiatives). In other cement companies [76] each company cement plant operates in a more autonomous manner, with each company cement plant conducting its own initiatives and managing its own costs. In some cases these companies are less inclined to invest in kiln or equipment upgrades and are more inclined to only test different alternative fuels that can be handled using existing materials handling equipment and existing kiln configurations. Several cement plant contacts [77] reported that their plants recently spent several million dollars in cement kiln or equipment upgrades in order to accept alternative fuel. One cement plant [78] spent several million dollars to configure the kiln to accept whole tires after the cement plant's supply of chipped tires was interrupted; another plant [79] spent a similar amount to install material handling and air emission (dust) control equipment to enable use of wood (sawdust) as an alternative fuel.

Performance Testing

In addition to the cost of making modifications to the kiln or materials handling system, the cost of performance testing is another cost that must be incurred to establish use of alternative fuels in cement production. Performance testing is generally required by state air quality regulations, and performance tests are designed to determine that the cement kiln operation is in compliance with its air emissions permit conditions. One alternative fuels supplier[80] reported that conducting performance testing for a non-hazardous alternative fuel (e.g., biosolids) could cost on the order of $50,000 per kiln, and that for multi-kiln cement plants each kiln using the alternative fuel must be tested individually. Performance testing costs for an alternative fuel that is regulated as a hazardous waste (e.g., CSOS) could be on the order of $250,000 to $500,000 [81] depending upon the regulatory requirements in the jurisdiction where the cement plant is located.

Cement sector contacts and alternative fuels suppliers have identified performance testing and associated permitting costs as a cost barrier to increased use of alternative fuels. In general, according to state regulatory agency contacts, each alternative fuel introduced into the plant is subject to individual performance test and permitting requirements. However, if various alternative fuel materials are preprocessed into an "engineered fuel" that meets defined specifications for calorific value and other fuel quality parameters, the cement kiln (at least theoretically) should be subject to only one performance test for the engineered fuel, because the quality of the engineered fuel would not vary regardless of the alternative fuel materials it is made from. One alternative fuel supplier [82] reported that they had some difficulty convincing a state regulatory agency that the quality of the engineered fuel was a constant, even though the alternative fuel materials it is made from could vary. Both cement companies and alternative fuel suppliers are advocating a permitting system in which the specific air emissions from the cement kiln are permitted, but the permit does not explicitly identify specific alternative fuels that can and cannot be used. Therefore, a cement plant could use different alternative fuels based on available supply and other factors, without having to modify the permit each time a change is made, provided that the air emissions limits in the permit are not exceeded. This is referred to as a "flexible fuel concept" of permitting.

Continuous Emissions Monitoring Systems (CEMS)

Continuous Emissions Monitoring Systems (CEMS) continuously measures air emissions from the cement kiln stack. A CEMS may be required by state air emissions regulations or by air emissions permit conditions for the cement kiln, however, not all cement plants are required by regulation or by permit conditions to install and operate CEMS. A cement plant that does not have a CEMS and that is applying for the first time to use alternative fuels may be required to install a CEMS as a condition of the revised air emissions permit for the cement plant. This represents an added capital and operating cost for use of alternative fuels at cement plants that do not already have a CEMS installed.

AFR Conditioning (preprocessing) and Engineered Fuel Production

Certain AFRs (e.g., scrap carpet) may be required to be preprocessed for the purposes of size reduction, removal of undesirable constituents (e.g., for scrap carpet, nails and other metal components need to be removed). Preprocessing of alternative fuel materials prior to use in cement production represents an added cost over that for use of conventional fuels. Preparation of "engineered fuel" (i.e., preprocessed alternative fuel materials of a consistent quality from a variety of alternative fuel materials) also represents an added cost; however, preparation of engineered fuel has an advantage in promoting stability of kiln operation.

Material Transportation Cost

Material transportation cost is also an important factor in utilization of alternative fuels. The cost of transporting the material itself can render the alternative fuel to be not cost effective. One alternative fuels supplier [83] reported that their processing plant could supply cement plants located up to several hundred miles from their plant, but that supplying cement plants located 400 miles from their plant was not cost effective. The effect of materials transportation costs depends in part on the value of the material being transported, and also in part on local landfill disposal costs. One cement plant contact [84] reported that the alternative fuels sourcing initiative is targeting alternative fuel material generators within a 50 mile radius of the cement plant site. Note that regulated hazardous wastes (including waste solvents) may be transported hundreds or thousands of miles from the location of the generator to a cement kiln or other facility. One refinery operator, for example, reported that their U.S. refineries have exported CSOS to Canada for treatment and disposal.

Material Acquisition Cost

Another important issue is material acquisition cost; is the material a "waste" that the cement kilns charge the supplier a fee to accept, or is the material a "raw material" or "fuel" that the cement kiln pays the supplier to provide. CSOS, specifically, is currently regulated as a hazardous waste and the cement plants have generally charged the petroleum refineries a fee to accept CSOS for "hazardous waste treatment and disposal," and petroleum refiners have historically paid cement plants to accept the material for disposal. According to refinery contacts, CSOS was initially proposed for consideration as a hazardous waste because the material was being landfilled. Petroleum refiners are now promoting CSOS as an alternative fuel and raw material with a calorific value and also high silica and alumina (i.e., cement kiln raw material) content that cement plants should purchase from the petroleum refineries in the same manner as cement plants purchase other fuels and raw materials of similar value; however, the material remains regulated as a hazardous waste under existing regulations. Disposition of this issue may depend in part on the specific language of any decision to change the regulatory characterization of CSOS to remove the designation of the material as a hazardous waste.

4.1.2 Technical Issues

There are various technical issues related to use of alternative fuels, including materials processing and handling and control of air emissions. Differences in kiln technology and configuration and materials handling systems mean that not every cement kiln can use every type of alternative fuel. Materials handling systems designed for one alternative fuel may not be easily convertible to another type of alternative fuel. Examples of technical issues identified in the study include the following:

Scrap Tires and Kiln Design

Some cement kiln designs are not conducive to using whole scrap tires, and may be limited to use of chipped tires. This is specific to the individual cement kiln design. One cement plant contact, using a preheater/precalciner-type kiln, reported that the plant [85] conducted performance testing to introduce whole tires into the kiln. The testing showed that introduction of whole tires into the kiln riser resulted in the tire belts not moving into the kiln; and that introduction of whole tires lower down in the kiln resulted in insufficient oxygen for tire combustion. Despite spending several hundred thousand dollars in conducting the performance tests, the plant was unable to solve the technical issues. Chipping tires prior to introduction was not deemed to be a cost effective solution. The plant is now investigating sources of industrial rubber scrap, but is not planning on retesting whole scrap tires.

Introduction of scrap tires into cement kilns can reduce cement kiln NO_x emissions. One cement plant contact [86] reported that use of scrap tires in the cement kiln is actually incorporated as permit condition of the facility air permit for this reason. However, state regulatory agencies could not mandate the use of scrap tires in all cement kilns as air emissions control strategy, because some kilns cannot accept scrap tires.

Materials Handling Systems

Several cement plant contacts indicated that one technical issue with respect to materials handling is that their plant's materials handling system cannot handle two types of materials simultaneously (this is an issue both for alternative fuels and alternative raw materials). Therefore for these plants a decision to apply the materials handling system to a specific alternative fuel (e.g., wood) is effectively a decision to forego use of a different alternative fuel (e.g., plastics). Materials handling systems can be designed to accommodate multiple types of materials, however there is an increased capital cost involved in such flexible design. Also, different materials can be preprocessed to similar characteristics (e.g., size reduced) such that a single materials handling system can handle the different materials, however preprocessing the materials also involves a higher operating cost than using the materials as generated.

Also, C&D debris must be pre-sorted, processed, and pre-sized to be used in cement kilns. One cement plant contact with experience with wood generated from C&D debris [87] reported that one issue encountered was the difficulty in separating the gypsum wallboard and other non-combustible materials in the C&D debris from the wood. Only one cement plant contacted [88] reported that the plant is currently using wood generated from a C&D debris yard.

Preprocessing of Refinery Spent Catalyst and Other Materials

Refineries generate a variety of materials (spent sandblasting media, granular catalyst beads, support balls, catalyst fines filter cake) that can be commingled to achieve a mixture that can be easily managed by conveyor belt systems. In addition, commingling enables blending of the chemical properties so that the material becomes more uniform chemically and physically. Stockpiling materials over several months promotes uniformity and large enough quantity to facilitate the variety of catalysts and other materials generated by the refinery.

4.1.3 Regulatory Issues

Cement plant contacts, regulatory agency contacts, and materials supplier contacts identified specific regulatory issues related to alternative fuels included in this study.

In general, cement kilns operate under a set of permit conditions established by the plant's Clean Air Act Title V Operating Permit. The permit conditions limit the emissions of criteria air pollutants (e.g., nitrogen oxides (NO_x), carbon monoxide (CO), sulfur dioxide (SO_2), and particulate matter (PM)) and hazardous air pollutants. Cement plants that do not burn hazardous waste are subject to MACT Standard 40 CFR 63 Subpart LLL, which regulates emissions of chlorinated dioxins/furans, particulate matter, mercury, and total hydrocarbons. A separate MACT Standard for hazardous waste combustors (HWCs) applies to cement kilns that burn hazardous waste. In general, cement kilns operate under Title V Operating Permits issued by state regulatory agencies implementing Clean Air Act programs.

Cement plants using alternative fuels may also need to obtain other state permits, including solid waste facility permits, depending upon the specific state regulations and the type of alternative fuel being used. Cement kilns using biosolids or scrap tires, for example, may be subject to state regulatory requirements to obtain a "solid waste facility" operating permit. Other states, e.g., South Carolina, exempt "recycling" facilities (including facilities burning alternative fuels for energy recovery) from state solid waste facility permit requirements.

Cement plant contacts and regulatory agency contacts provided information concerning how the environmental permitting process is implemented for cement plants testing the use of new alternative fuels. In general, cement plants are required to obtain construction permits to establish the use of a new alternative fuel, in part because modifications to the materials handling system involving capital expenditure need to be permitted.[89] Short-term testing of new alternative fuels for which no capital expenditure is required may be conducted under the MACT Standard without a permit modification. In this case there would be a limit on the duration of the test and the amount of alternative fuel material that could be tested. Cement kilns are generally required to conduct air emissions performance testing to demonstrate that use of the alternative fuel would not result in an increase in the air emissions from the cement plant. Cement kilns that have CEMS can use these systems to monitor emissions during performance tests; cement kilns that do not have CEMS would need to conduct physical testing of their emissions. If an increase in air emissions would result then other regulatory standards would be triggered. It is not necessarily the case, however, that every new use of alternative fuel or every modification needs to be permitted. State agencies [90] have developed guidance documents that outline what proposed activities would require permits.

Cement kilns conducting tests of new alternative fuels are generally granted a short-term permit by the regulatory agency to conduct performance testing both to test the technical performance and feasibility of using the alternative fuel. Several regulatory agencies [91] reported that cement plants applied for and were granted permits to test alternative fuels [and also raw materials] that ended up not being used because of technical difficulties (as opposed to issues concerning the cement plant air emissions).

Scrap tires, CSOS, ASR, and biosolids each have unique regulatory issues with respect to permitting, performance testing, and public perception when used as alternative fuels. Scrap paper/wood and plastics are generally regulated as non-hazardous (municipal solid) wastes and have fewer specific regulatory issues; however, permit modifications and performance testing are generally required for cement plants to initiate use of these materials as alternate fuels. In general, construction or modification of materials handling systems or air emission control systems or kiln modifications made to accommodate non-hazardous waste alternative fuels would necessitate permit revisions.

Performance testing and permitting requirements for hazardous waste alternative fuels (e.g., CSOS) would be significantly more expensive and time-consuming than for non-hazardous waste alternative fuels, because hazardous waste combustion is subject to the Hazardous Waste Combustor MACT Standards and other standards that specify the permit and performance testing requirements. These requirements would generally include preparation of a risk assessment in addition to performance testing.

<u>CSOS</u>

CSOS is a listed hazardous waste (RCRA Waste Code K170) and therefore only cement kilns that are permitted to accept hazardous waste can accept this material for use as an alternative fuel (only 18 cement plants have hazardous waste combustor permits). Therefore the utilization of this material is constrained first by the logistics and geographic relationship of the CSOS generators (petroleum refineries) and the permitted cement kilns, and second by the need to handle the material as a hazardous waste, including transportation of the material by licensed waste transporters. As a result, most petroleum refiners[92] contacted for this study reported that they are inclined to manage the CSOS that they generate onsite rather than send the material off site (either to a cement kiln or other offsite treatment or energy recovery) as a hazardous waste. In other cases [93] there are no cement kilns in the vicinity of the petroleum refinery that are permitted to accept the CSOS, therefore the material is sent to other offsite facilities for treatment and disposal.

The TXI cement kiln in Midlothian TX, the Ash Grove cement kilns in Foreman AR and Chanute KS, the Lafarge (Systech) cement kiln in Fredonia KS, the Continental Cement kiln in Hannibal MO, and Giant Resource Recovery in Harleyville SC are all permitted to accept K170 hazardous waste. However, according to EPA hazardous waste reporting system data, these facilities' acceptance of CSOS from refineries has been intermittent.

Petroleum refiners have been pursuing an initiative through their trade association (the American Petroleum Institute) to change the regulatory characterization of CSOS so that the material is not regulated as a hazardous waste (or as a solid waste) but rather as a fuel material (i.e., as a refinery product) when legitimately used as a fuel, such as in a cement kiln. The refineries suggested that the most direct approach to defining CSOS as a non-hazardous waste is through the EPA "definition of solid waste" (DSW) regulatory process. If CSOS is deemed by EPA not to be a "solid waste" when beneficially used, then the material inherently cannot be classified as a hazardous waste either. This change in the characterization of the material could facilitate utilization of the material in commerce. Currently much of the CSOS generated is managed on site at the refineries. According to refinery contacts [94] if the CSOS were to be reclassified as a non-hazardous waste, or reclassified as a non-solid waste, it could be sold as a refinery product into higher value offsite markets. Also, if the material were not regulated as a hazardous waste, theoretically any cement kiln could accept it. The combination of the increase in the amount of the material available in commerce and the number of cement kilns that could accept the material could result in increased utilization of the material in cement kilns as an alternative fuel. Reclassifying the material as a refinery product may enable petroleum refineries to sell the material to cement kilns (as a product) rather than having to pay the cement kilns to accept the material. So it is also possible that cement kilns would not accept CSOS if the cement companies had to pay for it. One refinery contact reported that the refinery has already established a contact with cement plants that are paying for the CSOS. The emergence of CSOS as an AFR that was not classified as waste or hazardous material would open a new market comprised of all the cement companies unable to use the material now. The utility of the material and its price would be negotiated, but could ultimately be more than it is now.

Petroleum refiners could also more easily consolidate batches of CSOS from their own refineries, or a consortium of refineries, into large shipments of material to a cement kiln if the material was to be regulated as a product rather than as a waste. As it is now, such consolidation would also have to be conducted at a facility permitted to accept hazardous waste.

TCEQ expressed interest in reclassifying CSOS, but a decision from the EPA Office of Solid Waste (OSW) is needed on this issue for TCEQ to make a decision.[95] Correspondence between the API and EPA OSW on this issue has been underway for several years without any decision being made by EPA OSW on the regulatory characterization of the material.

<u>Scrap Tires</u>

Regulations related to management of scrap tires vary by state and within states. The RMA has reported that several states have achieved a program in which most or all scrap tires generated in the state reach end use markets. [96] Other states have not achieved such performance.[97] For example, the State of South Carolina has ongoing issues with scrap tire piles, and although three cement kilns in South Carolina are permitted to use scrap tires, only two of the three are currently doing so.[98] [99] Several state regulatory agency contacts reported that regulations concerning whether scrap tires can be landfilled, and if so in what physical form, are established by the local government agencies operating MSW landfills. Certain states [100] categorize scrap tires as "solid waste" and regulate the combustion of scrap tires under the state solid waste management regulations.

One regulatory agency contact [101] reported that an air emissions (concentration) limit for sulfur dioxide (SO_2) applies to the combustion of scrap tires and that some cement kilns in the state were not able to meet the limit, limiting their ability to use scrap tires.

Biosolids

Biosolids (municipal wastewater treatment sludge) from wastewater treatment facilities can be legally used or disposed in three ways: (1) application of treated and tested biosolids to soils; (2) landfilling; or (3) incineration or combustion for energy recovery. The Clean Water Act provides the legal basis for management of biosolids nationwide. EPA established minimum national standards protecting human health and the environment at 40 CFR Part 503. Beyond these national standards, state and local governments make the key decisions regarding biosolids management.

One regulatory issue related to utilization of biosolids in cement kilns is the regulatory classification of the material with respect to pathogen content. Biosolids, as generated at POTWs, contain pathogens, and biosolids applied to different alternative uses (e.g., energy recovery, land application) have different regulatory classifications.

An alternative fuels supplier [102] that conducted performance tests of a cement kiln [103] using biosolids in California reported that the test was required to be conducted using only "Class A" biosolids. [*This is not unreasonable considering that the cement kiln could otherwise potentially introduce pathogens into the cement plant materials handling system if "Class B" biosolids were used.*] However, Class A biosolids must be subjected to temperatures of 60° C, which requires energy, while Class B biosolids, which can be applied to soil, are not required to be subjected to heat. Therefore there is an "energy penalty" associated with preparation of biosolids for use as alternative fuel in cement kilns that would not be incurred if the material was land disposed.

Another regulatory issue concerning biosolids is recent state and local government legislation to reduce emissions of greenhouse gases, and particularly CO_2 emissions. Biosolids are biogenic materials that are "CO_2 neutral." Use of biosolids in cement production to replace fossil fuels can therefore reduce the total CO_2 emissions per ton of cement produced.

Automobile Shredder Residue

The PCA E&E subcommittee contact [104] indicated that TSCA regulations specifically categorize ASR as a "PCB Waste" unless proven otherwise, and that it is "difficult to prove otherwise." EPA regulation 40 CFR §761.62(b)(1) Disposal of PCB bulk product waste [105] [106] applies specifically to landfilling of ASR but also, according to cement sector contacts, is being applied by EPA Region VI to incineration of ASR. Section (b)(i) specifically applies to landfilling of ASR. As of 2005, EPA Region VI was strictly interpreting the phrase "from which PCB small capacitors have been removed" in the regulation as applying to ASR, and interpreting the phrase in ways that shredders could not certify compliance. A recent study by the California DTSC on beneficial use of ASR as alternative fuel in cement kilns concluded that the current regulatory framework for ASR with respect to PCBs actually promotes landfilling of the material as opposed to beneficial uses and that changes to the regulatory framework applicable to ASR may be needed to facilitate use of ASR as an alternative fuel in cement kilns. [107]

4.1.4 Supply/Logistics Issues

Obtaining a sufficient long-term supply of material of consistent quality is a principal issue concerning use of alternative fuels in cement kilns. A principal reason for this is that a cement plant may need to spend several million dollars to purchase or upgrade the kiln or materials handling equipment in order to establish use of an alternative fuel, and an assurance that a long-term supply of material will be available would be needed to justify such expenditure. Materials handling systems that are designed for a specific alternative fuel (e.g., biosolids, plastics, wood) may not be easily converted to handling a different alternative fuel if supply of the original alternative fuel is interrupted, and even if so, the cement plant would incur costs in converting the materials handling system for the new material. Another reason why cement plants need a sufficient long-term supply of material is to maintain stable kiln operation. Unanticipated changes in the characteristics of the raw materials and fuels to the cement kiln that need to be made due to interruption of supply can result in kiln upsets.

Several companies operate wholly-owned subsidiaries that are responsible for sourcing of AFR. The subsidiaries obtain materials from suppliers, process the materials, and transport the materials to the company's cement plants.[108] Other cement companies contract with third party contractors [109] that perform the same functions as the cement company subsidiaries do. [110] Third-party contractors may provide services to more than one cement company; the subsidiaries are captive to a particular cement company. Other cement plant contacts indicated that their plants are relatively autonomous with respect to sourcing of AFR.[111] Some cement companies are working with independent suppliers of "engineered fuel" that is manufactured to a specific quality specification for the cement kiln. The independent supplier is responsible for sourcing alternative fuel materials that are used as raw materials in making the engineered fuel, manufacturing the fuel to quality specifications, and delivering the fuel to the cement plant.

Subsidiaries and private sector companies have been effective in materials sourcing of alternative fuels for cement plants. For example, one cement plant [112] recently established use of plastics, cardboard, scrap paper, and rubber scrap an alternative fuels. The plant installed two on-site shredders and other materials handling equipment that cost on the order of $7 million. The cement plant subsidiary company responsible for material sourcing established individual contracts with between 10 and 20 suppliers of these materials to obtain a sufficient supply of alternative fuel material for the cement plant. These suppliers are industrial facilities, not recyclers of post-consumer MSW.

The availability of material for use as alternative fuel may also be related to the relative price to dispose of the material in a landfill and/or the relative cost of alternative beneficial uses. Cement plant contacts [113] and alternative fuels suppliers [114] reported that the available supply of plastics may be constrained because MSW recycling agencies may be more inclined to send post-consumer recycled plastic to plastics manufacturers to be used as raw materials, rather than to cement kilns or other facilities for energy recovery. "Unrecyclable" plastics may also be unavailable as a cement plant alternative fuel if the cost of landfilling the material is sufficiently low, unless cement companies are willing to pay fair market prices for those materials based on their inherent calorific value.

Finally, cement kiln use of alternative fuels and raw materials that would otherwise be disposed as waste plays a part in EPA's hierarchy of waste management. EPA emphasizes reducing waste generation whenever possible. If byproduct material is generated, EPA encourages minimizing the quantity released or disposed as waste by recycling or reusing it, using it to produce energy, or treating it.

4.1.5 Trends Analysis

The overall trend is towards increasing use of alternative fuels, with emerging materials representing a potentially increasing percentage of the total amount of alternative fuels used. Generally cement plant contacts reported that the utilization rate of the alternative fuels used has been relatively constant from year to year. According to data in the 2006 PCA *Labor and Energy Report*, overall use of alternative fuels in U.S. cement plants has been relatively constant at 9 percent of total energy input for the past several years. Cement plants contacted indicated the amount of energy derived from alternative fuels is as low as zero percent for some cement plants [115] and as high as 50 percent for others. [116] Specific trends for alternative fuels evaluated in this study are described below.[117]

Scrap Paper/Wood and C&D Debris

As discussed above, only one cement plant contact [118] reported that their plants are using alternative fuels (wood) derived from C&D debris. No other cement plant contacts reported that their plants either using or investigating use of wood derived from C&D debris. Several cement plant contacts [119] reported that their plants recently established use of scrap paper/wood (e.g., scrap paper and cardboard) and that utilization rates are relatively constant. However, several other contacts at cement plants that are using scrap paper/wood reported that they are considering phasing out the use of scrap paper/wood in favor of other alternative fuels (e.g., plastics).[120] More recently, several states have banned disposal of C&D debris in landfills or are contemplating doing so, including Massachusetts and New York, creating an additional supply of C&D debris that could potentially be processed into alternative fuel for cement kilns.

CSOS

Cement plant [121] and petroleum refinery contacts [122] did not provide detailed information concerning the amount of CSOS being used as an alternative fuel in cement kilns; data from the EPA hazardous waste reporting system on the disposition of K170 waste indicates that use in cement kilns has been intermittent. Petroleum refinery contacts reported that they are pursuing market initiatives and identifying cement kilns that are permitted to accept CSOS in an effort to increase the amount of CSOS used in cement kilns. The availability of CSOS for utilization as alternative fuel in cement kilns would likely increase if regulatory barriers restricting the use of this material to RCRA-permitted cement kilns are addressed, as more CSOS would be readily available and more cement kilns would be able to accept it. One can anticipate changes in the market valuation of the CSOS if the material were not classified as a hazardous waste, and this may affect the pattern of future utilization of this material in cement kilns and other facilities for energy recovery.

Scrap Tires

Cement plant contacts at plants that are already using scrap tires generally reported that they are either using the maximum amount of scrap tires that the cement kiln is physically capable of processing (or that the cement kiln is permitted to process) or that they are conducting performance tests or initiating kiln modifications to increase the number of scrap tires that they can process. Several cement plant contacts reported that their plant is actually permitted to process more scrap tires than can physically be fed to the kiln.[123] One cement plant contact [124] reported that the supply of scrap tires available in the area of one of their plants exceeds the capacity of the cement kiln to use them; surplus scrap tire supply is chipped and transported to a second of the company's cement kilns for use as an alternative fuel.

Contacts at cement plants that are not currently using scrap tires generally did not report they are pursuing permits to use scrap tires at their plants. As discussed above, overall utilization of scrap tires as alterative fuels in cement kilns has been increasing. An issue that may tend to reduce the utilization of scrap tires in the future is the fact that certain types of cement kilns (e.g., short dry process kilns) cannot as easily process whole tires as other types (e.g., long wet process kilns).. Ongoing conversion of wet process plants to dry process plants may reduce the number of kilns for which accepting whole tires is feasible.

Biosolids

No specific trends data are available for biosolids, however, it appears from the number of cement plant and alternative fuels supplier contacts that provided detailed information concerning biosolids that utilization of this material in cement kilns is likely to increase substantially in the near future. Several cement plant contacts reported using biosolids as an alternative fuel and other cement plant contacts reported that they are investigating the use of this material either as a replacement for other alternative fuels (e.g., wood[125]) or as a new alternative fuel.[126] Other cement plants were identified that have recently conducted performance tests using biosolids.[127] Private sector companies that produce alternative fuels for cement kilns [128] are drying and processing biosolids materials specifically for cement plants.[129] One company is operating sludge dryers in New Jersey to supply a cement kiln in Indiana and in Baltimore City to supply a cement kiln in Maryland; a second company is producing alternative fuel to supply cement kilns in Western Pennsylvania; this company reported that the alternative fuel they produce has up to 40 percent biogenic content.

Plastics

Several cement plant contacts reported that they have recently conducted performance tests using plastics or have recently established the use of plastics[130] and that their plastics utilization rates are relatively constant. One cement plant recently established the use of plastics through materials sourcing conducted through a wholly-owned subsidiary.[131] Plastics are an emerging material; increased utilization of plastics will depend upon addressing supply/logistics barriers.

Automobile Shredder Residue

Only one cement plant was identified that is currently evaluating ASR as an alternative fuel. ASR is an emerging material; establishing utilization of this material in cement kilns will depend on addressing regulatory barriers.

Hazardous Waste Fuels

One cement plant contact [132] that has several cement kilns permitted as hazardous waste combustors reported seeing a slow but steady decline in the available supply of hazardous waste for use as alternative fuel over the past several years. This is in part because there is competition from other energy recovery facilities for hazardous waste fuel and in part because industrial facilities are continuing their waste minimization/pollution prevention efforts and thereby they are generating less hazardous waste. Another reason is very likely that the kilns are charging the generators to accept it rather than paying for it based on its fuel value, which drives generators to look for other alternatives.

4.1.6 Emerging Materials

One cement plant contact [133] reported using scrap carpet generated from residential and commercial building carpet installers as an alternative fuel. Two cement plant contacts [134] reported using oil filter fluff as an alternative fuel. Oil filter fluff is generated from used vehicle motor oil filters after the free oil and the metal parts are removed. The remaining oil-soaked paper is used as an alternative fuel.

4.2 *Summary – Alternative Fuels*

4.2.1 Scrap Paper/Wood and C&D Debris

Construction and demolition debris was deleted from further consideration in this report because only one cement plant contacted was found to be directly using wood derived from C&D debris. No other cement plants were identified that were either using or investigating using alternative fuels derived from this material.

The principal issues associated with the utilization of alternative fuels derived from C&D debris in cement production are the feasibility of processing this material into a consistent physical condition such that the material can be conveyed into the kiln, and the availability of a consistent supply of this material for the cement kiln. As discussed above, C&D debris (including wood) generated from Hurricanes Katrina/Rita was offered to one cement plant [135] but found to be unsuitable for processing into alternative fuel because the wood was commingled with other C&D debris. Cement plant contacts reported utilization of scrap paper/wood, including recycled cardboard, landscaping wood, and sawdust from lumber mills, and provided information concerning the supply and quality issues associated with the use of scrap paper/wood.

A contrast can be drawn to the case study for a cement kiln using wood (sawdust) generated by a lumber mill.[136] The sawdust is generated in a dry condition and in a form that can be conveyed pneumatically into the cement kiln. The permitted feed rate is approximately 5 short tons per hour. The cement plant incurred a significant amount of capital expenditure to install conveying equipment and emission control designed to prevent the material from becoming wet and also to prevent fugitive dust emissions; if the material becomes wet it could create blockage in the conveying equipment. If the material becomes wet, the moisture content also reduces the calorific value of the material, making it less desirable as an alternative fuel. The cement plant also invested significant amount of capital for performance testing and obtaining permits to use the material.

A contrast can also be drawn to the case study for a cement kiln using wood generated by a regional landscaping company.[137] This material is primarily creosote-treated wood used in landscape architecture. The material is processed into shredded wood by a supplier. Based on an average calorific value of 6,500 BTU per pound for wood and 12,000 BTU per pound for coal, two tons of wood are needed to replace one tone of coal. The cement plant reported an annual utilization rate of approximately 10,000 short tons per year wood waste (an hourly feed rate of four tons per hour). The cement plant contact reported that the plant was considering phasing out the use of this material because of uncertainty of the long-term supply of the material. This plant also invested a substantial amount of capital in purchasing materials handling and conveying equipment and also on the performance testing process, which took approximately two years to complete. The plant is considering converting the materials handling system to handle plastics instead of wood.

C&D debris would necessarily be generated on an intermittent basis under normal circumstances. Even in the event that a large amount of C&D debris was generated (e.g., from a tropical storm event) the material would need to be organized (likely from multiple points of generation) and then processed into a consistent long-term supply of consistent quality to be used as alternative fuel in cement kilns. Cement kilns would need to already have materials handling equipment in place to handle the processed material. Processing generally non-homogenous, and also potentially wet, C&D debris into a conveyable physical condition compatible with the materials handling equipment would be more difficult and costly than processing a relatively homogenous material generated by a lumber mill or by a landscape supplier. The capital investment needed for the materials handling equipment and the performance testing required to obtain a permit to burn the material are significant, and therefore cement plants would want some assurance of a consistent and long-term supply of a material of known quality to recover this investment. Cement plants also may not be able to obtain a permit to burn a certain type of alternative fuel material from a certain source and then change to another type of alternative fuel material from another source.

4.2.2 Refinery Spent Catalyst and Clarified Slurry Oil Sediments

The CSOS generated by petroleum refineries is managed in several ways. Petroleum refineries can return this material to the onsite refinery coking unit or other refinery processes, send the material to other petroleum refineries for processing, send the material to a RCRA hazardous waste-permitted cement kiln or other hazardous waste facility for use as an alternate fuel, or (in limited cases) send the material to Canada for treatment and disposal. [h]

As discussed in Section 4.1.3, petroleum refineries, through their trade association, the API, are pursuing a reclassification of CSOS so that the material would be regulated as a refinery product when beneficially used as a fuel or raw material in cement manufacturing, rather than as a hazardous waste or as a solid waste. A decision by EPA OSW would be needed to reclassify CSOS as a refinery product.

Gulf Coast petroleum refineries are already sending CSOS to hazardous waste-permitted cement kilns in the Gulf Coast Region. One refinery [138] reported that one of their refineries is sending some CSOS to a cement kiln[139] but that the company's other refineries are generally managing this material on site even though it may be less expensive to send the material offsite to a RCRA-permitted hazardous waste facility.

Petroleum refinery contacts reported that that one reason why CSOS is being managed onsite at potentially higher cost is to reduce the amount of hazardous waste generation reported by the refineries. The amount of hazardous waste generated by each refinery annually and sent offsite for disposal is publicly reported through the RCRA Biennial Hazardous Waste Report, and certain constituents may be reportable through the Toxic Release Inventory when shipped offsite as a waste. Refinery contacts indicated that the public perception associated with the required classification of this material as hazardous waste when shipped offsite, even for beneficial use as a fuel or raw material to cement, is an important factor in their decision to manage CSOS on site (at greater expense).

Refinery contacts indicated that they are conducting research into changing the method by which they maintain their CSO tanks in order to generate a lower quantity of CSOS. The CSO product is generally generated with roughly 1 percent or less solids; the remainder of the solid in the CSO tanks settles and is eventually removed as CSOS (a mixture of CSO and catalyst fines/solids). The refineries are researching methods of shipping the CSO with higher solids content to cement kilns. One refinery contact [140] reported that they had shipped CSO with a solids content of up to 20 percent in specialized transport trucks. Solids are generally classified as CSOS after they settle out of the CSO in the CSO storage tanks (although interpretation of this definition is one of the issues under discussion between the API and EPA OSW). Any solids that remain contained in the CSO product prior to settling are not classified as CSOS.

Refinery contacts also indicated that they are conducting research into consolidating the CSOS generated from several refineries (either their own company's refineries or others) and blending the material into a consistent supply for cement kilns. Consolidation is useful for refineries and cement kilns because individual refineries generate CSOS only on a batch basis (but potentially in million pound quantities) when maintaining their CSO storage tanks. CSO tank maintenance schedules among refineries in the same region

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[h] Treatment and disposal of CSOS in Canada would not be feasible for a Gulf Coast petroleum refinery, and anticipated changes to Canadian waste management regulations in the future may preclude this option for managing CSOS.

could potentially be coordinated to levelize the amount of material generated if there was a reliable market outlet driver to do so.

Presently, however, the RCRA hazardous waste designation of this material represents a significant cost barrier to improved management of the CSOS. Petroleum refinery contacts indicated that it is difficult to ship CSOS to cement kilns in hazardous waste transport trucks on a daily basis, both because of the cost and because of the logistics of scheduling hazards waste shipments.[141] Both the cost and the logistics barriers would be addressed if the CSOS were reclassified as a refinery product; transport could be conducted in conventional trucks complying with standard DOT requirements for similar hazardous materials rather than by licensed hazardous waste transporters, and at lower cost. At the same time, reclassification of the CSOS would increase the number of cement kilns that could potentially accept this material as an alternative fuel. The issue of whether cement kilns would continue to charge refineries for the material or whether refineries would be able to sell the material to cement kilns (as a refinery product) would need to be addressed. Cement kilns would be able to evaluate the utilization of CSOS based on cost and technical issues rather than based on whether or not the cement kiln is permitted to accept hazardous waste. This could greatly expand the utilization of CSOS as an alternative fuel in cement kilns, particularly in regions where there are refineries but not a large concentration of cement kilns that are permitted to accept hazardous waste.[142]

4.2.3 Scrap Tires

Cement plants made up 38 percent of the market for tire-derived fuels in 2005.[143] Contacts at several cement plants using scrap tires reported that the plants are using as many tires as the kilns are physically capable of accepting based on the equipment configuration, and others reported that their plants are either retrofitting additional existing kilns to accept scrap tires[144] or making modifications to their kilns to enable an increased throughput of scrap tires.[145] Some cement plant contacts[146] reported that their plants are actually permitted to burn more tires than the kiln is actually physically capable of burning, on account of process limitations. Cement plant contacts reported various rates of scrap tire utilization, from 5 percent of the heat input (equivalent to one scrap tire per minute)[147] to 12 percent of raw mix as tire-derived fuel, corresponding to approximately 1,000 short tons per year of whole tires.[148]

Contacts for several cement plants using scrap tires reported that there is increasing competition for scrap tires from other beneficial uses (e.g., crumb rubber) and also from continued disposal of scrap tires in landfills. These conditions may be characteristic of the specific local markets and do not necessarily reflect the overall national upward trends of scrap tire utilization for both energy recovery and for crumb rubber applications.

Scrap tire management programs vary by state, and in some cases vary by local jurisdiction. Certain states subsidize beneficial use of scrap tires by charging a fee to consumers for each scrap tire collected. The fees are applied, for example, to grants for projects utilizing scrap tires. Other states are either prohibited by law from collecting such consumer fees, or are prohibited by law from spending such fees as grants to use of scrap tires as alternative fuel.[149] Also, State Departments of Transportation may actively support production of crumb rubber for use in production of rubberized asphalt. California, Arizona, and Florida are the largest users of crumb rubber for production of rubberized asphalt. This application consumed approximately 12 million tires in 2006. Other states using increasing amounts of asphalt rubber include Texas and South Carolina. [150]

Despite various state-level programs to promote beneficial uses of scrap tires, a significant number of tires are disposed of in landfills. The RMA reported that in 2005 14 percent of scrap tires generated were land disposed.[151] [152] In some states, local governments operating MSW landfills implement local regulations concerning landfilling of scrap tires and other non-hazardous solid waste. In one state,[153] for example, revised regulations were recently implemented that allowed landfilling of cut up tires. Under the previous regulations, whole tires or cut up tires could not be landfilled, and therefore local suppliers chipped the scrap tires to supply alternative fuel to cement kilns and other applications. Upon implementation of the revised regulations, these suppliers no longer had any regulatory incentive to chip scrap tires, as scrap tires could be cut up and landfilled at much lower cost (chipping tires is an energy-intensive process.) As a result, one cement plant contact reported that the plant could no longer obtain a supply of chipped tires. The company had to spend several million dollars to outfit the cement kiln to accept whole tires instead of chipped tires in order to reestablish the use of scrap tires as an alternative fuel.

Public perception of utilization of scrap tires in cement kilns was also found to vary widely. One cement plant contact reported that the plant initiated a pilot project to burn scrap tires and obtained broad acceptance of the program from both the regulatory agency and the local community. Unfortunately, the pilot program was not successful; the kiln dimensions were not amenable to mid-kiln introduction of the scrap tires, and the raw material feed was also not of sufficient dimension to feed whole tires. Chipping the tires was deemed to be cost-ineffective.[154]

Several cement plant contacts reported that the utilization of scrap tires as an alternative fuel in the kiln is actually categorized by state regulators as a nitrogen oxide (NO_x) air emission control strategy, and the utilization of scrap tires is actually incorporated into the air emissions permit for the cement kiln.[155] Use of scrap tires has been shown to reduce NO_x emissions from cement kilns. Other states [156] have a state-wide ban on the use of scrap tires in cement production.

4.2.4 Wastewater Treatment Sludge (Biosolids)

As discussed in Section 3.3.2, biosolids are generated by municipal wastewater treatment plants throughout the U.S., and large amount of this material is potentially available for use as an alternative fuel in cement kilns. Several cement plant contacts[157] reported that the plant is using biosolids and others reported that they are investigating the use of biosolids [158] or have conducted performance testing for biosolids.[159]

Cement plant contacts and regulatory contacts indicated that the public and regulatory perception of use of biosolids in cement kilns is lower than that for wood, and permitting can therefore be more difficult. Wood has in some cases been viewed as a cleaner fuel than coal, while the perception not necessarily the case for biosolids. This could affect the type performance testing and public involvement for proposed use of biosolids. As discussed in Section 4.1.3, there are regulations that require the biosolids to be processed prior to use in cement kilns, and the material has to be "dry" in order to be desirable as an alternate fuel. Therefore there is an energy cost to processing the material. Further, as discussed above, in some jurisdictions biosolids can be land disposed with less intensive treatment than would be required for use in a cement kiln. Therefore both land disposal costs and treatment costs are a potential barrier to increased use of biosolids in cement kilns.

Cement kilns using biosolids have been required to conduct performance testing to demonstrate that air emissions (e.g., NO_x emissions) would not increase.[160] Cement sector contacts reported that such performance testing was successful.[161]

4.2.5 Plastics

Several cement plant contacts reported using plastics, either generated by MSW recycling programs or generated by industrial plants that manufacture plastic products; other contacts indicated that their plants are investigating using plastics either by identifying private sector suppliers or by investigating how to partner with municipal government MSW recycling programs. Two important issues related to utilization of plastics as an alternative fuel in cement kilns are obtaining an adequate supply of the material and managing the quality of the material.

Cement plant contacts and regulatory agency contacts reported that in some jurisdictions plastics generated from MSW recycling programs are not segregated adequately such that the plastics can be used as alternate fuel in cement kilns.[162] Cement kilns do not want chlorinated plastics (e.g., polyvinyl chloride) in their feed stream because the chlorine in the plastic can generate air emissions (e.g., chlorinated dioxins and furans) in excess of permit limits. Cement kilns also closely control the chlorine content of the raw mix because chlorine can affect the quality of the clinker produced. However, cement plants in different regions with different characteristics of available raw materials may have different tolerances for the amount of chlorine, depending on the alkali content of the raw materials and other parameters.

Cement plant contacts and regulatory agency contacts also reported that the recycling rate for plastics in many jurisdictions is not as high as it could be, reducing the amount of plastics collected for potential utilization in cement kilns.[163] Municipal governments responsible for operating MSW recycling programs in some cases would need to invest in equipment (e.g., sorters, shredders) and establish additional procedures to adequately segregate plastics and supply the plastics for use in cement kilns. The benefits of such investment would be a steady supply of high calorific value fuel (on the order of 14,000 BTU per pound) for the cement kilns and reduction of the potential for generation of landfill gas from disposal of plastics in landfills. However, cement plant contacts reported that it is not necessarily clear to the municipal governments managing the MSW programs that such capital or labor cost expenditures would pay for themselves in the increased value of the plastics that could be supplied to cement kilns. This is particularly the case in regions where the cost of landfill disposal is low. Low landfill disposal costs may drive local government decision making concerning recycling programs. Cement plants can either purchase shredded plastic from a supplier or install a shredder onsite. Installation of a shredder on site would be a significant capital expenditure. Some plants using plastics have chosen to install shredders on site, while others have chosen to purchase shredded plastic from a supplier.

One cement plant contact [164] reported that they are investigating how to form partnerships with municipal government recycling agencies to promote increased and improved segregation of plastics. In the company's estimate the additional sorting of materials would ultimately "pay for itself." Another cement plant contact [165] reported that their materials sourcing subsidiary recently conducted a market study to identify sources of plastics for the cement kiln. The subsidiary did not identify post-consumer plastics from MSW recycling agencies, but rather plastics generated by local industries. This is an indication that the MSW recycling agencies either are not generating plastics in sufficient quantities to supply the cement kiln or that the plastics being generated are not being adequately segregated.

4.2.6 Automobile Shredder Residue

Automobile shredder residue (ASR) is an emerging material. As discussed in Section 4.1.3, a principal barrier to use of this material in cement kilns is its regulatory classification. A recent study by the California DTSC assessed the regulatory and technical barriers to use of ASR as an alternative fuel in cement kilns. [166] In addition to the regulatory issues related to PCB capacitors, other potential regulatory issues include the occurrence of mercury switches and lead (e.g., wheel weights) in the scrap automobiles from which ASR is generated. The EPA recently established a voluntary program for management of mercury switches and a regulatory program for management of mercury switches and lead waste in processing of scrap automobiles and other ferrous metal scrap. [167, 168] The California DTSC Report also identified issues concerning the quality of the material, specifically related to the content of metals (e.g., copper wire scrap,) non-combustible material, water, and other undesirable materials (e.g., PVC plastic). The California DTSC Report identified specific technologies needed to upgrade the quality of ASR for use in cement kilns and evaluated their feasibility.

4.2.7 Emerging Materials

Other emerging materials identified by cement plant contacts and regulatory agency contacts include MSW, agricultural byproducts, scrap carpet; tire fluff, and oil filter fluff.

Municipal Solid Waste

Regulatory agency contacts[169] identified MSW as an emerging material and indicated that cement plants have expressed interest in burning this material. MSW includes durable goods, non-durable goods, containers and packaging, food wastes and yard trimmings, and miscellaneous inorganic wastes. According to New Source Performance Standards (NSPS) for MSW combustors, an existing cement plant would be permitted to burn up to 30 percent of MSW as a percentage of total feed rate. A higher throughput would trigger the NSPS for MSW incinerators; office paper is technically MSW, according to the regulatory definition.

Agricultural Byproducts

Several cement plant contacts reported that they formerly used agricultural byproducts but no longer do so because of supply issues.[170] One alternative fuel supplier [171] reported that cement plants in the Midwest had been burning off-spec seeds for energy recovery, but that this material was only available in [on the order of] 10,000 pound batches and not available in a continuous supply. Therefore when the batches of material were used up, the cement kilns needed to return to using conventional fossil fuels.

Oil Filter Fluff

Two cement plant contacts [172] reported using oil filter fluff as an alternative fuel. The cement plant contacts reported that the supply of oil filter fluff is relatively stable and that the material has a relatively high calorific value.

Scrap Carpet

One cement plant contact [173] reported using scrap carpet as an alternative fuel, consuming approximately 2,000 metric tons per year of scrap carpet and other textile materials. This material includes old carpet pads, cutting scraps, carpet rolls, and other materials from residential and commercial carpet replacement, and is generated by a regional carpet supplier. The principal issues with using this material are organizing the carpet installation personnel to segregate the scrap carpet from other debris (e.g., nails, metal strips) and segregate the material for transport to the cement plant rather than to the local landfill where other debris would be transported. The cement plant contact reported that small carpet installation companies cannot manage this effectively because they have less control over their carpet installation personnel than a larger company does. For example, the regional carpet supplier deploys their carpet installation personnel from central company locations on a daily basis. The cement company is working with CARE to organize other carpet suppliers to provide scrap carpet for use as an alternative fuels. However, cost of supplying this material is a substantive issue in increasing utilization.

Transportation cost for the scrap carpet is an issue; for example the hauling capacity of a truck may be only three to five tons of carpet, vs. a hauling capacity of 20- 25 tons of tire chips in the same size truck. As for other non-hazardous solid materials the cost of landfill disposal is an important competing factor. Landfill disposal fees in the Western U.S. (not including transportation cost) may be as low as $10 per short ton. The cost for transporting the scrap carpet and the labor and equipment costs of processing the material for utilization in a cement kiln may be higher than the landfill disposal fee. However, scrap carpet is not a very dense material and therefore takes up more space in landfills than an equal weight of other solid materials, potentially affecting the cost of landfill disposal. As for other non-hazardous solid materials, scrap carpet generator companies conducting cost-benefit analysis of landfill disposal vs. beneficial use of scrap carpet would need to consider the sustainability advantages of the beneficial use as well as the incurred costs of beneficial use vs. landfill disposal.

Realff, 2005, also reported that use of scrap carpet as an AFR has the potential to affect cement kiln air emissions, because of the nitrogen content of the scrap carpet. Nylon carpet residue contains approximately 4.5 percent nitrogen by mass, while polypropylene carpet residue contains less than 0.05 percent nitrogen. Therefore, use of scrap nylon carpet has the potential to result in increased NO_x emissions as compared to use of scrap polypropylene carpet. [174]

4.3 *Alternative Raw Materials*

4.3.1 Cost Issues

Spent Foundry Sand

Several cement plant contacts reported that the cost-benefit analysis for spent foundry sand vs. mined sand is not favorable after material acquisition costs, transportation costs, screening and grinding costs are considered. Several cement plant contacts reported that their plants have phased out or are phasing out use of spent foundry sand because of cost-quality issues.

Cost issues associated with the use of spent foundry sand are directly related to the geographic location of material generators and cement kilns, and the specific type and quality of the spent foundry sand being generated. One cement plant contact reported that use of spent foundry sand is "cost neutral" after the transportation cost is considered [175] while another cement plant contact [176] reported that considering the quality of the available material and transportation costs, use of spent foundry sand was not cost effective for the plant. A third cement plant contact [177] reported that they had identified several nearby sources of high-quality spent foundry sand, including a conventional metal casting foundry and a fused silica foundry, and that the cement plant was using whatever amount of spent foundry sand that these facilities could provide to them. Other cement plant contacts reported that they did not have a strong incentive to seek out spent foundry sand because mined sand was relatively inexpensive and widely available in their region, or that they generated a sufficient amount and quality of sand from company-owned quarries such that they did not need to obtain an additional supply of sand from spent foundry sand.[178]

Another cement plant contact [179] reported that the cement plant's use of spent foundry sand is "minimal" because of a combination of quality and cost issues. This contact reported that a supply of spent foundry sand is not available at a reasonable rate, and that is difficult to go through the screening process to screen out debris (tramp metal, etc). After considering transportation costs and other costs, spent foundry sand is "not a good value" compared to the cost of virgin materials.

Steel Slag

No specific cost issues were identified by cement plant contacts related to the use of steel slag.

4.3.2 Technical Issues

Spent Foundry Sand

Not every cement kiln can use spent foundry sand or needs to use spent foundry sand; the ability of a cement kiln to use spent foundry sand depends on the kiln type and the type of spent foundry sand available. Spent foundry sand supplies silica; cement plants that have a supply of virgin and other alternative raw materials that have a sufficient quantity of silica would not need to use spent foundry sand to supplement the silica content of the raw mix. One cement company [180] reported that the company as a whole is phasing out the use of spent foundry sand because of air emissions issues concerning carbon monoxide (CO) emissions. Some spent foundry sand available to them contains volatile organic compounds including the binder materials (oils, phenolic resins) used to make molds. Older technology long dry kilns were able to use spent foundry sand without incurring increases in CO emissions. As the company converted their cement kilns to one-stage preheater designs, the volatile organic compounds in the spent foundry sand started to burn off in the cement kiln preheater, rather than in the kiln itself, generating excess CO emissions. The CO emissions were such that the cement plant was approaching its overall permitted CO emission limit, so the company began to phase out the use of spent foundry sand for their new one-stage preheater design kilns. The company's older long dry kilns are capable of using spent foundry sand. Other cement plant contacts [181] reported that they have not experienced any issues with use of spent foundry sand resulting in excess CO emissions or other air emissions.

Several cement plant contacts [182] noted the necessity of processing of spent foundry sand to remove "tramp metal" (metal chips) that can damage cement plant grinding equipment. The material can be screened either at the supplier or at the cement plant. Other spent foundry sand applications (e.g., construction fill) are less sensitive to the quality of the material.

One cement company [183] reported a change in kiln design resulted in them phasing out the use of spent foundry sand. Older technology long dry kilns were able to use spent foundry sand without incurring increases in CO emissions resulting from the combustion of volatile organic compounds in the spent foundry sand. However, in the company's new one-stage preheaters design kilns, the volatile organic compounds in the spent foundry sand started to burn off in the cement kiln preheater, rather than in the kiln itself, generating excess CO emissions. The company's older long dry kilns are capable of using spent foundry sand without creating excess CO emissions. Other cement plant contacts [184] reported that they have not experienced any issues with use of spent foundry sand resulting in excess CO emissions or other air emissions.

Steel Slag

No specific technical issues were identified by cement plant contacts related to the use of steel slag.

4.3.3 Regulatory Issues

Cement plant contacts and regulatory agency contacts reported fewer regulatory issues for utilization of non-hazardous solid materials as raw materials in cement production. Alternative raw materials (e.g., spent foundry sand, steel slag) have generally fewer regulatory issues than do alternative fuels with respect to permitting, performance testing, and public perception. For example, air emissions performance testing and modifications to the facility air emissions operating permit are generally required for cement plants to initiate use of alternative fuel, while cement plant contacts reported that for use of alternative raw materials (e.g., spent foundry sand, steel slag) permit modifications and performance testing are not necessarily required for cement plants to initiate use of the materials. Several cement plant contacts [185] and regulatory agency contacts [186] reported that no modifications to plant operating permits were required for the plant to initiate use of spent foundry sand, steel slag, or other "non-fuel" alternative raw materials. Initiating the use of "non-fuel" alternative raw materials were considered to be an "operational change" to the plant and required only a letter to the regulatory agency, not a permit modification, provided that no changes to facility emissions or the ability to comply with existing permit conditions would result.[187]

Some cement plant contacts and state regulatory contacts [188] reported that in their states sand and other solid raw materials are relatively inexpensive and widely available, and that therefore there is little if any cost benefit for cement plants to seek out spent foundry sand.[189] Competing uses (construction fill, daily landfill daily cover) are less costly than transporting spent foundry sand to cement kilns, and there are lower potential environmental permitting issues in using the spent foundry sand for competing uses than for raw material to cement kilns.

Some states do not have an active regulatory agency program for managing spent foundry sand. Several cement plant contacts reported that in their states management and disposal of foundry sand is not highly regulated. Foundries can accumulate the spent foundry sand on their property or use the material as a "soil amendment." A soil amendment is any material added to a soil to improve its physical properties. Most foundries, depending on regional and contractual variables, do not have a strong incentive to move the spent foundry sand offsite. Cement plants incur transportation costs and processing costs to obtain and prepare spent foundry sand for introduction into the cement kiln. The lack of incentive for foundries to send the spent foundry sand to cement plants and cost barriers for cement plants to obtain and process the spent foundry sand decreases the desirability of the material as an alternative raw material.[190] Unlike scrap tires, however, landfilling of spent foundry sand probably cannot be precluded by state or local MSW landfill regulations, since landfill daily cover is one of the principal applications of spent foundry sand. Daily cover is material placed on the surface of the active face of a MSW landfill at the end of each operating day to control vectors, fires, odors, blowing litter, and scavenging

4.3.4 Supply/Logistics Issues

Spent Foundry Sand

The supply of spent foundry sand available to cement kilns depends upon the locations of and production capacity of foundries in the vicinity of the cement kiln. Some cement plant contacts [191] reported that they have contract relationships both with individual foundries and with third-party "consolidators" that consolidate spent foundry sand generated by multiple foundries into shipments to the cement kiln. Either the foundries or the third-party consolidators may process the spent foundry sand (e.g., to remove metal, for size reduction) prior to shipment to the cement kiln. Several cement plant contacts [192] reported that the supply of spent foundry sand is limited and that the cement plants could use more spent foundry sand than is available to them.

Steel Slag

Two cement plant contacts [193] reported using a specific type of steel slag from Japan as a clinker additive. Use of slag as clinker additive is outside the scope of this study. One cement plant contact [194] suggested that competition from concrete batch plants using steel slag as an additive may be affecting the market for steel slag use as a cement kiln raw material. Other than supply issues, cement plant contacts did not report any specific issues related to use of steel slag as a raw material in cement kilns.

4.3.5 Trends Analysis

It is unclear from information provided by the cement sector contacts for this study whether utilization of spent foundry sand in cement kilns will increase or decrease in the future. A number of cement plants (and some entire cement companies) reported that they are phasing out the use of spent foundry sand as being incompatible with their kiln design or because use of the material is not cost effective.[195] The number of older technology kilns that could easily use spent foundry sand (without preheaters and associated carbon monoxide emissions issues) is anticipated to decrease over time, and more immediate uses of spent foundry sand, such as construction fill and landfill daily cover, may be more cost effective with respect to both transportation costs and material processing costs than utilization as a raw material in cement production. However, other cement plant contacts reported that they are not able to obtain as much spent foundry sand supply as the plant is capable of using [196] or that spent foundry sand that could be used in cement production is being landfilled or stockpiled because the state does not have an effective regulatory program for managing spent foundry sand.[197] It th erefore appears that there may be local or regional differences in trends for utilization of spent foundry sand.

Utilization of steel slag is anticipated to increase through application of CemStar[tm] and similar steel slag processing technologies. TXI transferred the patent for the CemStar[tm] process to an independent company specifically to promote the expanded use of the technology.

4.3.6 Other Emerging Materials

Cement plant contacts reported several other alternative raw materials as being used in cement kilns. These include latex paint solids,[198] sandblast grit, and storm drain solids (generated from municipal storm drain cleanouts).[199] Each of these materials was identified by single cement plant. Sufficient information is not available for these materials to develop case studies.

5. Conclusions

This section summarizes the conclusions of the material-specific analysis for each beneficial use material studied. These observations are based on the interviews conducted with cement plant contacts, regulatory agency contacts, and suppliers, and on additional research conducted for this study.

5.1 General Observations

A wide variety of AFR are being used in cement kilns, and the cement sector is being aggressive at identifying and testing various types of beneficial use materials. Most of the cement plant contacts indicated that their plants, or their companies, have been conducting performance testing of new AFR and/or investigating potential suppliers of these materials

Cement sector contacts, regulatory agency contacts, and suppliers all indicated that the principal focus of cement plants in beneficial use is alternative fuels; there is less of an ongoing focus in the cement industry on the beneficial use of raw materials (e.g., spent foundry sand, steel slag). This is principally related to cost. For example, several cement plant contacts indicated that the use of spent foundry sand was not cost effective for their plants because of transportation costs, processing costs, or both, while other contacts indicated that their plants are using spent foundry sand on an ongoing basis but could replace this material with mined sand or other silica raw materials if necessary.

Almost all of the cement plant contacts indicated that use of alternative fuels was important to the continued competitiveness of their plants. This is reflected in the ongoing programs at many cement plants to conduct performance testing of new materials and the appearance of third-party alternative fuel suppliers with business plans specifically targeted towards cement kilns (as well as the operations of the wholly-owned subsidiaries of some cement companies that are responsible for sourcing of AFR).

The technical issue of handling materials was a common issue. For instance, a contact for a cement plant using wood reported that they are investigating the use of biosolids, but that the plant could not use both wood and biosolids because the materials handling system cannot handle two different materials simultaneously.[200] So a decision to use biosolids is also a decision to no longer use wood. Biosolids, scrap paper/wood, and agricultural byproducts offer the potential of greenhouse gas emissions offsets for the cement plants, from replacement of fossil fuels with biogenic fuels.

State agency involvement in promoting beneficial use in cement kilns is currently at a relatively low level, and the level of state agency involvement varies by material. Regulatory agency involvement in managing scrap tires is somewhat higher than for other AFR. Many states have statewide programs for managing scrap tires [as reported in the RMA 2005 *Scrap Tire Markets Report*.] For other AFR, some states [201] operate state assistance programs and maintain databases of potential suppliers and potential users (including cement plants) of these materials, but other state regulatory agency contacts [202] indicated their view that it is more the responsibility of the suppliers and users (e.g., cement kilns) to organize themselves and that the responsibility of the agency is (in the words of one regulatory contact) to "give alternative materials a fair shake" in the permitting process. The overall sentiment was that the economic market is more efficient at matching alternative fuel and raw material suppliers and users than regulatory agencies would be. However, one key observation is that certain regulatory constraints, such as the strict hazardous waste combustor requirements applied to offsite management of CSOS when beneficially used as an alternative fuel and raw material, create "false economics" and do not allow the true economic opportunities in the cement scenario to be realized.

Both EPA and state regulatory agencies have generally appeared reluctant to provide the appropriate regulatory adjustments to address those issues. Where some of those alternate fuel materials may currently be subject to RCRA hazardous waste requirements, regulatory agency involvement may be necessary to recognize this as a legitimate fuels supply business, rather than hazardous waste management, in order for the full beneficial use opportunities to be developed.

The cement industry has the capacity to collect information concerning potential AFR suppliers on their own either through corporate beneficial use departments, wholly-owned and dedicated subsidiaries, non-affiliated commercial suppliers, or individual plant purchasing departments, but clear regulatory agency support is sometimes necessary to allow the AFR use to proceed effectively.

There is a growing commercial market for "brokers" of industrial byproducts, and they are recognizing their potential value as fuel and feedstock to various industry sectors; these brokers may consolidate smaller quantities of materials into larger shipments to cement plants and may also process the material prior to shipment. For example, in some states[203] third-party brokers are consolidating shipments of spent foundry sand from multiple suppliers to supply a cement plant. In the Gulf Coast region there is the potential for third party brokers to organize shipments of CSOS from petroleum refineries into consolidated shipments to cement plants. The wholly-owned subsidiaries perform this function for their company's cement plants, for example, by organizing and entering into contracts with multiple local suppliers of plastics.[204] There are also independent alternative fuel suppliers that are sourcing various types of alternative fuel materials and using the materials to manufacture engineered fuel to specific quality specifications for use in cement kilns.

Significant differences were identified in corporate management of the beneficial use of materials among cement companies: some companies[205] set corporate benchmarks for the beneficial use of materials and transmit benchmarks to their cement plants; for example, in some companies [206] different plants are working on different pilot projects with different beneficial materials, with the results of the performance tests communicated to the company's various plants. In other companies,[207] each cement plant operates more autonomously, setting plant-specific objectives for use of AFR.

Significant differences were also identified in cement companies' interest in expending capital to establish or expand use of AFR. Some companies were relatively conservative in making capital expenditures to enable or expand the use of AFR; other companies [208] appeared to routinely make such investments in their plants, in some cases responding to specific issues related to material supply.

In general, both cement plant contacts and suppliers indicated that the cost and proximity of landfill disposal of beneficial use materials was a significant barrier to increased use of materials in cement kilns when landfills are closer and less expensive. This general conclusion applies to scrap tires, ASR, biosolids, plastics, spent foundry sand, and other non-hazardous materials that can be disposed of [by regulation] in non-hazardous solid waste landfills or otherwise used in cement production or other beneficial uses. In general, the lower landfill costs (including transportation and tipping fee) are in a particular region, the more difficult it is for cement plants or AFR suppliers to divert this material from landfill disposal.

Other factors in local and state government decision making concerning promotion of AFRs vs. landfill disposal include the local and state governments' approach to the "waste management hierarchy." In general, if a waste management hierarchy is implemented as government policy at the local or state government level, landfill disposal of materials is a less desired option than reuse, recycling, or beneficial use. Therefore government policies that actively take into account a waste management hierarchy would discourage landfill disposal of materials that could be used as AFRs. Also, local and state governments that are implementing regulations to reduce greenhouse gas emissions may also be establishing specific "waste diversion goals" to promote beneficial use of materials in industrial processes, including cement production, to reduce greenhouse gas (CO_2) emissions.

Table 12 presents tipping fees for landfills in 2004. Note that total landfill cost includes the tipping fee and transportation cost. Landfill costs tend to be lower in the Western U.S. (except for California) and higher in the more densely populated Eastern U.S. Several cement plant contacts reported that landfill tipping fees in Texas and Oklahoma (not including the waste transportation costs) can be as low as $10 per ton.

Table 12. Landfill Tipping Fees, 2004

Region	Dollars per short ton
Northeast	$70.53
Mid-Atlantic	$46.29
South	$30.97
Midwest	$34.96
South Central	$24.06
West Central	$24.13
West	$37.74
National Avg.	$34.29
Source: National Solid Wastes Management Association 2005 Tip Fee Survey (2006)	

Much of the AFR being used in cement kilns provide natural synergies [direct correlation] between the cement sector and other sectors. These include:

- Automobile Manufacturing: Automobile Shredder Residue
- Automobile Parts Manufacturing: Plastics
- Oil and Gas: Refinery Spent Catalyst and CSOS
- Metal Casting: Spent Foundry Sand

This correlation among sectors provides opportunities for joint projects, based on geographic proximity, among the sectors matching up material generators and potential users (cement kilns).

Material-specific conclusions are as follows:

- Scrap Paper/Wood and C&D Debris

As discussed above, only one cement plant was identified that is using alternative fuels derived from C&D debris; no other cement plants were identified that are investigating the use of alternative fuels derived from C&D debris. The principal issue with this material is the difficulty in identifying a long-term supply of C&D debris and the difficulty in processing the material into a consistent quality of alternative fuel for use in cement kilns. The principal issue identified with use of scrap paper/wood is also the difficulty in securing a long-term supply of the material. In order to secure long term supply, one cement plant identified a wood products manufacturing plant as a source of wood, and another cement plant, through a wholly-owned subsidiary, organized a number of local suppliers to supply scrap paper and cardboard. Some cement plant contacts indicated that they were investigating discontinuing the use of scrap paper/wood and initiating use of plastics in part because of the uncertainty in the long-term supply of the scrap paper/wood.

- CSOS

The regulatory classification of CSOS as a hazardous waste (RCRA Waste Code K170) is a significant barrier to increased beneficial use of this material in cement kilns and other applications as an alternative fuel and raw materials. Under the current regulatory classification, only facilities that are permitted as RCRA hazardous waste facilities can accept this material. Petroleum refinery contacts reported that they are often managing this material onsite using thermal treatment (coking) processes, rather than sending the material to cement kilns for use as alternative fuel, even though in some cases processing the material onsite is more costly than sending the material off site to a cement kiln. Petroleum refineries are managing the material onsite in part to avoid classification of the material as hazardous waste when shipped offsite, and in part because managing shipments of the material as a hazardous waste is difficult from a logistics standpoint. Also, the classification of the CSOS as a hazardous waste means that only [the 18] cement kilns that have hazardous waste combustor permits can accept the material. Some CSOS is sent to cement kilns, but trends data indicate that shipments of CSOS to cement kilns are intermittent and have been decreasing (see Table 7). If CSOS was not hazardous waste, all cement kilns could use it and the amount available to the market would increase because refineries would no longer have the same incentives to manage the material on site.

There are two potentially competing factors related to potential reclassification of CSOS as a non-waste material when beneficially used. Reclassification would likely mean that petroleum refineries would limit, or cease entirely, managing the CSOS on site based on cost and environmental efficiency considerations. It could therefore be anticipated that the supply of CSOS available to the market would increase if the CSOS was reclassified as a non-waste material. However, reclassification would also likely mean that others could also accept the material for use as an alternative fuel. This would potentially increase the market competition for the material, although this effect could be lessened by the potential increase in the supply of the material. According to refinery contacts, CSOS was initially considered for listing as a hazardous waste because the material was being disposed of in landfills. Therefore, it is unlikely that any change in the classification of the material would permit disposal of the material in non-hazardous solid waste landfills, as opposed to using it for energy recovery.

- ASR

The classification of ASR as a "PCB-containing waste" under TSCA is a barrier to use of this material as an alternative fuel in cement kilns. Much of this material is being disposed of in landfills as a result. ASR is generated from automobile shredders that are located throughout the country, and (other than its regulatory classification) would represent a widely-available source of high-calorific value material for use as alternative fuel in cement kilns. The technologies needed to upgrade the quality of ASR for use in cement kilns also represents a potential cost barrier to use of the material in cement kilns. Modification of the waste classification definitions applicable to ASR may be needed to facilitate use of ASR as an alternative fuel in cement kilns.

- Scrap Tires

Barriers to increased use of scrap tires in cement kilns include negative regional public perception concerning such use and the perception that recycling of scrap tires into new products (e.g., playground, sidewalk, and other crumb rubber material) is a "higher use" for scrap tires. The waste management hierarchy applied to scrap tires to some extent depends on the perception and consideration of the calorific value of the scrap tires. The "higher use" perception can be reflected in state regulations concerning scrap tire management that promote crumb rubber uses while remaining neutral on beneficial use in cement kilns.

Another barrier to increased use of scrap tires in cement production are state and in some cases local regulations that allow scrap tires to be disposed of in non-hazardous solid waste landfills. This issue could potentially be addressed by coordination among EPA, state governments, and the cement sector to establish programs to divert scrap tires from landfill disposal, potentially by revising state regulations or establishing or revising state scrap tire management programs.

- Spent Foundry Sand

As discussed above, several cement sector contacts indicated that their plants (or companies) are not using spent foundry sand either because the use of the material is not cost effective or because the phenolic resin content of the material is not compatible with dry kilns with preheater/precalciner design. The cost issues are related to the quality of the material and the availability of inexpensive virgin material. The need to screen the lower quality spent foundry sand to remove metal and other extraneous materials increases the cost of using the material. Some cement plant contacts indicated that they are working with local spent foundry sand suppliers to solve the quality issues; other cement plant contacts did not express interest in continuing to use the material. Cement plant contacts for which their kiln designs are incompatible with the organic compound content of the spent foundry sand also did not express interest in continuing to use this material.

Another barrier to increased use of spent foundry sand in cement kilns is competing uses. Uses of spent foundry sand such as for construction fill are less sensitive to the quality of the material, and the locations of these competing uses may be closer to the facilities that are generating the spent foundry sand than the cement kiln is. These conditions would provide a cost disadvantage to use of spent foundry sand in cement kilns. Also, some states do not have active regulatory management programs for spent foundry sand and permit the material to be land disposed, or stockpiled on the foundry site. This lowers the cost of disposal of the material and does not provide an incentive for foundries to generate high-quality spent foundry sand for cement kilns.

- Steel Slag

Cement plant contacts and regulatory agency contacts did not identify specific issues related to use of steel slag as an alternative raw material in cement kilns.

6. Recommendations/Further Actions

This section summarizes further possible actions that could be taken by cement plants, suppliers, and federal and state regulatory agencies to address identified barriers to increased beneficial uses of materials.

Regional differences were identified in the use of beneficial materials depending upon the availability, cost, quantity and quality of virgin materials and availability, cost, quantity and quality of beneficial use (AFR) materials, and also depending upon federal, state, or local regulatory frameworks. Such geographic differences suggest that the development of recommendations for possible further actions be tested regionally.

Also, these recommendations for possible further actions consider supply and demand issues and associated cost, technical, and regulatory issues; health effects issues associated with the beneficial use of materials are outside of the scope of this report, but health effects will need to be considered in implementing any recommendations for further actions.

SSP Sector Partnerships

- SSP could consider promoting the development of partnerships between the cement sector and other SSP sectors; there is a strong interest in examining these issues jointly among various sectors. Considering the wide variety of alternative fuels and raw materials identified as being used or potentially being used in cement kilns, SSP could also consider expanding the types of materials under the program's review.

- SSP could develop partnerships between SSP and state agencies with active beneficial use promotion programs and also work to promote the establishment or expansion of state beneficial use promotion programs.

Regional Workshops and Pilot Projects

- SSP and the Portland Cement Association could coordinate setting up regional meetings and workshops with cement companies, state regulatory agency and EPA Regional offices, and beneficial use material suppliers to address barriers to increase use and to connect cement plants with potential AFR suppliers.

- SSP could work with OSW and PCA to promote "pilot projects" with specific cement plants and AFR suppliers as an outgrowth of the regional workshops.

- With respect ASR and CSOS specifically, SSP should consider initiating meetings with other relevant EPA offices to discuss where regulatory classification of these materials may impose barriers, prior to coordinating regional workshops or pilot projects.

Examples of potential actions that SSP and PCA could undertake include:

- Promoting a performance test project with a cement company, an ASR supplier, and state and EPA Regional offices to obtain data concerning the performance of the material as an alternative fuel. This pilot project could potentially be expanded to other regions that have refineries generating CSOS and cement kilns that could potentially use the material as an alternate fuel and raw material.

- Organizing a workshop to address performance testing issues related to expanding use of CSOS to cement plants in the Gulf Coast region.

- PCA and EPA could potentially jointly develop long-term goals for replacing conventional fuels and materials with alternatives (e.g. increasing national alternative fuel replacement to specify increasing a certain type of alternative fuel by a certain percentage by a certain year).

- PCA and EPA could consider initiating discussions with State government agencies concerning development of more a standardized permitting and performance testing approach for alternative fuels in general and "engineered fuel" specifically.

- PCA and EPA could potentially initiate discussions with State government agencies concerning development of a "stewardship strategy" for AFRs, including standardized receipt and characterization and testing standards.

7. Appendix A: Case Studies

7.1 Beneficial Use Case Studies

Appendix A presents the results of the material-specific analysis for each beneficial use material analyzed for each cement kiln case study.

7.1.1 Spent Foundry Sand

California Portland Cement Company, Colton CA

The California Portland Cement, Colton CA plant uses approximately 10,000 to 25,000 tons[i] per year of spent foundry sand from multiple suppliers. A third party collects the material, screens the material for trash and debris, combines the material into truckloads, and delivers the material to the Colton cement kiln site. The use of the spent foundry sand has resulted in an overall decrease in raw material costs (after the cost of testing the material) of $0.70 per ton clinker.

Foundry sand is used at the Colton Plant for silica replacement. The Colton Plant quarry operation produces high purity limestone, but the limestone has no silica or alumina content. Thus, the Colton Plant has to import silica and alumina from spent foundry sand and other sources to make their raw material mix. The California Portland Cement plants in Rillito AZ and Mojave CA don't have this issue with the silica/alumina content of their limestone.

The Colton Plant does not have as much spent foundry sand as desired, and they also use mined silica and diatomaceous earth to supply silica to the raw material mix. The Colton Plant's spent foundry sand supply is limited because there are not enough aluminum and steel foundry sand suppliers in proximity. Competition from alternative uses of spent foundry makes the material more expensive for the Colton Plant to obtain. There is more efficient recycling of foundry sand within the foundry (driven by internal cost), and there are alternative uses for spent foundry sand. The overall cost for the Colton Plant to acquire the spent foundry sand is $14 per ton.

The Colton Plant uses spent foundry sand from aluminum and steel foundries. The plant does not use spent foundry sand from brass foundries because brass foundry sand contains lead; using lead-containing waste would require the plant to obtain a RCRA permit. The Colton Plant has not experienced any regulatory issues with aluminum or steel foundry sand.

CEMEX, Knoxville, TN

CEMEX operates one preheater/precalciner kiln in Knoxville. The cement kiln uses two primary types of spent foundry sand: (1) spent foundry sand from a "typical casting facility

[i] All "ton" quantities in these case studies are "short tons" unless otherwise specified.

for casting metal parts" and (2) spent sand from a "fused silica" plant, which is used in manufacturing transistors. The material is more than 99 percent silica, consisting of high purity sand mixed with fused silica. CEMEX has not encountered any issues related to phenolic resin binders in the spent foundry sand or other effects on air emissions from the use of spent foundry sand from the casting facility.

A broker that works with the cement industry connected CEMEX with the foundry. The quantity of spent foundry sand used has been constant over time, and the CEMEX plant uses whatever the facilities produce. This source of silica is cheaper than mined material.

The plant operates under air permit conditions including a 12-month "rolling sum" of emissions. The emission factors are derived from previous stack tests, including tests for total metals. There are NO_x, SO_x, and CO emission limits in the permit; the 12-month rolling sum emissions limits in the permit are for lead, mercury, and beryllium. Mercury is part of the "raw material substitute" program for the plant. Raw materials, including the spent foundry sand, are analyzed quarterly, and an updated alternative materials report is completed every month. The plant has not encountered any environmental permit issues associated with the use of these materials. Alternative raw materials are subject to emission limits; however, as long as the materials are not hazardous wastes, they are permitted for use. The regulatory agencies involved in permitting for the Knoxville plant include the Tennessee Solid Waste Department and the Knoxville Air District.

TXI, Midlothian, TX

The TXI Midlothian TX cement plant used spent foundry sand previously, but does not do so now because of processing costs, transportation costs, and availability of the material. TXI indicated that management of spent foundry sand in Texas is not subject to any active state regulatory program. Without an active state regulatory program, foundries have little incentive to send this material off site either for beneficial use or disposal. Many foundries are piling their spent foundry sand up on their sites, avoiding transportation costs.

One facility in Fort Worth TX processes spent foundry sand for subsequent beneficial use. The processing includes screening the spent foundry sand to remove oversized materials so that the material can be beneficially used.

The plant noted several issues regarding the quality of spent foundry sand depending on the type of foundry producing the material. Spent foundry sand from aluminum foundries has organic compound content, while spent foundry sand from steel and magnesium foundries generally does not. The organic compound content of spent foundry sand, specifically phenolic resin binders, has been identified as an important issue for preheater/precalciner cement kilns because it can generate excess carbon monoxide emissions and potentially affect compliance with air emissions permit limits. Phenolic compounds can also react to form hazardous air pollutant emissions if the compounds oxidize in mid-kiln without reaching the combustion zone of the kiln. This can also potentially affect compliance with air emissions permit limits. Spent foundry sand may also contain chromium, which natural sand does not contain. Therefore use of spent foundry sand in cement kilns would cause the state regulatory agency to look at the operation and the potential disposition of the chromium with respect to the potential for hazardous air pollutant emissions.

The capacity of cement kilns to use spent foundry sand in Texas exceeds the amount of available spent foundry sand in Texas; most cement plants charge a recycling fee of $5 per ton for spent foundry sand. The transportation cost for the material is also a barrier to increased use of spent foundry sand in Texas.

The increase in fuel prices and the associated increase in transportation costs have led to more spent foundry sand being used as a "soil amendment." Texas policy on spent foundry sand does not discourage such use of the material, leading to less material available in commerce for potential use in cement production.

Lafarge, Seattle, WA

The Lafarge Seattle cement kiln uses a small amount of spent foundry sand. This material is mixed with petroleum-contaminated soils that are used as an AFR. These materials are used to replace silica. There are no restrictions on permit flexibility related to the use of these materials. The spent foundry sand shipments are set up on a just-in-time delivery. The material is not stored on site, and the plant has experienced no difficulty in transportation or availability of the material. Approximately 40 tons of the material are stored on site at any one time.

The Lafarge Seattle cement kiln is a wet process kiln and has experienced no issues with phenolic resin content in the material, excess CO emissions, or clinker quality as a result of using the spent foundry sand. To obtain the material, the Lafarge Seattle plant works through Systech Environmental Corporation, a wholly-owned subsidiary of Lafarge. The Systech sales representatives located at the plant help find alternative materials, investigate prospective materials, and produce chemical and physical profiles of the materials.

Lafarge, Sugar Creek, MO/Tulsa, OK

The Lafarge Tulsa Oklahoma plant formerly used spent foundry sand from a local foundry; however, the plant experienced material quality issues with the spent foundry sand and discontinued its use by 2004. The Tulsa plant found tramp metal, pig iron and other solid materials in the spent foundry sand that got caught in the raw material mill and damaged the equipment. There was also a neutral cost to get the spent foundry sand material to the plant as compared to mined materials. The Tulsa plant has since installed a screening process that can be used to screen out tramp metal. The screening equipment was purchased for another application, but could be applied to spent foundry sand. The plant is considering using material from the same supplier, and would screen the material first to remove tramp metal. The spent foundry sand feed rate would amount to 1 to 2 percent of the raw mix, about 60,000 tons per year.

The Lafarge Sugar Creek Missouri plant uses approximately 3,000 tons or more of spent foundry sand annually, depending on the available supply. The plant did not report any quality issues or other issues related to use of spent foundry sand.

Lehigh Cement, Mitchell, IN/ Fleetwood, PA

Historically Lehigh Cement used a lot of spent foundry sand to supply silica to the kilns. Lehigh Cement is phasing out the use of spent foundry sand because of issues with excess CO air emissions. Spent foundry sand contains volatile organic compounds in the binder materials (oils, phenolic resins) used to make foundry molds. As Lehigh Cement converted their long dry kilns to one-stage preheaters, spent foundry sand was introduced into the preheaters, and the material started to burn off the volatile organic compounds in the preheater. Some Lehigh Cement plants adopted voluntary CO emissions limits in their permits to avoid Prevention of Significant Deterioration (PSD) air emissions review. The spent foundry sand caused CO emissions to increase, approaching the CO l air emissions limits. The Lehigh Cement Mitchell Indiana plant is a long dry kiln; this kiln technology can still take spent foundry sand; preheater kilns are newer technology; these cannot generally take spent foundry sand because of the preheater issues.

7.1.2 Steel Slag

TXI, Midlothian, TX

TXI developed the proprietary CemStar ^{tm} process that processes steel slag into a raw material for cement production. TXI recently sold the patent rights to a separate company. TXI researched where the steel plants are in relation to the cement kilns to market CemStar ^{tm} to cement kilns. TXI conducted representative raw mix calculations for cement kilns throughout the U.S. and found that there is a constant need for steel slag at cement kilns in most regions of the U.S. except for the Northeast where the limestone quality is "perfect" for clinker, negating the need to supplement raw mix with steel slag.

TXI reported that most steel slag generated in Texas is being used as a raw material in cement kilns. Chaparral Steel (formerly a unit of TXI, and now a separate company) sends their steel slag to TXI. The SMI steel mill in Seguin, TX sends steel slag to Hunter Cement. Some steel slag from Chaparral Steel is also going to Ash Grove Cement, located in Midlothian.

The rate of steel slag feed to the TXI Midlothian cement plant is relatively constant, about 6 percent of clinker production. The maximum feed rate is controlled by product quality. TXI Midlothian cement kiln clinker production rate is increased because of the steel slag. Previously the production rate was 35 tons per hour of clinker for the wet kiln. TXI added 2 tons per hour of slag and is now getting 37 tons per hour of clinker. Steel slag also improves fuel efficiency and reduces cement kiln NO_x emissions.

According to TXI, with the CemStar ^{tm} process there is no technical reason for steel mills not to send their steel slag to cement kilns. The material can be easily processed for use in cement kilns using the process. When analyzing the use of steel slag in cement kilns, one must compare the transportation and processing costs with the value of the extra clinker that would be produced and the extra tons of cement that would be produced. Most cement markets are "sold out" (although this is changing somewhat), so cement plants using the steel slag with the CemStar^{tm} process would increase clinker production and cement production by the amount of steel slag used.

CEMEX, Knoxville, TN

The CEMEX Knoxville plant uses mill scale, mixed mill scale, and iron slag as alternative raw materials. Use of these alternative raw materials is not cost issue but a product quality issue. The chemistry of limestone dictates how much sand the kiln needs and how much iron the kiln needs. The chemistry of raw materials mix enables CEMEX to meet standards for customers, product strength profile, etc.

Mill scale used as alternative raw material in the CEMEX Knoxville plant comes from ponds, affecting the quality of the material. Initially, the mill scale material removed from the ponds contained some metallic debris. The plant noted that the metal debris got into the grinding mill and conveyor belts, damaging the equipment.

The material used to be landfilled. The material vendor put in screens to screen out debris, enabling better handling of product and enabling use in the cement kiln. Still, the materials are subject to waste acceptance testing criteria including TCLP (toxicity screening) and heavy metals analysis.

CEMEX identifies sources of alternative raw material through contractors. For the mill scale a contractor was working for the supplier and started looking for potential outlets of the material. The contractor submitted sample of the material to CEMEX for analysis, then CEMEX evaluated the material against their permit conditions and then accepted the supply and established a contract.

CEMEX also works with vendors concerning material supply issues. For example, in the winter months the vendor may have an extra amount of material. CEMEX stores the material and, in return, gets a better price for material. There is less supply of the material in the summer, so CEMEX handles the surge of material. The storage pile of material is turned over within a 12-month period, and material supply changes from week to week or month to month.

7.1.3 Scrap Paper/Wood

Lehigh Cement, Redding CA

The Lehigh Cement Redding, California plant has a long history of burning wood and other biogenic materials. The Redding Plant was first permitted in the 1970s to burn agricultural byproducts; however, the market for this material in cement kilns collapsed in the 1980s because facilities in California started to install wood-fired boilers. The Redding Plant then switched to burning rice hulls. Then, rice hull burning power plants were built in California, and the supply of rice hulls disappeared. It took the Redding Plant four years to get wood back on line, which was a corporate initiative. The Redding Plant is a "small" capacity cement plant (800,000 tons per year of cement) and the plant therefore needs to use alternative materials to remain competitive with larger cement plants.

In order to reestablish the use of wood, the Redding Plant needed to build a new storage silo and materials handling equipment. The Redding Plant conducted a market evaluation; the plant purchasing department sought suppliers. The only material the plant identified in the vicinity to replace the rice hulls was sawdust from window frame production plants. Sawdust production is tied to the building industry. The sawdust goes into the front of the kiln, displacing coal. The wood at the Redding Plant can represent between 4 to 15 percent of the plant's total fuel consumption, depending upon the availability of supply.

The Redding Plant needed to be repermitted to burn wood, in part because the plant needed to apply capital expenditure to construct the new storage silo, materials handling equipment, and associated air emissions control equipment. The amount of wood that can be burned is based on the results of the performance tests conducted. Because of the repermitting, the plant cannot burn more than 7 tons per hour of wood. Under California Law AB2588, toxic emissions law, the Redding Plant could not get a permit to process more than 15 percent more wood than the amount of wood tested in the trial burn test; the test run was conducted at 5 tons per hour wood. The Redding Plant could permit the plant at a wood feed rate of 8 tons per hour if they conducted a new trial burn test, but there is currently a lower market supply of wood because of the housing market slump. The Redding Plant has a direct contract with the window frame company and is hopeful that the supply of wood will continue from the window frame company.

The moisture content is important to the materials handling characteristics of the wood The Redding Plant had to get new permits to upgrade materials handling equipment to keep material dry. This included installation of new baghouse, extended materials handling system covers, and upgraded hoppers to keep out rainwater. The sawdust tends to seize up in the materials handling equipment when gets wet.

Sawdust, when dry, tends to bridge in pipes, and the dust is explosive, like coal dust. Therefore sawdust is difficult to use. Although not a federal regulation, the equipment modification required state BACT review, including installation of state of the art dust collectors. This made using the material more challenging. Application of the California Environmental Quality Act (CEQA) was not required for the wood because sawdust is cleaner than coal. The Redding Plant has evaluated switching to plastics (the plant could not use plastics and wood simultaneously because of limitations of the materials handling system). If the plant switched to plastics, or MSW, CEQA would need to be implemented because the perception is that these alternative fuels may not be cleaner than coal. The CEQA Environmental Impact Report (EIR) and subsequent permitting could take several years to complete, and even after the process is complete the Shasta County Supervisors would have to vote on the issue, lending uncertainty to the process.

Lehigh Cement, Fleetwood, PA

The Lehigh Cement Fleetwood plant used approximately 9,000 tons of wood in 2007, predominately ground scrap creosote-treated wood. The plant initiated use of wood five years ago. The supplier is a local company that started as a landscaper and became a wood processor; the company approached the Fleetwood plant and asked whether the plant could burn wood. The Fleetwood plant then ran a trial to establish the maximum burning rate in the kilns, showing that two tons of wood were needed to offset one ton of coal (wood provides 6,500 BTU per pound, and coal provides 12,000 BTU per pound).

The Fleetwood plant obtained plan approval and established a contract agreement with the wood processor. The supplier sources the wood, processes the wood, loads the processed wood onto trailers, and delivers the wood to the plant on as as-needed basis.

A large capital expenditure was needed to install an "alternate fuel dosing system" for the wood. This system consists of trailers that are run hydraulically through the plant process control system. The wood is unloaded to a bin and conveyor. The bin has a load cell on it, and the conveyor feeds a "Pfister Feeder" that takes the ground wood into rotary feeder and blower. The wood blows into the front end of the kiln right above the coal pipe/burner. The maximum wood feed rate is two tons per hour for each kiln, four tons per hour total. The feed rate can be adjusted by adjusting how fast or slow the dosing equipment runs. There is a separate set of feed equipment for each kiln. The plant noted technical issues with handling wood, particularly with respect to moisture. If the wood gets wet it reduces the calorific value of the material.

The permitting process took several years to complete. In order to obtain plan approval, the plant submitted a "coproduct determination" application through PADEP to get approval to use the wood as a "coproduct." The PADEP Air Board required that the material have a minimum of 5,000 BTU per pound of heat input available to prevent "sham recyclers."

As a permit condition, the plant needs to analyze the wood for metals content. This includes weekly sampling. The operating permit requires sampling of each load of wood. The samples are composited into weekly load samples for calorific value, proximate and ultimate analysis, metals, and other constituents. There are no specific permit limits for these parameters but the plant is required to report the analysis results to PADEP. PADEP could use sampling and analysis reports to provide limits, but the agency hasn't done so, because cement plants doesn't create ash. If the wood was burned in a wood-fired boiler the permit conditions would be different.

The supply of wood is now fairly constant, but the plant anticipates that the supply may disappear sometime in the future. Issues associated with purchasing wood include the difficulty of maintaining wood supply from an economic standpoint. Many companies are looking for wood supply. Wood generators used to pay the cement plant to accept the material; now the cement plant pays the supplier for the material, and the long-term supply of the material is questionable.

The alternate fuel dosing system equipment could be expanded to other alternative fuels. The Fleetwood plant is obtaining leads from the corporate level concerning utilization of plastic; Lehigh Cement plants elsewhere in the US or in Europe also put out ideas that other plants can use with respect to alternative fuel uses.

Lafarge, Sugar Creek, MO

The Lafarge Sugar Creek Missouri plant initiated use of plastics, cardboard, rubber scrap, paper, and related materials in March 2008. These materials are being obtained from generators in the greater Kansas City metropolitan area. The plastics, rubber, cardboard, paper, and related materials are all being obtained through direct contracts through different suppliers.

The Lafarge subsidiary Systech conducted a market study to identify suppliers, working with a non-profit "byproducts synergy group" to identify markets for alternative fuel materials. Systech supplies hazardous waste and non-hazardous alternative fuels to the Lafarge plant. The Lafarge plant has also established contracts to use landfill gas from local landfills as an alternative fuel.

The target for the alternative fuel use is 40 to 50 percent of total BTU input to the kiln; this will involve ramp up over two to three years; the interim target for the end of 2008 is 20 percent replacement of total BTU input including landfill gas (10 percent) and solid fuels (10 percent).

A permit modification of the plant air permit was needed to clarify what alternative fuels the plant could use, including plastics, paper, cardboard, and related materials. A permit was also obtained from the local government; this is a "special use permit" which allows the city to tax the use of alternative fuels as a "solid waste facility" operation. Public notification was required, but no public hearing was requested. No changes in air emissions permit limits were needed to introduce plastics, only changes to the list of materials identified in the operating permit that could be burned. The permitting process for the plastics was initiated earlier than the Prevention of Significant Deterioration (PSD) permit process for the entire plant; otherwise the State permitting agency might have been able to ask for lower emission limits in the PSD permit. However, other plants performance tests showed no increase in emissions or reduction in emissions from plastics use.

California Portland Cement, Rillito, AZ / Mojave, CA

California Portland Cement reported that their Rillito AZ and Mojave CA cement plants are permitted to use wood, and have used wood in the past, but that there is little supply of this material in the areas of the two plants and neither plant is using wood at present. The two plants are also permitted to use on-spec surplus oil and surplus jet fuel.

7.1.4 Refinery Spent Catalyst and CSOS

Gulf Coast Petroleum Refineries (Generators)

Clarified Slurry Oil (CSO) is produced at refineries in the Fluidized Catalytic Cracker (FCC) process. The catalyst used results in an alumina/silica-based fines material with no heavy metals content that is suspended in the CSO. When the CSO material is removed from the FCC unit into refinery tankage (slurry oil tanks), some catalyst fines are entrained in the product stream, which later settle in the slurry oil tanks.

As noted above, the CSO is produced with inherent solids content; the solids that are settled out of the CSO are classified as Clarified Slurry Oil Solids (CSOS). CSO is sold directly to various energy markets as a fuel material (i.e., as a refinery product) with various ash specifications (generally representing the solids content). As the fines (i.e. ash) content increases in the CSO above certain ash specifications, market outlets become limited and refineries cannot sell the material directly into conventional markets such marine fuel (i.e., bunker fuel) or carbon black feedstock. Therefore there is an economic incentive for the refineries to separate the CSO from the CSOS. Refineries let the CSO material settle in the slurry oil tanks, the oil is then pumped out and is sent to traditional energy markets as a refinery product. The value of the CSO as a refinery product is based on the solids content, the higher the solids content, the lower the value of the material. Once the solids content of the CSO reaches about 0.7 percent the value of the material to potential customers decreases substantially.

The settled material remaining at the bottom of the slurry oil tanks is considered CSOS – CSOS is a listed hazardous waste (K170), Historically this material was landfilled; however, now refineries avoid utilization of landfills as a matter of corporate environmental policy. Centrifuged CSOS "cake" can fail EPA land disposal restrictions test for semivolatiles, and the material cannot in any case be sent to a landfill. The material is generally managed onsite at the refinery, such as by reprocessing the material back into the cokers (thermal treatment). One incentive of refineries reinjecting the CSOS into the cokers is that the refineries then do not have to classify the material as a waste. Since material processed onsite at the refinery is not classified as a "waste," it is not reportable wither in the RCRA Biennial Hazardous Waste report or the annual TRI reports.

Some refineries have sent their CSOS (as a hazardous waste) to cement kilns for energy recovery. Systech (Lafarge) cement kilns in Fredonia KS and the TXI cement kilns in Midlothian TX, among other cement kilns, are permitted to accept K170 hazardous waste. The CSOS provides the cement kiln with both energy content and raw material content (alumina, silica). Typically cement kilns first analyze an initial sample of the material to ensure that they are permitted to accept the material, and then may analyze additional samples in the event that the characteristics of the material change (e.g., there is a change in the solids content of the material as generated by the refinery). Data concerning the amount of CSOS (K170 waste) transferred to cement kilns for energy recovery is included in the main section of this report.

The CSOS is not generated on a continuous basis; tank cleanouts are conducted as a batch process. Typically, refineries remove CSOS from their each of the slurry oil tanks every ten years or so. These settling tanks are on the order of one million gallons each; a typical large refinery can generate over one million pounds of K170 waste per year depending upon the schedule of tank cleanout. The CSOS material is typically slurried out of the settling tank and the solids are sent to 20 cubic yard roll-off boxes. The liquid becomes (low solids content) CSO product, and the solids removed become CSOS.

According to refinery contacts there is an outstanding and fundamental question regarding the point at which the CSOS becomes "hazardous waste" in the CSO settling and CSOS removal process. CSO is not hazardous waste, it is a refinery product, however, CSOS is classified as a hazardous waste. "Wet" FCC catalyst that is removed directly from the fluidized catalytic crackers during catalyst replacement isn't classified as hazardous waste either, and cement kilns use this material as a non-hazardous alternative raw material. Spent FCC catalyst is classified in Texas as "Class II non-hazardous waste" and is being recycled into materials used for road bed construction in Texas. This material is a major alternative raw material from petroleum refining to cement manufacturing.

A fundamental regulatory question is where (at what physical location within the CSO settling tank) is the catalyst material first classified as hazardous waste? According to the refineries, EPA OSW has not directly answered this question. The refineries suggested that the most direct approach to defining CSOS as a non-hazardous waste is through the EPA "definition of solid waste" (DSW) regulatory process. If CSOS is deemed by EPA not to be a "solid waste" when beneficially used, the material inherently cannot be classified as a hazardous waste either. The refineries pointed out that CSOS was originally listed by EPA as a hazardous waste because of its chromium content and poly-aromatic hydrocarbon (PAH) content, and that the material was originally considered for listing as a hazardous waste because the material was historically being landfilled. However, the PAH content in this material (just as the PAH content in any other commercial fuel) is not a technical issue for processing of CSOS in cement kilns for energy recovery. Therefore, according to refinery contacts, there is a basis for reclassifying CSOS used as an alternative fuel or raw material as a refinery product rather than as a solid waste.

Reinjection of CSOS into the cokers is recognized by refineries as a less optimum use than cement kilns would be, but refineries do this to avoid having to classify and report the material as a hazardous waste. Refineries have to use energy to prepare the CSOS material to go back to the cokers or incur the cost of centrifuging the material. They would generally prefer being able to sell the material to cement kilns without further processing. The refineries have identified transport trucks that can transport unprocessed CSOS as a "free-flowing" material. Such cost savings are of no value, though, as long as CSOS is classified as a hazardous waste. Refineries have estimated that if the CSOS were not classified as a hazardous waste the refineries could save more than $1 million per tank cleanout from the increased value of the CSOS and avoidance of the onsite management costs (i.e., the processing cost of slurrying the material out of the tank and centrifuging the material for reinjection into cokers). The cost of sending the CSOS to a hazardous waste landfill is about $150 per ton. Therefore, refineries are incurring higher cost to avoid having to dispose of the CSOS as hazardous waste in landfills.

Refineries have been discussing CSOS supply with cement companies. The acidity of the CSOS has so far not been an issue for the cement kilns; however, cement kilns as customers want to know the sulfur content, mercury content, and calorific value of the CSOS, and whatever other characteristics of the material that the cement companies could impact air emission control system. The cement kilns want material that is in the range of 9,000-10,000 BTU per pound, and can accept material with up to 20 percent solids content. However, centrifuged CSOS (which is about 70 percent solids) can range from 8,000-9,000 BTU per pound, because the centrifuging process removes some of the oil content (the slurried material prior to centrifuging is about 20 percent solids). The centrifuged CSOS can be transported to cement kilns on trucks in roll-off boxes. The centrifuged material is tipped into a screw conveyor and mixed with other liquids at the cement kiln to make a slurry to inject into the cement kiln.

The refineries noted that because of the batch nature of the slurry tank management process that generates CSOS, a single refinery would not generate sufficient material to supply a cement kiln on a continuous basis. However, the refineries also noted that if several refineries coordinated their tank cleanout schedules and perhaps also worked through a third party consolidator, the refineries collectively could generate sufficient material to continuously supply a cement kiln. Refineries are also developing methods of modifying their settling tank operating procedures; rather than operate the settling tank to build up solids (CSOS) and allow them to settle, the tank could be operated with CSO with higher solids content without letting sediment build up in the tank. The operating concept is to sell the CSO with the higher solids to markets (e.g., cement kilns); maybe then the refineries pump out solids once a year rather than once every ten years. Refineries may also contract out the management of the settling tanks to third parties. The third party would manage removal of the material from the tank and return the "empty tank" to the control of the refinery.

The refineries indicated that transportation costs preclude long-distance transport of CSOS, but that the material can be transported on a regional basis. The refineries supported the concept of a regional workshop with the cement companies to discuss generation and management of the CSOS.

Motiva, Norco LA (generator)

Motiva Norco typically sends 4,000 tons per year of FCC catalyst to the Holcim Theodore cement kiln rather than to a landfill. Since the material is a dusty powder, it is managed and transported in pneumatic trucks. This form is compatible with the pneumatic feed system at the kiln and maximizes the tonnage per truckload. Overall economics make this practice competitive with landfilling. The spent catalyst material is about 75% aluminum oxide and silicon dioxide.

The challenge in using the material was to set up a management system that could turn several smaller loads of granular or damp catalyst material into a larger load of uniform composition that could be easily transported and handled in silos, conveyor belts, and pulverizers of the cement kiln. The concept of stockpiling and mixing the materials together worked to achieve the uniformity and handling properties needed. In addition, reusing the larger load was cheaper or competitive with the cost of landfilling. Motiva conducted trials to demonstrate material compatibility over a period of many months. Motiva Norco initiated use of this material as a kiln feedstock when it barged 3,900 tons of a mixture of spent material to Holcim Theodore in August, 2006.[209]

Refineries generate a variety of materials (spent sandblasting media, granular catalyst beads, support balls, catalyst fines filter cake) that can be commingled to achieve a mixture that can be easily managed by conveyor belt systems. In addition, commingling enables blending of the chemical properties so that the material becomes more uniform chemically and physically. Stockpiling materials over several months promotes uniformity and large enough quantity to facilitate the variety of catalysts and other materials generated by the refinery.

Marathon Oil, Houston TX (generator)

Marathon Oil has seven refinery locations: St. Paul Park, MN; Detroit MI; Canton OH; Robinson IL; Catlettsburg KY; Garyville LA; Texas City TX. The Marathon Oil refineries generate CSOS. The slurry oil tanks are "flow through units" in which the CSOS collects. The slurry oil tanks are typically cleaned out on 10-year cycle. CSOS can be a difficult material to handle since it may be thick and sticky or gummy. In some cases, the material needs to be "excavated" from the slurry oil tanks. Less labor is involved with continuous slurrying rather with periodic cleanout. Refinery service companies have proprietary technologies for slurry oil tank management, and some refineries are changing practices to continuously remove solids from the tanks rather than removing the solids periodically. This is referred to as "continuous slurrying." However, Marathon Oil is not yet convinced that these proprietary processes are proven technology and is still investigating them.

One Marathon refinery conducted slurry oil tank cleanout projects in 2001, 2002, and 2008. This refinery generated approximately 4 to 5 million pounds of CSOS per tank on cleanout; another refinery removed almost 7 million pounds of CSOS material in 2007. This refinery, in Illinois, shipped the CSOS to Canada. Canada permits landfilling of this material after stabilization. There is no land disposal ban in Canada at present, but the CSOS is still classified as a hazardous waste in Canada. Land disposal restrictions are coming into effect in Canada in 2009, and material would then need to be treated before disposal.

The Marathon Oil refineries in Detroit, MI, Catlettsburg, KY, and Robinson IL, are within reasonable transportation distance to the disposal facilities in Canada. Marathon Oil is continuing to work with disposal facilities in Canada to meet the land disposal ban requirements. The material first would be treated in the U.S. Alternatively, starting in 2009 the material generated by the Illinois refinery could be incinerated in US. However, hazardous waste incineration cost is 2 to 3 times more than landfill cost.

Marathon Oil has established a corporate goal for waste management to choose onsite management first; then fuel blending for energy recovery; then disposal in a landfill or an incinerator.

Marathon also operates two refineries in Gulf Coast, Garyville, LA and Texas City, TX. These refineries have not conducted tank cleanouts in the past seven or eight years. Previously the Gulf Coast refineries either disposed of the CSOS through incineration or by transport to Canada. The Texas City refinery has worked with the Clean Harbors hazardous waste incineration facility in Deer Park TX for incineration of CSOS. Clean Harbors or a subcontractor is also the transporter of the CSOS as a hazardous waste transport common carrier.

Marathon has investigated sending the CSOS to cement kilns for energy recovery. The CSOS material is a "solid" at certain conditions, but it can be liquefied depending upon how much oil is left in it. Marathon refineries could slurry the material and ship the material to a fuels blending facility in a tanker truck. The blending facility would need "stirred tank" to process the material into alternative fuel. Marathon has had discussions with vendors, but has not done any projects with them yet.

Some of this CSOS waste from the St. Paul Park, MN refinery is generated on a continuous basis; the generation rate is approx. 1,000 pounds per month. They will generally try to recover oil from the CSOS and return that oil to the refinery for processing, using a sieve trap to filter the oil; the filter collects fines from oil, and the fines go into a drum. The CSOS generated from this refinery has more oil in it than CSOS generated at other Marathon Oil refineries because of the continuous slurry processing. CSOS has been sent from the St. Paul Park refinery through SYSTECH to the Lafarge Fredonia KS cement kiln.

The Garyville LA refinery is considering continuous slurrying technologies. A refinery service company (TRADEBE Company) has a proprietary technology for slurry oil tank management. Under this proposal the service company, as a third party, would manage the tank for the refinery. The Garyville, LA refinery has a secondary oil recovery unit that should be able to treat the CSOS from tank cleanouts on site. This is high temperature sludge treatment unit. Marathon is investigating installing a similar process at Catlettsburg KY refinery. The Garyville refinery process treats the API separator sludges and other refinery wastes. The CSOS would be a small part of the total feed to the sludge treatment unit.

Marathon Oil also generates non-hazardous spent FCC catalyst and is looking to send this material to cement kilns also. The Texas City refinery generates approximately 11,000 tons per year of spent FCC catalyst. This material is now being landfilled at a cost of $20 per ton.

Ash Grove Cement, Foreman AR; Chanute, KS

Ash Grove Cement operates hazardous waste-permitted cement kilns at Foreman AR and Chanute KS. These facilities are permitted to accept hazardous wastes, including CSOS, and occasionally accept CSOS for use as an alternative fuel. These facilities formerly accepted refinery waste "tank bottoms", which were delivered to the cement plants in roll off boxes. Ash Grove ceased accepting this material when the regulatory status of the material changed in 1995 and the material was deemed non-hazardous waste. Ash Grove could no longer charge a fee to accept the materials, and therefore the cost of continuing to use the material as an alternative fuel was cost-prohibitive.

Ash Grove has maintained permits for burning hazardous waste in the Chanute KS and Foreman AR plants since mid-1980s. The Chanute plant obtained the first "Boiler and Industrial Furnace Rule" (BIF) permit issued in the U.S., and the Foreman plant obtained a BIF permit shortly afterward. The BIF Standards were replaced by the Hazardous Waste Combustor (HWC) MACT standards, so all of the hazardous waste-burning cement kilns were required to obtain a new permit. Ash Grove rebuilt the Chanute plant after the HWC MACT standards were issued, and the Chanute plant had to comply with the new HWC MACT Standard at startup in 2001.

The number of cement kiln hazardous waste combustors has been decreasing nationwide because of public perception, and EPA enforcement and regulatory requirements. Public perception can affect the ability of cement kilns to use alternative fuels and particularly solid and hazardous wastes. For example, Montana has state regulatory requirements prohibiting use of alternative fuels that are solid wastes in cement kilns. Montana citizens in particular are very active, and oppose even using scrap tires in cement kilns. There are now 18 permitted hazardous waste combustor cement kilns in the U.S.

The cost for maintaining a hazardous waste combustor permit includes the cost of monitoring and testing. This includes performance testing (stack testing) under the hazardous waste combustion NESHAP. Routine testing is required every 2.5 years, full Comprehensive Performance Testing (CPT) is required every five years, and full risk assessment is routinely required every 10 years. This involves reevaluating the prior risk assessment for the facility, conducting a screening-test risk assessment, evaluating any changes in the emissions and how changes may affect risk assessment results. Either the facility passes the risk screen or has to revise the risk assessment. Such revisions are an expensive process.

The cost for obtaining a hazardous waste combustor permit for a newly-permitted cement kiln would be on the order of several million dollars including permitting, risk assessment, and performance testing. Cement plants that are not already permitted would not spend several million dollars to obtain a new hazardous waste combustor permit just to burn refinery CSOS. It is highly unlikely that any cement plant that had not been burning hazardous waste prior to the HWC MACT standards (i.e., the cement kiln was previously permitted under the BIF rules) would obtain a hazardous waste combustor permit; this would be difficult both from a public perception standpoint and from a cost standpoint. Therefore, the number of cement kilns permitted as hazardous waste combustors is not expected to increase.

Ash Grove uses a third-party supplier (Cadence Environmental Energy) to supply alternative fuels to their cement kilns and does their own fuel blending. Cadence has no physical facilities; they operate sales staff and call on large hazardous waste generators, facilities that are producing hazardous waste manifests. Cadence is an independent company, not a subsidiary like Lafarge/Systech and Holcim/Geocycle.

7.1.5 Wastewater Treatment Sludge (biosolids)

CEMEX, Victorville, CA; Vexor Fuels, Medina OH

Vexor Fuels, an engineered fuel supplier to cement kilns, conducted a performance testing using biosolids at the CEMEX Victorville, California cement plant. The performance test baseline was a kiln feed rate of 10 tons of coal per hour; using biosolids the coal feed rate dropped from 10 to 3 tons per hour, with good emissions results.

A driver for biosolids beneficial use in California is landfill costs. Generators cannot landfill biosolids in California. The material has to be first dried at temperatures of at least 60 ° C to generate "Class A biosolids." Energy is needed to dry the material. Some biosolids generators are using a combination of filter presses and driers to dry the material. The dried biosolids has good ash content for cement kilns, including silica. The dried biosolids has 7,000-8,000 BTU per pound. The transportation cost of the dried material is also lower; generators are not paying to transport the water.

Vexor Fuels also identified a number of other ongoing biosolids projects, including a New Jersey project to dry biosolids to the consistency of sand; this project may be supplying cement plants in Evansville IN and Union Bridge MD. Vexor Fuels also reported that the Union Bridge MD cement kiln is obtaining biosolids from Baltimore City. The Synagro Company is drying the material for the Union Bridge cement kiln.

Lehigh Cement, Fleetwood, PA

As discussed above, the Lehigh Cement Fleetwood PA cement kiln is investigating the use of biosolids potentially as an alternative to wood. The plant is currently conducting a trial to burn dry biosolids from municipal wastewater treatment plants. There is less moisture in biosolids (less than 10 percent) than there is in wood; the calorific value is about the same as wood, and the economics are about the same as wood.

The Synagro Company already has sludge dryers on line and is putting more dryers on line; the City of New York already has sludge dryers on line. The Union Bridge MD plant is already permitted to burn this material;

The Fleetwood plant considers biosolids to be a potential future material, and considers wood to be a past material to be phased out. Permitting of biosolids may not be any different than permitting wood; the plan approval for this material has been accepted by PADEP, and local municipalities are already on line to provide biosolids.

Lehigh Cement, Redding, CA

The Lehigh Cement Redding plant is evaluating use of biosolids, but has not conducted any performance testing. The plant material handling system, which is used now for wood (sawdust), could also be used for biosolids but the Redding plant considers sawdust to be a more secure market at the moment. The Redding plant expectation is that public involvement for biosolids would be more difficult than for sawdust. The plant can't burn sawdust and biosolids at the same time using the same materials handling system so the plant would have to give up burning sawdust to burn biosolids. Redding has a population of approximately 80,000 people; Shasta County has a population of approximately 150,000 people. Redding is two to three hours from Sacramento and Bay Area, which are the major sources of biosolids in the area. There would therefore be additional materials transportation costs to obtain a sufficient supply of biosolids for the plant. The sawdust generator is much closer to the Redding plant than are the biosolids generators.

7.1.6 Plastics

Lafarge, Sugar Creek, MO

The Lafarge Sugar Creek Missouri plant initiated use of alternative fuels including paper, cardboard, plastics, and related materials in March 2008. The plastics are not derived from C&D debris or post-consumer plastic (municipal solid waste) but from industrial plants. One issue that the cement plant encountered with the plastics was how to get plastics sorted adequately. The cement plant needed to develop an understanding of the industry practices and design a sorting process so that PVC plastics are separated from the other plastics.

The Sugar Creek plant permit has a chlorine limit, one reason why PVC plastic is not desired. The plant runs tests on the plastics streams for a number of characteristics including chlorine content and hazardous constituents. The plant will reassess the materials acceptance procedures as plastics shipments start coming in from different suppliers, but the intent is not to sample each and every incoming load considering that there maybe ten or twenty different suppliers with separate contracts.

Plastics shipments are processed on site, with a "two path shredder" system to 2 inch minus size. The materials handling system includes a warehouse, and storage and conveyor systems to transport the material to the preheat tower. The plant spent on the order of $7 million for capital equipment. The original market studies were initiated in April 2006 and the plastics came on line in March 2008.

TXI New Braunfels, TX

TXI is working on a demonstration project at their New Braunfels, TX plant with company that procures plastics for cement kilns. TXI previously conducted a performance test in Midlothian using refuse-derived fuels. The refuse-derived fuel test was conducted with material from Minneapolis for a thesis test in 1993. The test demonstrated that the cement kiln could burn RDF within permit limits and without an increase in pollutant emissions. New Braunfels is scheduled to conduct a trial burn using RDF in mid-2008.

One barrier for cement kilns using RDF in Texas is that it is very inexpensive to landfill MSW plastic material. Landfill costs in Texas can be as low as $10 per ton. Therefore, it takes a lot of momentum and incentives to get a municipality to sort plastics to make RDF. Plastics must be sorted separately from general trash; chlorinated plastics and non-chlorinated plastics must be sorted separately to make RDF for cement kilns. Municipal governments would bear the capital and operating cost of sorting the plastics, TXI is investigating how to collaborate with municipalities and provide incentives to get municipalities to do this. The sorting would eventually pay for itself in fuel and potentially also carbon cost; use of RDF as an alternative to landfilling the MSW is a climate change issue for avoiding generation of landfill gas CO_2 and CH_4.

Lehigh Cement, York, PA

Vexor Fuels manufactured "plastic fuel" for Lehigh Cement for a performance test and the test was successful. However, Lehigh Cement initially could not obtain a sufficient amount of plastics from the market for full-scale introduction of plastics because the plastics generated in the local area are being recycled into new plastics. This is a waste management hierarchy issue, and is common to other alternative fuel materials that can be recycled into new products.

The Lehigh Cement plant in York Pennsylvania is a White Cement plant. The York plant is about 1/10 the size of a gray cement plant. The York plant uses plastics as an alternative fuel. This material is a high-calorific value material, but Lehigh needed to organize 10 suppliers to get sufficient quantities of the material for the York plant. It would be more difficult to organize a sufficient number of suppliers to supply a gray cement plant with plastics than a white cement plant 1/10 the size. These plastics being used are not recyclable and otherwise would have been landfilled; i.e., these are materials that would not otherwise get into the recycling stream. The material is received at the plant already shredded.

Initially the plant had a supply problem with the plastics supply; has worked out this problem and is now working on technical issues. For example, the existing conveyor system is not adequate to convey material, delivery feed problems being addressed. White cement plants are even more difficult to feed alternative materials than gray cement plants, because white cement plants cannot feed anything that would affect the whiteness of the cement.

Pennsylvania Department of Environmental Protection

The Pennsylvania Department of Environmental Protection (PADEP) has a grant-making economic development agency that works with AFR generators but does not have a very active market program to identify suppliers and users of plastics. One view is that the private sector is better at matching suppliers and users than agencies are. The PADEP contact did acknowledge that MSW plastics recycling rates are not high in Pennsylvania and that too much of this material going to landfills. This material could otherwise be use as alternative fuel and reduce the demand for fossil fuels. State/local governments in Pennsylvania are currently recycling only plastics recycle grade 1 and plastics recycle grade 2. Existing recycling processes cannot segregate plastics recycle grade 5 and plastics recycle grade 6 from the plastics stream. This type of segregation is needed for segregation of chlorinated plastics from non-chlorinated plastics because chlorine affects the quality of the cement.

Permitting for alternative fuels for the Lehigh Cement plant did not encounter much opposition. The plant is subject to PCDD/PDCF limits; but these emissions are lower with alternative fuels than with coal. In addition, there are fewer "shooting events" (startups and shutdowns) with alternative fuels than with coal. If a cement kiln is contracted to make 100 tons of clinker, the kiln potentially needed to make 120 tons if startup and shutdown makes 20 tons of off spec product. The use of alternative fuels makes the quality of fuel more consistent, and therefore less off spec product is produced.

7.1.7 Scrap Tires

Holcim/Geocycle, Midlothian TX/Ada OK

Geocycle is a wholly owned subsidiary of Holcim and is responsible for sourcing and processing alternative fuel and raw material feedstocks and supplying the Holcim cement plants with alternative fuels and raw materials. Both the Midlothian Texas and Ada Oklahoma cement plants are completely non-hazardous with respect to the materials that the cement plants are permitted to accept.

The Midlothian plant is primarily a coal-fired plant; the plant started using petroleum coke last year. The Midlothian plant includes two kilns, each a four-stage preheater precalciner kiln. The current plant fuel mix includes:

- 20 percent petroleum coke,
- 15 percent alternative fuels
- Remainder coal

The Ada plant is primarily a coal-fired plant. The plant includes two wet process kilns. The current plant fuel mix includes:

- Petroleum coke 25 percent
- Alternative fuels 20 percent (almost all tires)
- Remainder coal primarily

The Midlothian plant is currently coprocessing tire chips; wood, spent activated carbon, spent filter cake solids, and oil filter fluff (described below). The Midlothian plant is also permitted to coprocess used oil, glycols, and glycerin. In terms of calorific value, the alternative fuels used in the Midlothian plan are primarily TDF, oil filter fluff, and wood. TDF and oil filter fluff are higher percentage in terms of heat input because these materials have a higher calorific, wood is a lower percentage in terms of heat input because wood has a lower calorific value. The tire chips, wood, and oil filter fluff market supplies are relatively stable. The tire chips derive from the Holcim/Geocycle Ada Oklahoma plant where they have a tire chipping plant. Geocycle hauls 25 tons in a truck, one way transportation is about 180 miles. Geocycle backhauls another material to Ada from Midlothian to decrease cost of shipping the tire chips.

Scrap tires are chipped in Ada and transported to Midlothian because the scrap tire supply in Ada does not perfectly match whole tire consumption (demand) at Ada. The "safety valve" for surplus scrap tire supply in Ada is chipping the scrap tires and transporting the tire chips to Midlothian.

Tires are not available in the open market in Oklahoma. Oklahoma runs the tire program, under the Oklahoma DEQ. Post consumer tires pay $1 per tire; this funds the Oklahoma Tire Fund. The processors, end users, and transporters of tires are all covered by the program, but very confusing legislation and implementation. At the end of each month each tire transporter and tire processor/user sends a report to state and applies to state for funds for tires handled. The State pays out money every month. If the program is over funded or under funded in a particular month, the state balances this out in dispersing the funds. The transporters are paid first; then the processors and end users are paid. Therefore, the transporters try to control the supply because they are paid first.

There are two crumb rubber operations in Oklahoma, and several cement kilns in Oklahoma are using tires. One company is also using tires as erosion control on riverbanks. Tires are therefore a stable market but also a dynamic market.

Lafarge, Seattle WA

The Lafarge Seattle WA wet process cement plant was using chipped scrap tires as an alternative fuel until 2006. Prior to 2006, whole scrap tires could not be disposed of in MSW landfills. Therefore, suppliers chipped the tires and provided the chipped tires to local customers including the Lafarge cement plant. A change in local regulations in 2006 allowed the disposal of "quartered" scrap tires in MSW landfills. Quartering and landfilling the scrap tires is relatively inexpensive compared to the cost of the energy-intensive process to chip the scrap tires. After the change in the local regulation, suppliers did not have an economic incentive to continue chipping tires, and chipped tires became unavailable. The Lafarge plant was informed that suppliers would send not be sending the plant any additional shipments of chipped tires by the truck driver who brought the final shipment of chipped tires to the plant. The Lafarge plant decided to modify the kiln by installing a kiln chute so that the kiln could accept whole tires instead of chipped tires. The capital cost of this modification was about $4 million, not including the cost of permitting and performance testing. Therefore, this local regulatory change cost the cement plant $4 million to maintain the use of scrap tires in the cement kiln.

The local regulatory agency, the Puget Sound Clean Air District, is responsible for air emissions permitting for the Lafarge Seattle plant. The objective of the kiln modification was to achieve 20 percent replacement of calorific value with whole scrap tires, on the order of 1.5 tons per hour of scrap tires. The draft permit (notice of construction) required a complete series of trial burn performance testing. The test program was based on a certain period of time with conducting 5 individual stack testing events including baseline and four other tests. Initially the permit modification had hard and fast dates in it for scheduling and conducting the performance tests. Lafarge worked with the local permitting agency to change these. The original dates would have made it too difficult for management to make decision concerning the capital expenditure. The change to a flexible date for the performance testing: "x days from complete installation of the equipment" saved the project, because management had time to make a good decision.

Washington Department of Ecology
Solid Waste and Financial Assistance Program

There is no statewide prohibition on landfilling of scrap tires in Washington. Municipal governments that operate MSW landfills control regulations on landfill disposal of scrap tires. Some municipal landfills accept scrap tires and quarter them for disposal. Washington DOE does not provide any support at the state level for scrap tire management. Washington cannot provide financial assistance for management of scrap tires and cannot collect "dollar per tire" consumer fees, because of a prohibition in Washington Constitution concerning the collection and distribution of such fees. The state can support pilot testing programs. For instance, there is some crumb rubber research and pilot testing work underway, and the Washington Department of Transportation has a "quiet road test" using rubber-modified asphalt, and the City of Bellevue is initiating a program to use "crumb rubber" rubberized sidewalks for tree plantings.

Puget Sound Clean Air Agency

For the whole tire kiln modification project, Lafarge applied for a permit to burn whole tires. The local regulatory agency required performance testing because there were "unknowns" related to the potential effects on cement kiln emissions. For the performance test, there was limit on the duration of the test and the amount of scrap tires that could be used during the test. The performance test was conducted for demonstration of compliance with the cement plant MACT rule and chlorinated dioxin and furan emission limit. The amount of scrap tires the cement plant can burn per hour will be based the results of the performance test. The cement plant would be issued a construction approval for that amount of tires, included in the cement plant Title V operating permit. The cement plant needed to obtain a notice of construction because the cement plant needed a capital modification to convert the cement kiln to burn whole tires. If capital expenditure had not been required, the agency could have implemented the "15-day" rule under EPA MACT Rule for testing of new materials.

California Portland Cement, Colton, CA

The California Portland Cement Colton California plant is a long dry kiln that is permitted to use coal, petroleum coke, natural gas, fuel oil #6, fuel oil #2, and whole scrap tires. The scrap tire feed rate for Colton plant is at a "target" of 2 tires per revolution (i.e., two tires every 90 seconds) to replace approximately 50 percent of cement kiln fuel requirements. Petroleum coke is obtained from local refineries and also from offsite locations. The petroleum coke market in California is becoming more expensive, and most petroleum coke produced in California is therefore exported.

The ability of the Colton plant to obtain a scrap tire permit from the South Coast Air Quality Management District (SCAQMD), the regional agency responsible for permitting for the Colton plant, is specifically related to the economics of burning scrap tires and the technical aspects of tire burning. The Colton plant gets paid to use the scrap tires, and thus gets paid to use the BTUs. Also, the use of scrap tires reduces the NO_x emissions from the plant, and scrap tires are therefore categorized as a NO_x control strategy. This made the permitting of scrap tires much more palatable for the agency. Scrap tires are now mandated in the Colton Plant air permit as a NO_x control strategy for plant.

California Portland Cement spent maybe $500,000 in air toxics emissions testing for "before tires" and "after tires" in order to secure the scrap tire permit from the SCAQMD. SCAQMD would require similar "before" and "after" air toxics testing for any other type of alternative fuel, so the economics of alternative fuels do not work for the plant, except for scrap tires.

California Integrated Waste Management Board

The California Integrated Waste Management Board (CIWMB) is responsible for regulation of non-hazardous wastes in California. The CIWMB estimates that close to 40 million scrap tires per year are generated in California and approximately 10-11 million scrap tires are going to landfills annually in California. There are several beneficial use applications of scrap tires in California:

- Crumb rubber for sidewalks

- Field turf applications, recreational surfaces, playgrounds
- Larger chips for lightweight fill for Caltrans transportation applications
- Smaller chips for vibration attenuation for rail applications
- Construction aggregate projects
- Landfill alternative daily cover
- TDF for cement kilns/power generation

The CIWMB conducts a study of scrap tire management and generates an annual report. The agency does market development and studies to divert tires from landfill disposal, and has an annual budget of $30 million for market development efforts. Historical stockpiles of scrap tires in California have been largely worked off – there were two large tire pile fires in California in the late 1990s and early 2000s. Larger tire piles (millions of tires) have now been cleaned up by state agencies or by landowners, smaller tire piles still exist to be worked off.

Many of the projects that the CIWMB issues grants for are transportation infrastructure projects conducted through local government agencies. The CIWMB issues grants to local agency for these types of projects. Construction aggregate projects are not developed enough for the CIWMB to give out grants yet; these are demonstration projects only at present. Tire-derived product projects are mixed local government and private entity projects. Grants are available for from the agency for these projects also.

Grants are no longer available from the agency for supporting the use of TDF in cement kilns or electric power generation. The California state legislature passed a statute that changed the law three or four years ago to prohibit agency grants to TDF projects. This was part of the public resource bill – the bill created refunding of the CIWMB tire program and raised the consumer scrap tire fee to $1.75 per tire. The reauthorization restricted grants to TDF projects. The premise of the restriction is that TDF projects don't need to be subsidized. TDF as an application for scrap tires would exist even without any CIWMB intervention. However, a subtext here is that some legislators opposed expanding the use of TDF in cement kilns/power generation applications.

In California, scrap tires must be shredded or baled in order to be landfilled, but otherwise municipalities operating landfills set prices/practices for scrap tires to be landfilled. Scrap tires can also be processed into "alternative daily cover" for landfills. From an engineering standpoint scrap tires cannot be landfilled whole because they don't stay in place if they are whole and affect the integrity of the landfill structure.

The consumer fee for scrap tires is $1.75 per tire. Of this fee, $0.75 goes to the California Air Resources Board (CARB) for their diesel fuel engine research program; the rest of the fee goes to the CIWMB.

Lehigh Cement, Redding, CA

The Lehigh Cement Redding California cement kiln is a dry process plant that formerly used chipped scrap tires; the plant then switched to whole scrap tires. The whole scrap tires are put into the riser duct of the four-stage preheater. In some cement plants this is equivalent to a precalciner. The scrap tires are used to replace coal at approximately 20 percent of fuel usage, approximately 1.75 to 2.5 tons per hour. The plant is feeding the maximum amount of scrap tires; increasing the feed rate would affect the pyroprocess and heat load and would affect product quality. There is no limit in plant operating permit on the scrap tire feed rate; but the plant is burning as many scrap tires as they can burn. The plant is permitted as a tire recycling facility. A third party on site supplies the scrap tires; these include truck tires and small tires as well as automobile tires.

The Redding plant was expanded in 1982; 800,000 tons per year of cement production capacity. Now Redding is a "small" cement plant; tires are important to keeping the plant running and keeping up with competitors.

Burning scrap tires lowers NO_X emissions, and scrap tires are a cleaner fuel than coal. The Redding Plant has periodic stack test data; the stack test data has been provided to the state regulatory agency in Sacramento. Nearly half of cement plants in California are permitted to burn scrap tires, however only two are doing so. The California climate change statute AB32 could not "mandate" that cement kilns use scrap tires because some plants cannot burn scrap tires for technical reasons.

The Redding Plant has experienced no community relations issues with respect to their use of scrap tires or with respect to other issues. The California Environmental Quality Act (CEQA) affects scrap tire and tire-derived fuel projects and other alternative fuel projects such as plastics. This is because plastics fuel and scrap tires are viewed by regulatory agencies as "not necessarily cleaner" than coal and therefore potential environmental impacts need to be demonstrated. For a new alternative fuel application, it could take several years for the CEQA-required Environmental Impact Report (EIR) to be approved. Preparation of the EIR and other state permit application documents for a new alternative fuel application could cost $250,000 - $500,000.

The California Integrated Waste Management Board regulates scrap tire usage and also regulates non-hazardous solid waste landfills. The CIWMB charges $4 per tire for tire management. The state legislature recently passed regulations so that cement plants cannot apply for grants for tire-derived fuel projects anymore. In 2005, the Redding Plant installed an automated system for tire feed based on 2004 grant, including installing a sorting hopper to replace a manual sort system. Grants are no longer available to cement kilns for these types of projects. Grants can still go to crumb rubber and other scrap tire uses. Most cement plants in California also operate aggregate plants. The aggregate is used in asphalt plants, and crumb rubber goes to asphalt plants among other applications. Chipped tires can also be used in playground construction and other applications. Scrap tires can also be landfilled in California.

California is a "free market" with respect to scrap tires. The Redding plant anticipates that despite the competition for scrap tires, scrap tires will continue to be available to the plant if a free market environment for scrap tires is maintained.

CEMEX, Knoxville, TN

The State of Tennessee has an active scrap tire management program, and the State Agency approached the CEMEX plant about eight years ago concerning their ability to use scrap tires. The plant is using about the same amount of scrap tires now as it was then. Scrap tires are a significant source of heat input; somewhat less than 5 percent of heat input to the cement kiln is scrap tires. The plant is permitted to burn three tires a minute, but the plant can only burn one tire a minute because of process limitations. While studies have been done to increase the throughput of scrap tires, capital expenditure would be needed to improve the rate, and no decision has been made as to whether to make the capital expenditure.

The scrap tires are supplied by a third party supplier. The State scrap tire management program gets a fee for each scrap tire and the supplier gets a fee for each scrap tire. Tire customers (people purchasing new tires) pay a dollar per tire to dispose of scrap tires; the state gets half, the supplier a gets part, and the end user gets part.

Lafarge, Tulsa, OK

The Lafarge Tulsa Oklahoma plant is a dry process plant that uses whole scrap tires. Approximately 12 percent of entire raw feed is tire-derived fuel. In the first quarter of 2004 the plant used 216 tons of scrap tires. This is a relatively constant feed rate. The plant first started burning tires in 1994; the operating permit including scrap tires was issued in 1995. The permit revision incorporated scrap tires, landfill gas, and onsite generated oils and greases into permit [the permit conditions for landfill gas and onsite generated oils and greases were never used].

For scrap tires the permitting process was a prequalification program – i.e., the scrap tires are not hazardous waste and use of scrap tires would not increase emissions; the plant modeled ambient air concentration for SO_2 and estimated the fence line concentration beyond the baseline. The plant does not have a Continuous Emission Monitoring System, so the plant is using emission factors for emissions estimation. The plant CAAA Title V operating permit was issued in November 2007, no criteria pollutant stack testing was required before that time. The plant was required to conduct opacity determination by May 2008; NOx and PM determination by May 2008; and a one-time test for criteria pollutants and HCl emissions within five years of permit issuance. This test is to be conducted at one set of operating conditions. No parametric testing was required for scrap tires vs. no scrap tires. (This differs from other states, e.g., California, in which parametric testing was required for cement kilns using scrap tires).

7.1.8 Automobile Shredder Residue

TXI, Midlothian, TX

TXI has been investigating use of automobile shredder residue (ASR) at their Midlothian plant. The material is generated by Chaparral Steel. Chaparral Steel is a former subsidiary of TXI that is now a separate company, and is located in Midlothian. Chaparral Steel generates ASR from shredding automobiles for its steel mill operation. The ASR, also referred to as "fluff," includes non-metallic material from seats, dashboards, etc. ASR generated by automobile shredders has historically been landfilled.

TXI has worked with Chaparral Steel on processing ASR at the Chaparral site. The steel mill first processes the automobile shredder residue to separate out non-ferrous metals. Nickel, aluminum, copper, and other non-ferrous metals sell at prices on the order or $1000 per ton, so the additional material processing of the ASR to remove the non-ferrous metal is cost effective. Shredders use eddy current or other processes to remove the non-ferrous metals to capture this value. As a final processing step, Chaparral puts the ASR through a "vertical mill" to get the material processed and sized to cement kiln standards. Chaparral processes the material down to – ¼ inch size and to low moisture content. After this final treatment step the ASR has a calorific value similar to coal.

The regulatory barrier to use of ASR in cement kilns is the Toxic Substances Control Act regulations. The TSCA regulations (referred "Superrules") for PCB wastes affect the status of automobile shredder waste. Shredder waste is categorized as a "PCB waste" until proven otherwise, and according to TXI it is very difficult to prove otherwise. Therefore, automobile shredders can landfill this material relatively easily, but cement kilns cannot burn the material without encountering major regulatory hurdles under the PCB regulations. TXI is continuing correspondence with EPA concerning the TSCA issue.

7.1.9 Miscellaneous Materials

VEXOR Fuels, Medina OH / CEMEX, Wampum PA /ESSROC, Bessemer PA

<u>**Engineered Fuel (Biosolids/Plastic/Paper)**</u>

Engineering Fuel Production and Specifications

Vexor Fuels operates a facility in Medina OH that manufacturers "engineered fuel" for cement kilns and cogeneration plants. The engineered fuel consists of various types of non-hazardous materials, including used oil, wood and other biosolids, paper, and plastic. Vexor engineered fuel can have as much as 40 percent biomass in it, depending upon the alternative fuel material feedstocks used.

Vexor Fuels started processing non-hazardous materials in 2000 and by 2003 was blending non-hazardous fuel for cogeneration units, including Covanta and Wheelabrator facilities. Holcim cement contacted Vexor Fuels in 2005 concerning supplying engineered fuel to the Holly Hill cement plant. Vexor then purchased an existing alternative fuel processing facility in Dorchester SC specifically for Holly Hill supply. Holcim now owns this facility and Vexor Fuels is contracted as an operations consultant. The Dorchester facility manufactures 6,500 BTU per pound calorific value alternative fuel. The alternative fuel is fed into the preheater/precalciner of the Holly Hill cement kiln.

Vexor Fuels is supplying engineered fuel to cement kilns in Pennsylvania located close to Medina OH. These cement kilns are wet kilns without preheater/precalciners. Therefore the engineered fuel must be delivered into the kiln along with the coal. Engineered fuel therefore must have different characteristics for wet kilns than for preheater/precalciner kilns.

The CEMEX plant in Wampum PA conducted a test program using Vexor engineered fuel in July 2007. The "engineered fuel" looks like mulch, has a minimum calorific value of 10,000 BTU per pound, 10 percent moisture or less, and can be conveyed into the kiln through a four inch pipe. The CEMEX Wampum plant test was successful, and the facility is now permitted by the Pennsylvania Department of Environmental Protection (PADEP) to use Vexor engineered fuel. Vexor Fuels indicated that they would commence delivering engineered fuel to the CEMEX plant in mid May 2008. Vexor Fuels anticipated a 60,000 tons-per-year delivery contract with the Wampum plant. Vexor Fuels anticipated that the ESSROC cement kiln in Bessemer PA will be performance tested using for Vexor engineered fuel in mid-2008. The ESSROC kiln is also a wet kiln and engineered fuel would be delivered to the kiln along with the coal.

The cost to make engineered fuel for a wet kiln is higher than for a preheater/precalciner kiln, because for a wet kiln the engineered fuel has to meet 10,000 BTU per pound spec. For a preheater/precalciner kiln the spec is 6,500 BTU per pound to 8,000 BTU per pound, therefore Vexor Fuels can mix more wet material into the fuel; mixing this fuel is much easier than making fuel for wet kilns, because for wet kilns the fuel has to be like coal and there is only one fuel entry point into the kiln. Vexor Fuels can put inorganic material into the wet kiln fuel as long as they meet the 10,000 BTU per pound spec. For dry kilns Vexor Fuels can develop both types of fuel for precalciner and for the kiln itself. The difference in spec is moisture content and particle size for the wet kiln fuel and the dry kiln fuel. The ash content is silicates and aluminates and lowers the calorific value of the engineered fuel, but the ash content is also raw material for the cement kiln.

For wet kilns, any ash in the fuel goes into the clinker, so the ash content in the fuel for wet kilns has to be controlled. Engineered fuel cannot replace all of the coal; coal generates 10-12 percent ash, which goes into clinker; Vexor engineered fuel has 3 to 8 percent ash; therefore the cement kiln would be missing some clinker production from burning Vexor engineered fuel rather than coal. The target for engineered fuel is 50 percent replacement of coal.

The average coal calorific value is 12,000 BTU per pound (Western PA). A 10,000 BTU per pound spec is established for wet kiln engineered fuel. The spec is not as high as coal (e.g., 12,500 BTU per pound) because making engineered fuel at this higher spec is more difficult, and difficult to make consistently.

One issue encountered by Vexor Fuels is that wet cement kilns could not build a separate delivery system for this material; the existing delivery systems could not handle the material. Vexor Fuels therefore had to develop the equipment to blow the material into the wet kiln right beside the coal feed; precalciner feed equipment design is much easier; Holcim did this modification themselves for the Holly Hill cement kiln.

For introduction of engineered fuel with the coal, the introduction cannot change the flame shape because this would change the clinker production characteristics. Introduction of engineered fuel also cannot create gas flow backpressure in the kiln because this would also change the flame characteristics.

Market Characteristics

The Vexor Fuels Medina OH facility can easily supply wet kilns because they are close to the facility. However, wet kilns are being phased out in favor of precalciner kilns that can burn 1/3 as much coal as a wet kiln does. Vexor Fuels can supply both the wet kiln and dry kiln markets with different spec products. However, wet kiln operators particularly want waste fuels to remain cost competitive with kilns that are more modern. Vexor Fuels worked on how to deliver a non-hazardous engineered material consistently with a narrow range of spec, consistent quality, and consistent supply.

The Vexor Fuels Medina OH facility can produce sufficient engineered fuel to feed one or two wet kilns. Vexor Fuels plans to build additional facilities at cement kilns in Eastern Pennsylvania and other locations. Landfill prices are $60-$80 per ton in Eastern Pennsylvania and coal prices are high, but Vexor Fuels still cannot economically transport their engineered fuel 400 miles to cement kilns in Eastern Pennsylvania. Therefore, they have to build facilities in Eastern Pennsylvania to service this market.

Raw Materials and Suppliers

Non-hazardous alternative fuel material comes from many types of facilities to the Vexor Fuels facility. Vexor Fuel's customers supply this material because they want to deal with a "best practices" plant and avoid landfill disposal. Suppliers include petrochemicals, rubber, tire manufacturing scrap, pharmaceuticals, plastics, paper, food, and fragrance chemicals, and consumer products manufacturers. Vexor Fuels is now looking to obtain unrecyclable papers and plastics from MSW recyclers. This unrecyclable material has a high calorific value, good particle size, and other favorable qualities; but the material is very cheap because this material can go to landfill. Vexor Fuel's customers are paying them for "complete elimination of their waste" Including elimination of the need for ash disposal. Cement kilns don't generate ash. "Waste-to-Energy" facilities generate 10 -15 percent ash that still has to be landfilled.

For precalciner kiln fuel, Vexor Fuels is incorporating aqueous waste, latex paint, epoxies, and related materials into the feedstock. Approximately 85 percent of materials coming into the Vexor Fuels facility can be blended into precalciner fuel. For wet kiln fuel, less aqueous material can be added to the feedstock. For both precalciner kiln fuel and wet kiln fuel, PVC plastics cannot be used because cement kilns have to control the feed rate of halogens to the kilns.

Vexor Fuels has established direct relationships with suppliers. Some suppliers are contracted to supply material, while some are not contracted and the material is purchased on a spot basis. One issue with establishing supplier relationships is that until Vexor Fuels has a supply agreement it is difficult for them to establish a contract with a cement kiln, and vice versa. Vexor Fuels cannot simply approach DuPont and say that Vexor Fuels will dispose of all their byproduct materials unless they first have a contract with a cement kiln.

Vexor Fuels is not overly concerned with volume of supply of feedstock for engineered fuels because they understand the alternative fuel materials business and markets. Some streams are priced high because generator can't easily manage them; other streams are priced low because they can go to landfills.

Vexor Fuels indicated that markets for alternative fuel materials (feedstock) and engineered fuel product vary by region. For example, South Florida does not have industrial base to generate plastics; but South Florida does have lots of MSW. MSW is cheap, but coal costs $80 per ton in Miami, so the supply and demand costs for engineered fuel balance out to some extent. Vexor Fuels is competing with low landfill costs and relatively low coal costs in some areas. Coal is $40 per ton in western PA; Coal is $80 per ton in southern CA.

Every material that comes into the Medina OH facility is "preapproved" by Vexor Fuels; there are standard approval procedures and an Ohio EPA-approved Waste Analysis Plan (WAP); each waste is given a unique Waste Approval Number. Shipments are subject to 100 percent QA/QC using fingerprint analysis on every container to ensure that the material shipped is what the generator identified and what the WAP approved; generators are notified within 24 hours of any discrepancies and the material must then be removed from the site within 10 days; these procedures ensure that Vexor Fuels does not inadvertently process hazardous waste.

Regulatory Barriers

Vexor Fuels has encountered regulatory barriers mainly at state level, and indirectly with EPA through implementation of the CAAA Title V Program. One issue is that Vexor Fuels is blending feedstocks to make a specification-driven engineered fuel product. Therefore, Vexor Fuels is unique operation. The quality of the engineered product supplied to the cement kiln is not going to vary regardless of the specific alternative fuel materials used to produce it; the calorific value, particle size, and carbon hydrogen nitrogen ratios are all controlled product specifications. One regulatory agency from which Vexor Fuels was seeking a permit (to supply a lime kiln) did not clearly understand at first that the engineered fuel product spec doesn't vary regardless of the variability of the specific feedstocks used to make the material.

Vexor Fuels also identified an issue that there are different testing protocols for different kilns in different regions; a uniform testing program would help to allow testing first and then allow modeling for new permits after a certain number of tests were conducted; at present Vexor Fuels has to test each kiln every time a new alternative fuel is introduced; stack testing is expensive for cement kilns. In recent performance testing for Vexor Fuels, stack testing has shown either no increases in emissions or increases below action levels and Title V operating permit thresholds. The cost of testing is $30,000 to $100,000 per stack test per kiln, and despite the consistent results, each kiln has to be tested before engineered fuel can be introduced.

Vexor Fuels also identified as an issue at the municipal and local government level concerning the definition of "solid waste" and what gets paid for. The "unrecyclable" material generated by MSW authorities is classified as "waste." If the state regulatory agency requires "solid waste fees" and "solid waste facility permits" for facilities that are handling this unrecyclable material, the material may not be able to be used for recycling.

South Carolina was very proactive on this issue. The Vexor Fuels facility in South Carolina did not need to be regulated as a "solid waste facility;" South Carolina regulations are that if 75 percent of the solid waste material is "recycled" including used as a fuel, the facility is exempt from state solid waste regulations.

Lafarge, Seattle, WA

Biodiesel

The Lafarge Seattle plant permit process does not prevent the plant from using alternative fuels and raw materials; the plant is investigating some new opportunities such as biofuels. If state agencies determine that a material is a "waste," then cement kilns are capped as to the number of tons per day they can use. There is no corresponding cap on use of materials that are "fuels." Glycerin generated from biodiesel plants, for example, has a high calorific value, but the mid-level state environmental agency staff want to classify this material as a "waste" rather than as a fuel. If the plant was designed as a biodiesel plant, it is uncertain whether the glycerin produced by the plant a "byproduct" or a "waste."

Used Oil

The Lafarge Seattle plant uses "used oil" including tank bottoms oil and used motor oil, and other types of non-hazardous oils. This material comes from intermediate sources; a supply contractor brings in loads in range of 4000 gallons, two to three truckloads per week. The Lafarge Seattle plant reported that the used oil market is dynamic and that there is competition for used oil. Because of rising energy costs, pricing of used oil is starting to rival coal and petroleum coke in some places, and other industries are competing for the used oil, specifically the asphalt industry.

California Portland Cement, Colton, CA

Latex Paint Solids

The California Portland Cement Colton plant uses processed latex paint solids as a raw material. This material is obtained from paint recycling company that conducts household paint waste collection. Household recycling of non-hazardous waste is common in California. This material does not include oil-based paint, only latex paint. The recycling company separates the latex paint solids from the paint waste and resells the liquids as "graffiti removal paint." California Portland Cement adds CKD to the latex paint solids, and then the CKD/latex paint solids mixture is fed into kiln. The latex paint solids are "sticky" and aggregate the CKD; this allows recycling of more CKD into the kiln. The methylcellulose content of latex paint is made into a grinding agent and plasticizing agent for cement.

Holcim/Geocycle, Midlothian, TX

Oil Filter Fluff

The Holcim Midlothian plant has been using oil filter fluff as an alternative fuel for the past ten years. Oil filter fluff is generated from used vehicle motor oil filters after the free oil and the metal parts are removed. The remaining oil-soaked paper is used as an alternative fuel. The oil filters are generated by automobile service centers in the Dallas and Houston metropolitan areas. The oil filter fluff market is relatively stable and the plant does not have any supply issues

Holcim/Geocycle, Devil's Slide, UT

<u>**Scrap Carpet**</u>

Geocycle is responsible for supplying alternative fuels and raw materials to Holcim cement plants in Utah, Montana, and Colorado, including the Utah Devil's Slide plant. None of the Holcim Mountain State plants are permitted to accept hazardous waste. Geocycle operations receives alternative fuel materials and conducts preprocessing / blending operations to prepare "engineered fuel." Geocycle delivers "engineered fuel" to the Devil's Slide cement kiln.

The Devil's Slide plant is more than 100 years old; updated in 1998 to dry process plant. Alternative fuels and raw materials are used at the Utah plant: scrap tire chips and diaper scrap (cubed) have been used for about 15 years. The new dry process plant was designed to accommodate these alternative fuels. The Utah operation also uses plastics and scrap from mattress companies, including fluff, foam, fabric, etc. after wood and metal (frames) are removed. The fuel mix for the Utah plant is approximately:

- 15,000 tons of tire chips per year
- 6,000 tons of plastics per year
- 2,000 tons of textiles and carpet per year

This constitutes approximately 30 percent of the heat input into the kiln. Geocycle / Holcim has a goal to increase this number. Utah was at 20-25 percent for years before Geocycle started adding new alternative fuels. Holcim recently invested 2 million dollars for installing another feeding point at the Utah kiln. Holcim could install a second additional feeding point to feed wood or some other type of material if the material is available.

Geocycle processes scrap carpet into alternative fuel. Geocycle first analyzes the scrap carpet to create a "profile" both for the purposes of material management and process control/cement clinker quality control. Geocycle then shreds the material and sends it to the Utah cement plant.

Geocycle receives carpet pad/cutting scrap, e.g., from regional carpet supplier RC Willey and Company. This includes old carpet pads, cutting scraps, rolls, etc. from residential and commercial carpet replacement. Geocycle preprocesses the scrap carpet to remove metal strips, nails, wood, etc. from the carpet prior to processing. Scrap carpet has 12,000 – 15,000 BTU per pound. Geocycle is working with CARE, a national carpet recycling organization, on carper recycling issues.

Geocycle has found it difficult to find suppliers for scrap carpet; small carpet installers cannot manage consistent production of quality scrap carpet material because it is difficult to control the practices of their installers. The installers need to separate the scrap carpet from other debris generated from the installation job. This segregation of material involves time and cost, and the need for separate transportation of the scrap carpet from the installation site to the cement kiln also involves time and cost. Large carpet companies can coordinate better because they send out carpet installers from central location.

Geocycle takes whatever scrap carpet installers bring them at the moment, approximately 2,000 tons of textiles and scrap carpet per year. Geocycle can use different types of scrap carpet, but Geocycle cannot accept "trash" that is mixed with scrap carpet. The customer (e.g., carpet installers) pays Geocycle for taking the scrap carpet material for material disposal, as opposed to paying a local landfill a tipping fee for material disposal. CARE is waiting to see if Geocycle can make relationships with "big companies" and work out issues with processing and transportation of the material.

The cost of transportation of scrap carpet is an issue: the hauling capacity of a truck may be only three to five tons of carpet, as opposed to a truck hauling capacity of 20 - 25 tons of tire chips. Landfill cost involves tipping fee and transportation, and scrap carpet takes up a lot of space in landfills because it is loose. Therefore, there is a cost for landfilling this material.

Geocycle's price for services takes into account transportation distance to the cement kilns. Geocycle is targeting customers close to Geocycle, e.g., within a 50 mile radius of the cement kiln. Geocycle's major "competitor" for waste carpet is the relatively low cost of landfill disposal in Utah. If there is a landfill close to the carpet installation site, the carpet installer would ordinarily send the material there. Therefore, Geocycle deals with corporate sustainability goals, etc., and sells a "value added" service to divert scrap carpet and other materials away from landfills. .

Geocycle has service agreements with customers, some are multi-year, and some are for a specific event, such as a ski resort changing their carpet. Service agreements with individual companies may have an estimated tonnage per month and quality specification, e.g., waste volume not to exceed 20,000 pounds per year.

The Devil's Slide plant has a CAAA Title V operating permit that lists the conventional and alternative fuels that the plant can accept individually. Conventional fuels, such as TDF or diaper scrap, are separately listed in the permit. The permit has various specifications, such as maximum percent sulfur in coal and specifications on used oil. Up to 15 percent "coal additives" can be added under the permit. Holcim can request addition of additional alternative fuels to permit, working under the "15 percent" threshold limit.

For introduction of a new alternative fuel, Holcim submits "ultimate/proximate" analysis of fuel to the state regulatory agency. Geocycle does a more detailed analysis of the material beyond an "ultimate/proximate" analysis because of process control reasons. So far, no stack tests have been needed to introduce new fuels under the Title V operating permit limits for emissions of criteria pollutants, PM, SO_2, NO_x, etc.

8. Appendix B: Study Contacts

Company	City	State
Ash Grove Cement	Foreman	AR
Ash Grove Cement	Overland Park	KS
California Portland Cement	Glendora	CA
CEMEX	Knoxville	TN
GRR: Giant Resource Recovery	Harleyville	SC
Lafarge	Seattle	WA
Lafarge	Sugar Creek	MO
Lafarge	Tulsa	OK
Lafarge	Tulsa	OK
Lehigh Cement Company	Fleetwood	PA
Lehigh Cement Company	Allentown	PA
Lehigh Cement Company	Glens Falls	NY
Lehigh Cement Company	Redding	CA
Texas Industries	Midlothian	TX
Holcim	Morgan	UT
Geocycle (Holcim)	Devil's Slide	UT
Geocycle (Holcim)	Midlothian	TX
Geocycle (Holcim)	Dundee	MI

Supplier and Other Contacts	City	State
Exxon Mobil	Baytown	TX
Shell	Houston	TX
Marathon Oil	Houston	TX
Vexor Fuels	Medina	OH

Regulatory Agency Contacts		
Agency	**City**	**State**
Texas Commission on Environmental Quality (TCEQ)	Austin	TX
Shasta Air Quality District	Redding	CA
Missouri Department of Natural Resources (MoDNR)	Columbia	MO
California Integrated Waste Management Board (CA IWMB)	Sacramento	CA
California Integrated Waste Management Board (CA IWMB)	Sacramento	CA
Pennsylvania Department of Environmental Protection (PADEP) South Central District	Reading	PA
Puget Sound Clean Air Agency	Seattle	WA
Washington Department of Ecology (WDOE) Solid Waste/Financial Assistance	Lacey	WA
Texas Commission on Environmental Quality (TCEQ)	Austin	TX
Texas Commission on Environmental Quality (TCEQ)	Austin	TX
Texas Commission on Environmental Quality (TCEQ)	Austin	TX
Pennsylvania Department of Environmental Protection (PADEP) Northwest District	Meadville	PA
South Carolina Department of Health and Environmental Conservation (SCDHEC)	Columbia	SC
South Carolina Department of Health and Environmental Conservation (SCDHEC)	Columbia	SC
California Department of Toxic Substance Control (CA DTSC)	Sacramento	CA

9. Appendix C: Kiln Types

9.1 Wet Process

The wet process is so named because the proportioned raw materials mixed with water and fed into the kiln in the form of a slurry. The amount of water varies depending on the physical and chemical properties of the raw materials, and the raw meal typically contains 30 to 40 percent moisture.[210] Wet grinding of hard minerals is usually much more efficient than dry grinding, and wet processing might be preferable when raw materials contain high moisture content.

The kiln is generally larger in plants using the wet process because the water is first evaporated in the lower temperature zone. The length to diameter ratio may be up to 38, with lengths up to 252 yards.[211] Also, more fuel is needed to create sufficient energy to evaporate the water. Fuel use in a wet kiln can vary between 4.6 and 6.1 MBtu per ton clinker.[212] The capacity of large units may be up to 3,970 short tons of clinker per day.[213]

9.2 Long Dry Process

In dry processing, the materials are ground into a flowable powder in horizontal ball mills or in vertical roller mills. The feed material has about 0.5 percent moisture content and is pneumatically or mechanically conveyed to the upper end of the kiln. Two types of dry process plants predominate: (1) preheater and precalciner kilns (discussed below) and (2) long dry kilns.

Dry process kilns operate with a high exit gas temperature of approximately 449° C and typically employ water sprays to cool the gas before it enters the dust control equipment. The fast-flowing combustion gases tend to blow the powdery raw meal out from the kiln.

Cyclones are used to collect cement kiln dust (blown out by the heat of the kiln) from the exhaust gas in order to facilitate the return of the particulate back to the kiln. Additional dust is collected as the exhaust gas enters a baghouse. The CKD collected is then fed back into the kiln, recycled in other processes, or disposed.

9.3 Variations of the Dry Process

Preheaters and precalciners are modifications of the dry process. With these processes, operators preheat and calcine the raw meal before it enters the kiln – using some heat that escapes from the kiln, which reduces the energy demands of the pyroprocess.

The preheater and precalciner process kilns have only calcining and clinkering zones, because the material has been dried before entering the kiln. Accordingly, these kiln types may in some cases be very short (under 61 meters).[214] The wet process was initially used to improve the chemical uniformity of raw materials being processed; however, it requires 47 percent more energy per ton of clinker production than the average for dry processes.[215] Technological improvements have allowed cement makers to utilize the dry process without quality deficiencies, and no new wet kilns have been built in the United States since 1975.[216] Some plants are switching from the wet to the dry process.[217] About 80 percent of U.S. cement production capacity now relies on the dry process technology.[218]

9.4 Dry Process with Gas-Suspension Preheaters:

Suspension preheater kilns preheat and partially calcine raw meal by passing it through a system of heat exchange cyclones before it enters the kiln. In traditional dry process kilns, the intense heat causes dust-laden gas to escape the kiln. To collect the escaping dust, operators used "cyclones." The cyclone is conical vessel into which a dust-bearing gas-stream passes tangentially, producing a vortex within the vessel. The solids are thrown to the outside edge of the vessel by centrifugal action, and leave through a valve in the vertex of the cone.

Because of the heat associated with the escaping gas, operators can send the raw materials through the cyclone, resulting in a heat exchange. The gas is cooled, producing less waste of heat to the atmosphere, and the raw materials are heated.

Fans draw the gases through the string of cyclones. The number of cyclones stages used in practice varies from 1 to 6. Generally, the cost of powering the fans outweighs the benefits when more than 6 cyclones are used. Typical fuel consumption of a dry kiln with 4 or 5 stage preheating can vary between 2.7 and 3.0 MBtu per ton of clinker, and the most efficient preheater, precalciner kilns use approximately 2.5 MBtu per ton clinker.[219]

A disadvantage of the preheater kiln is that plug-up problems can occur at he lower cyclone stage and the kiln inlet due to high concentrations of volatile constituents such as alkalis, sulfur, and chlorides in the kiln exit gases. To mitigate this problem, alkali and sulfur bypass systems allow evacuation of some of the kiln exit gases before they reach the preheater cyclones.

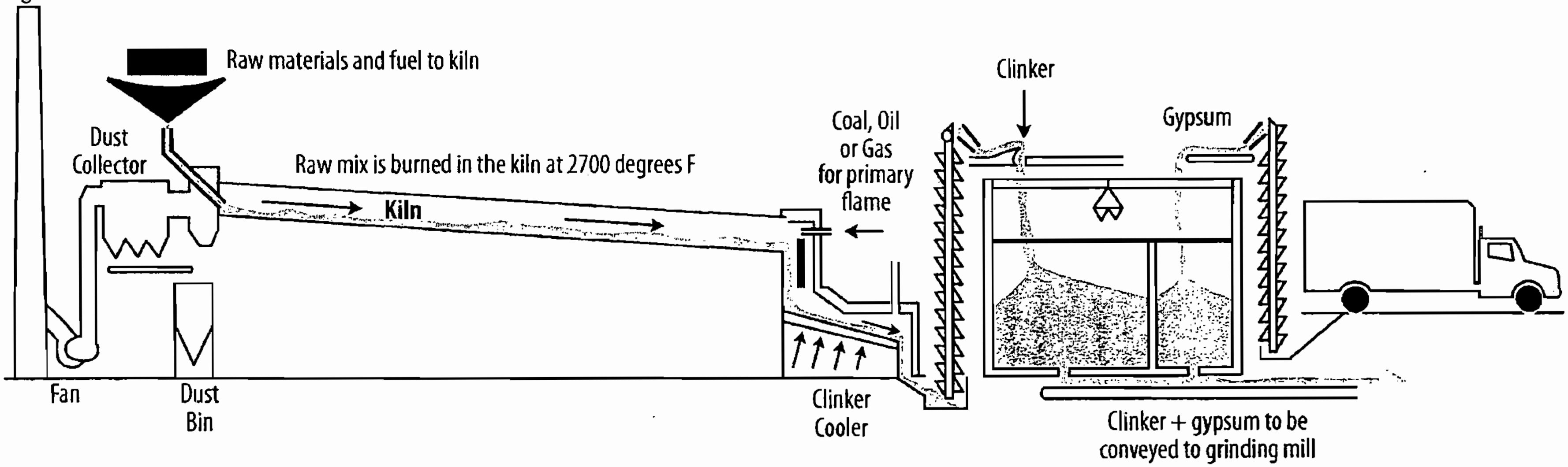
9.5 Precalciner Kilns

Precalciner technology involves a second combustion chamber added between the kiln and a conventional pre-heater, allowing for further reduction of the kiln fuel requirements. Precalciner systems associated with kilns with tertiary air ducts are supplied with air from the exhaust gases from the clinker cooler. Precalciner kilns without tertiary air ducts receive air that passes through the kiln itself.

Precalciners using the hot air from the kiln use that air to ignite fuel in a combustion chamber at the base of the preheater. Less expensive, lower grade fuels such as sub bituminous coal, lignite, and oil shale, as well as tires and waste oil, can be burned in the auxiliary firing unit, reducing fuel cost per unit of clinker.

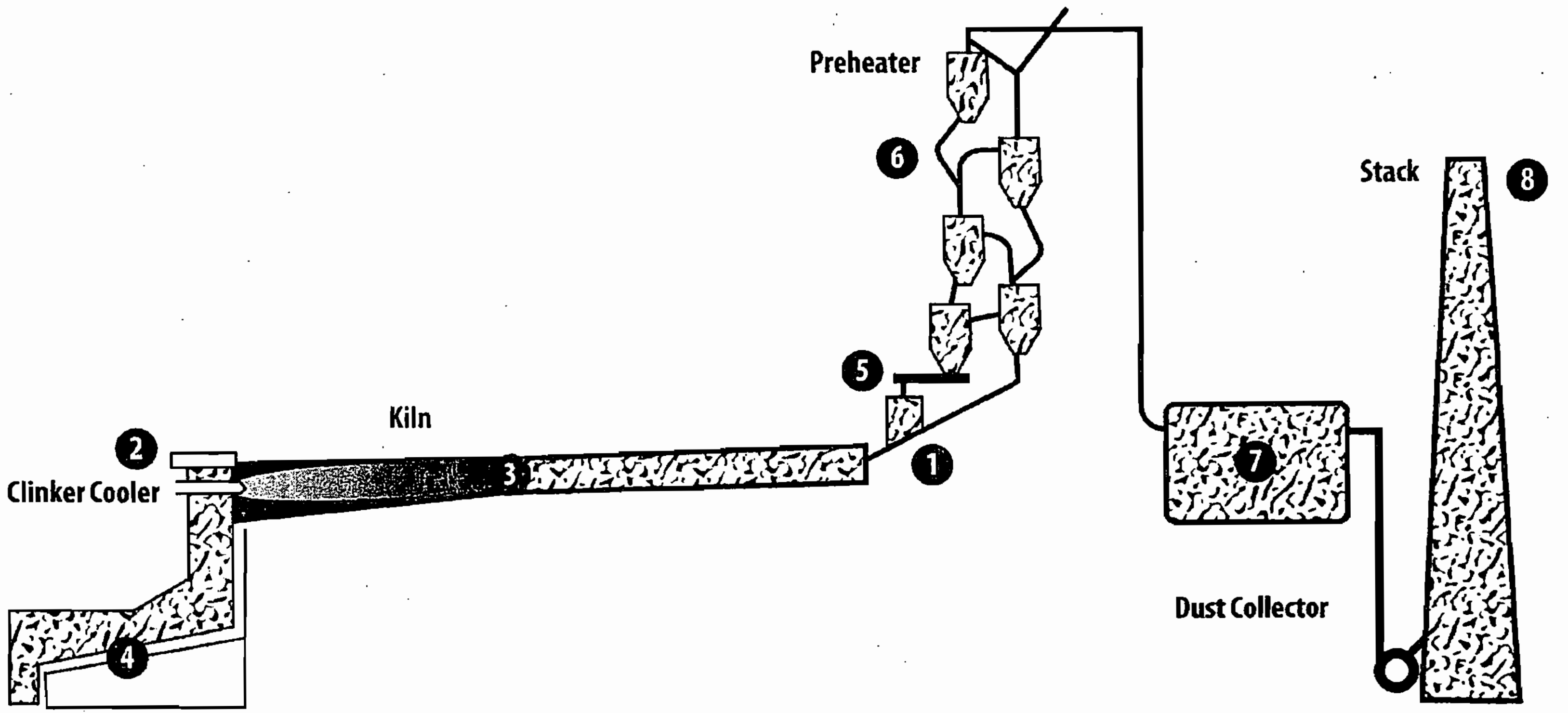
The hot combustion air for precalciners with tertiary air ducts arrives in a duct directly from the cooler, bypassing the kiln. The feed entering the rotary kiln is 92-98 percent calcined (100 percent calcined meal would be sticky and cause feed pipe plugs), so the kiln has only to raise the feed to sintering temperature. An advantage of this type of precalciner is that a large proportion of the alkali-laden kiln exhaust gas can be taken off as alkali bleed. Because this accounts for only 40 percent of the system heat input, it can be done with lower heat wastage than in a simple suspension preheater bleed.

Figure 5 Preheater Unit



Source: California Environmental Protection Agency, Compliance Assistance Program, *Cement Kilns*, October 1996, excerpted from Figure 300.5

Figure 6. Basic Workflow with Preheater unit



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[74] Vexor Fuels, Medina OH
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[77] Lafarge, Seattle WA; Lehigh Cement, Redding CA
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[79] Lehigh Cement, Redding CA
[80] Vexor Fuels, Medina OH
[81] California Portland Cement Company, Colton CA
[82] Vexor Fuels, Medina OH
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[123] Lehigh Cement, Fleetwood PA; CEMEX, Knoxville TN
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[125] Lehigh Cement, Fleetwood PA; California Portland Cement, Colton CA; Lehigh Cement, Union Bridge, MD
[126] TXI, Midlothian TX
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[128] Vexor Fuels; Synagro
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[130] Lafarge/Systech, Sugar Creek, MO; Lehigh Cement, York PA; TXI, New Braunfels TX
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[156] Including Montana
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[179] Ash Grove Cement, Foreman AR.
[180] Lehigh Cement.
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[182] Lafarge, Tulsa OK; Ash Grove Cement, Foreman AR.
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[186] Shasta County Air Quality District CA; Puget Sound Clean Air Agency WA.
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[189] Lehigh Cement, Pennsylvania.
[190] TXI, Midlothian TX.
[191] California Portland Cement, Colton CA.
[192] CEMEX, Knoxville TN; California Portland Cement, Colton CA.
[193] Lafarge, Seattle WA and Lehigh Cement, Glens Falls NY.
[194] Lehigh Cement.
[195] Lehigh Cement; Ash Grove Cement
[196] CEMEX, Knoxville TN; California Portland Cement, Colton CA.
[197] TXI, Midlothian TX.

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[198] California Portland Cement, Colton CA.
[199] Lafarge, Seattle WA.
[200] Lehigh Cement, Redding CA.
[201] South Carolina, Texas.
[202] PADEP.
[203] California.
[204] Systech, Lafarge Sugar Creek MO.
[205] Lehigh Cement.
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ATTACHMENT 5

TXI Midlothian, TX
Title V Permit

FEDERAL OPERATING PERMIT

A FEDERAL OPERATING PERMIT IS HEREBY ISSUED TO

TXI Operations, LP

AUTHORIZING THE OPERATION OF

Midlothian Cement Plant
Cement, Hydraulic

LOCATED AT

Ellis County, Texas

LATITUDE 32••27' 51" LONGITUDE 097••01' 36"

Regulated Entity Number: RN100217199

This permit is issued in accordance with and subject to the Texas Clean Air Act (TCAA), Chapter 382 of the Texas Health and Safety Code and Title 30 Texas Administrative Code (30 TAC) Chapter 122, Federal Operating Permits. Under 30 TAC Chapter 122, this permit constitutes the permit holder's authority to operate the site and emission units listed in this permit. Operation of the site and emission units listed in this permit are subject to all additional rules or amended rules and orders of the Commission pursuant to the TCAA.

This permit does not relieve the permit holder from the responsibility of obtaining New Source Review authorization for new, modified, or existing facilities in accordance with 30 TAC Chapter 116, Control of Air Pollution by Permits for New Construction or Modification.

The site and emission units authorized by this permit shall be operated in accordance with 30 TAC Chapter 122, the general terms and conditions, special terms and conditions, and attachments contained herein.

This permit shall expire five years from the date of issuance. The renewal requirements specified in 30 TAC § 122.241 must be satisfied in order to renew the authorization to operate the site and emission units.

Permit No: O1077 Issuance Date: January 25, 2006

Glenn Shankle
Executive Director

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GENERAL TERMS AND CONDITIONS

The permit holder shall comply with all terms and conditions contained in 30 TAC § 122.143 (General Terms and Conditions), 30 TAC § 122.144 (Recordkeeping Terms and Conditions), 30 TAC § 122.145 (Reporting Terms and Conditions), and 30 TAC § 122.146 (Compliance Certification Terms and Conditions).

If the permit holder chooses to demonstrate that this permit is no longer required, a written request to void this permit shall be submitted to the Texas Commission on Environmental Quality (TCEQ) by the Responsible Official in accordance with 30 TAC § 122.161(e). The permit holder shall comply with the permit's requirements, including compliance certification and deviation reporting, until notified by the TCEQ that this permit is voided.

The permit holder shall comply with 30 TAC Chapter 116 by obtaining a New Source Review authorization prior to new construction or modification of emission units located in the area covered by this permit.

All reports required by this permit shall be forwarded to the TCEQ Central Office and to the TCEQ Regional Office for your site. For reports submitted, please include a cover letter which identifies the following information: company name, TCEQ regulated entity number, site name, area name (if applicable), and Air Permits Division permit number.

SPECIAL TERMS AND CONDITIONS:

Emission Limitations and Standards, Monitoring and Testing, and Recordkeeping and Reporting:

1. Permit holder shall comply with the following requirements:

    A. Emission units (including groups and processes) in the Applicable Requirements Summary attachment shall meet the limitations, standards, equipment specifications, monitoring, recordkeeping, reporting, testing, and other requirements listed in the Applicable Requirements Summary attachment to assure compliance with the permit.

    B. The textual description in the column titled "Textual Description" in the Applicable Requirements Summary attachment is not enforceable and is not deemed as a substitute for the actual regulatory language. The Textual Description is provided for information purposes only.

    C. A citation listed on the Applicable Requirements Summary attachment, which has a notation [G] listed before it, shall include the referenced section and subsection for all commission rules, or paragraphs for all federal and state regulations and all subordinate paragraphs, subparagraphs and clauses, subclauses, and items contained within the referenced citation as applicable requirements.

D. For the purpose of generating discrete emission reduction credits through 30 TAC Chapter 101, Subchapter H, Division 4 (Discrete Emission Credit Banking and Trading), the permit holder shall comply with the following requirements:

(i) Title 30 TAC § 101.372 (relating to General Provisions)

(ii) Title 30 TAC § 101.373 (relating to Discrete Emission Reduction Credit Generation and Certification)

(iii) Title 30 TAC § 101.374 (relating to Mobile Discrete Emission Reduction Credit Generation and Certification)

(iv) Title 30 TAC § 101.378 (relating to Discrete Emission Credit Banking and Trading)

(v) The terms and conditions by which the emission limits are established to generate the discrete reduction credit are applicable requirements of this permit

2. The permit holder shall comply with the following sections of 30 TAC Chapter 101 (General Rules):

A. Title 30 TAC § 101.1 (relating to Definitions), insofar as the terms defined in this section are used to define the terms used in other applicable requirements

B. Title 30 TAC § 101.3 (relating to Circumvention)

C. Title 30 TAC § 101.8 (relating to Sampling), if such action has been requested by the TCEQ

D. Title 30 TAC § 101.9 (relating to Sampling Ports), if such action has been requested by the TCEQ

E. Title 30 TAC § 101.10 (relating to Emissions Inventory Requirements)

F. Title 30 TAC § 101.201 (relating to Emission Event Reporting and Recordkeeping Requirements)

G. Title 30 TAC § 101.211 (relating to Scheduled Maintenance, Startup, and Shutdown Reporting and Recordkeeping Requirements)

H. Title 30 TAC § 101.221 (relating to Operational Requirements)

I. Title 30 TAC § 101.222 (relating to Demonstrations)

J. Title 30 TAC § 101.223 (relating to Actions to Reduce Excessive Emissions)

3. Permit holder shall comply with the following requirements of 30 TAC Chapter 111:

A. For stationary vents with a flow rate of less than 100,000 actual cubic feet per minute and constructed on or before January 31, 1972, the permit holder shall comply with the following requirements:

(i) Title 30 TAC § 111.111(a)(1)(A) (relating to Requirements for Specified Sources)

(ii) Title 30 TAC § 111.111(a)(1)(E)

(iii) Title 30 TAC § 111.111(a)(1)(F)(i), (ii), (iii), or (iv)

(iv) For emission units with vent emissions subject to 30 TAC § 111.111(a)(1)(A), complying with 30 TAC § 111.111(a)(1)(F)(ii), (iii), or (iv), and capable of producing visible emissions from, but not limited to, particulate matter, acid gases and NO_x, the permit holder shall also comply with the following periodic monitoring requirements for the purpose of annual compliance certification under 30 TAC § 122.146. These periodic monitoring requirements do not apply to vents that do not emit visible emissions such as vents that emit only VOC or vents that provide passive ventilation, such as plumbing vents; or vents that are subject to the emission limitation of 30 TAC § 111.111(a)(1)(A) and Compliance Assurance Monitoring, as specified in the attached Applicable Requirements Summary and "Additional Monitoring Requirements."

1. An observation of stationary vents from emission units in operation shall be conducted at least once during each calendar quarter unless the emission unit is not operating for the entire quarter.

2. For stationary vents from a combustion source, if an alternative to the normally fired fuel is fired for a period greater than or equal to 24 consecutive hours, the permit holder shall conduct an observation of the stationary vent for each such period to determine if visible emissions are present. If such period is greater than three months, observations shall be conducted once during each quarter. Supplementing the normally fired fuel with natural gas or fuel gas to increase the net heating value to the minimum required value does not constitute creation of an alternative fuel.

3. Records of all observations shall be maintained.

4. Visible emissions observations of emission units operated during daylight hours shall be conducted no earlier than one hour after sunrise and no later than one hour before sunset. Visible emissions observations of emission units operated only at night must be made with additional lighting and the temporary installation of contrasting backgrounds. Visible emissions observations shall be made during

times when the activities described in 30 TAC § 111.111(a)(1)(E) are not taking place. Visible emissions shall be determined with each stationary vent in clear view of the observer. The observer shall be at least 15 feet, but not more than 0.25 mile, away from each stationary vent during the observation. For outdoor locations, the observer shall select a position where the sun is not directly in the observer's eyes. When condensed water vapor is present within the plume, as it emerges from the emissions outlet, observations must be made beyond the point in the plume at which condensed water vapor is no longer visible. When water vapor within the plume condenses and becomes visible at a distance from the emissions outlet, the observation shall be evaluated at the outlet prior to condensation of water vapor. A certified opacity reader is not required for visible emissions observations.

5. Compliance Certification:

   1. If visible emissions are not present during the observation, the RO may certify that the source is in compliance with the applicable opacity requirement in 30 TAC § 111.111(a)(1) and (a)(1)(A).

   2. However, if visible emissions are present during the observation, the permit holder shall either list this occurrence as a deviation on the next deviation report as required under 30 TAC § 122.145(2) or conduct the appropriate opacity test specified in 30 TAC § 111.111(a)(1)(F) to determine if the source is in compliance with the opacity requirements. If an opacity test is performed and the source is determined to be in compliance, the RO may certify that the source is in compliance with the applicable opacity requirement. However, if an opacity test is performed and the source is determined to be out of compliance, the permit holder shall list this occurrence as a deviation on the next deviation report as required under 30 TAC § 122.145(2). The opacity test must be performed by a certified opacity reader.

   3. Some vents may be subject to multiple visible emission or monitoring requirements. All credible data must be considered when certifying compliance with this requirement even if the observation or monitoring was performed to demonstrate compliance with a different requirement.

B. For stationary vents with a flow rate of less than 100,000 actual cubic feet per minute and constructed after January 31, 1972, the permit holder shall comply with the following requirements:

(i) Title 30 TAC § 111.111(a)(1)(B) (relating to Requirements for Specified Sources)

(ii) Title 30 TAC § 111.111(a)(1)(E)

(iii) Title 30 TAC § 111.111(a)(1)(F)(i), (ii), (iii), or (iv)

(iv) For emission units with vent emissions subject to 30 TAC § 111.111(a)(1)(B), complying with 30 TAC § 111.111(a)(1)(F)(ii), (iii), or (iv), and capable of producing visible emissions from, but not limited to, particulate matter, acid gases and NO_x, the permit holder shall also comply with the following periodic monitoring requirements for the purpose of annual compliance certification under 30 TAC § 122.146. These periodic monitoring requirements do not apply to vents that do not emit visible emissions such as vents that emit only VOC or vents that provide passive ventilation, such as plumbing vents; or vents that are subject to the emission limitation of 30 TAC § 111.111(a)(1)(B) and Compliance Assurance Monitoring, as specified in the attached "Applicable Requirements Summary" and "Additional Monitoring Requirements."

1. An observation of stationary vents from emission units in operation shall be conducted at least once during each calendar quarter unless the emission unit is not operating for the entire quarter.

2. For stationary vents from a combustion source, if an alternative to the normally fired fuel is fired for a period greater than or equal to 24 consecutive hours, the permit holder shall conduct an observation of the stationary vent for each such period to determine if visible emissions are present. If such period is greater than three months, observations shall be conducted once during each quarter. Supplementing the normally fired fuel with natural gas or fuel gas to increase the net heating value to the minimum required value does not constitute creation of an alternative fuel.

3. Records of all observations shall be maintained.

4. Visible emissions observations of emission units operated during daylight hours shall be conducted no earlier than one hour after sunrise and no later than one hour before sunset. Visible emissions observations of emission units operated only at night must be made with additional lighting and the temporary installation of contrasting backgrounds. Visible emissions observations shall be made during times when the activities described in 30 TAC § 111.111(a)(1)(E) are not taking place. Visible emissions shall be determined with each stationary vent in clear view of the observer. The observer shall be at least 15 feet, but not more than 0.25 mile, away from each stationary vent during the observation. For outdoor locations, the

observer shall select a position where the sun is not directly in the observer's eyes. When condensed water vapor is present within the plume, as it emerges from the emissions outlet, observations must be made beyond the point in the plume at which condensed water vapor is no longer visible. When water vapor within the plume condenses and becomes visible at a distance from the emissions outlet, the observation shall be evaluated at the outlet prior to condensation of water vapor. A certified opacity reader is not required for visible emissions observations.

5. Compliance Certification:

1. If visible emissions are not present during the observation, the RO may certify that the source is in compliance with the applicable opacity requirement in 30 TAC § 111.111(a)(1) and (a)(1)(B).

2. However, if visible emissions are present during the observation, the permit holder shall either list this occurrence as a deviation on the next deviation report as required under 30 TAC § 122.145(2) or conduct the appropriate opacity test specified in 30 TAC § 111.111(a)(1)(F) to determine if the source is in compliance with the opacity requirements. If an opacity test is performed and the source is determined to be in compliance, the RO may certify that the source is in compliance with the applicable opacity requirement. However, if an opacity test is performed and the source is determined to be out of compliance, the permit holder shall list this occurrence as a deviation on the next deviation report as required under 30 TAC § 122.145(2). The opacity test must be performed by a certified opacity reader.

3. Some vents may be subject to multiple visible emission or monitoring requirements. All credible data must be considered when certifying compliance with this requirement even if the observation or monitoring was performed to demonstrate compliance with a different requirement.

C. For visible emissions from a building, enclosed facility, or other structure; the permit holder shall comply with the following requirements:

(i) Title 30 TAC § 111.111(a)(7)(A) (relating to Requirements for Specified Sources)

(ii) Title 30 TAC § 111.111(a)(7)(B)(i) or (ii)

(iii) For a building containing an air emission source, enclosed facility, or other structure containing or associated with an air emission source subject to 30 TAC § 111.111(a)(7)(A), complying with 30 TAC § 111.111(a)(7)(B)(i) or (ii), and capable of producing visible emissions from, but not limited to, particulate matter, acid gases and NO_x, the permit holder shall also comply with the following periodic monitoring requirements for the purpose of annual compliance certification under 30 TAC § 122.146:

1. An observation of visible emissions from a building containing an air emission source, enclosed facility, or other structure containing or associated with an air emission source which is required to comply with 30 TAC § 111.111(a)(7)(A) shall be conducted at least once during each calendar quarter unless the air emission source or enclosed facility is not operating for the entire quarter.

2. Records of all observations shall be maintained.

3. Visible emissions observations of air emission sources or enclosed facilities operated during daylight hours shall be conducted no earlier than one hour after sunrise and no later than one hour before sunset. Visible emissions observations of air emission sources or enclosed facilities operated only at night must be made with additional lighting and the temporary installation of contrasting backgrounds. Visible emissions shall be determined with each emissions outlet in clear view of the observer. The observer shall be at least 15 feet, but not more than 0.25 mile, away from each stationary vent during the observation. For outdoor locations, the observer shall select a position where the sun is not directly in the observer's eyes. When condensed water vapor is present within the plume, as it emerges from the emissions outlet, observations must be made beyond the point in the plume at which condensed water vapor is no longer visible. When water vapor within the plume condenses and becomes visible at a distance from the emissions outlet, the observation shall be evaluated at the outlet prior to condensation of water vapor. A certified opacity reader is not required for visible emissions observations.

4. Compliance Certification:

    1. If visible emissions are not present during the observation, the RO may certify that the source is in compliance with the applicable opacity requirement in 30 TAC § 111.111(a)(7) and (a)(7)(A).

    2. However, if visible emissions are present during the observation, the permit holder shall either list this occurrence

as a deviation on the next deviation report as required under 30 TAC § 122.145(2) or conduct the appropriate opacity test specified in 30 TAC § 111.111(a)(7)(B) to determine if the source is in compliance with the opacity requirements. If an opacity test is performed and the source is determined to be in compliance, the RO may certify that the source is in compliance with the applicable opacity requirement. However, if an opacity test is performed and the source is determined to be out of compliance, the permit holder shall list this occurrence as a deviation on the next deviation report as required under 30 TAC § 122.145(2). The opacity test must be performed by a certified opacity reader.

D. For visible emissions from all other sources not specified in 30 TAC § 111.111(a)(1), (4), or (7); the permit holder shall comply with the following requirements:

(i) Title 30 TAC § 111.111(a)(8)(A) (relating to Requirements for Specified Sources)

(ii) Title 30 TAC § 111.111(a)(8)(B)(i) or (ii)

(iii) For a source subject to 30 TAC § 111.111(a)(8)(A), complying with 30 TAC § 111.111(a)(8)(B)(i) or (ii), and capable of producing visible emissions from, but not limited to, particulate matter, acid gases and NO_x, the permit holder shall also comply with the following periodic monitoring requirements for the purpose of annual compliance certification under 30 TAC § 122.146:

1. An observation of visible emissions from a source which is required to comply with 30 TAC § 111.111(a)(8)(A) shall be conducted at least once during each calendar quarter unless the source is not operating for the entire quarter.

2. Records of all observations shall be maintained.

3. Visible emissions observations of sources operated during daylight hours shall be conducted no earlier than one hour after sunrise and no later than one hour before sunset. Visible emissions observations of sources operated only at night must be made with additional lighting and the temporary installation of contrasting backgrounds. Visible emissions shall be determined with each source in clear view of the observer. The observer shall be at least 15 feet, but not more than 0.25 mile, away from each stationary vent during the observation. For outdoor locations, the observer shall select a position where the sun is not directly in the observer's eyes. When condensed water vapor is present within the plume, as it emerges from the emissions outlet, observations must be made beyond the point in the plume at which condensed water vapor is no longer visible. When water vapor

within the plume condenses and becomes visible at a distance from the emissions outlet, the observation shall be evaluated at the outlet prior to condensation of water vapor. A certified opacity reader is not required for visible emissions observations.

4. Compliance Certification:

1. If visible emissions are not present during the observation, the RO may certify that the source is in compliance with the applicable opacity requirement in 30 TAC § 111.111(a)(8) and (a)(8)(A).

2. However, if visible emissions are present during the observation, the permit holder shall either list this occurrence as a deviation on the next deviation report as required under 30 TAC § 122.145(2) or conduct the appropriate opacity test specified in 30 TAC § 111.111(a)(8)(B) to determine if the source is in compliance with the opacity requirements. If an opacity test is performed and the source is determined to be in compliance, the RO may certify that the source is in compliance with the applicable opacity requirement. However, if an opacity test is performed and the source is determined to be out of compliance, the permit holder shall list this occurrence as a deviation on the next deviation report as required under 30 TAC § 122.145(2). The opacity test must be performed by a certified opacity reader.

E. Certification of opacity readers determining opacities under Method 9 (as outlined in 40 CFR Part 60, Appendix A) to comply with opacity monitoring requirements shall be accomplished by completing the Visible Emissions Evaluators Course, or approved agency equivalent, no more than 180 days before the opacity reading.

F. For emission units with contributions from uncombined water, the permit holder shall comply with the requirements of 30 TAC § 111.111(b).

G. Emission limits on nonagricultural processes, except for the steam generators specified in 30 TAC § 111.153, shall comply with the following requirements:

(i) Emissions of PM from any source may not exceed the allowable rates as required in 30 TAC § 111.151(a) (relating to Allowable Emissions Limits)

(ii) Sources with an effective stack height (h_e) less than the standard effective stack height (H_e), must reduce the allowable emission level by multiplying it by $[h_e/H_e]^2$ as required in 30 TAC § 111.151(b)

(iii) Effective stack height shall be calculated by the equation specified in 30 TAC § 111.151(c)

H. Outdoor burning, as stated in 30 TAC § 111.201, shall not be authorized unless the following requirements are satisfied:

(i) Title 30 TAC § 111.207 (relating to Exception for Recreation, Ceremony, Cooking, and Warmth)

(ii) Title 30 TAC § 111.209 (relating to Exception for Disposal Fires)

(iii) Title 30 TAC § 111.219 (relating to General Requirements for Allowable Outdoor Burning)

(iv) Title 30 TAC § 111.221 (relating to Responsibility for Consequences of Outdoor Burning)

4. Permit holder shall comply with the following 30 TAC Chapter 115, Subchapter C requirements:

A. For the low vapor pressure VOC unloading operations specified in Division 1 "Loading and Unloading of Volatile Organic Compounds," the permit holder shall comply with the following requirements:

B. When filling gasoline storage vessels with a nominal capacity greater than 1,000 gallons (Stage I) at motor vehicle fuel dispensing facilities, which have dispensed less than 125,000 gallons of gasoline in any calendar month after January 1, 1999, the permit holder shall comply with the following requirements specified in 30 TAC Chapter 115, Subchapter C:

(i) Title 30 TAC § 115.222(7) (relating to Control Requirements)

(ii) Title 30 TAC § 115.222(3), as it applies to liquid gasoline leaks

(iii) Title 30 TAC § 115.224(1) (relating to Inspection Requirements), as it applies to liquid gasoline leaks

(iv) Title 30 TAC § 115.226(2)(C) (relating to Recordkeeping Requirements)

5. The permit holder shall comply with the following requirements for units subject to any subpart of 40 CFR Part 60, unless otherwise stated in the applicable subpart:

A. Title 40 CFR § 60.7 (relating to Notification and Recordkeeping)

B. Title 40 CFR § 60.8 (relating to Performance Tests)

C. Title 40 CFR § 60.11 (relating to Compliance with Standards and Maintenance Requirements)

D. Title 40 CFR § 60.12 (relating to Circumvention)

E. Title 40 CFR § 60.13 (relating to Monitoring Requirements)

F. Title 40 CFR § 60.14 (relating to Modification)

G. Title 40 CFR § 60.15 (relating to Reconstruction)

H. Title 40 CFR § 60.19 (relating to General Notification and Reporting Requirements)

6. For the nonmetallic mineral processing operations specified in 40 CFR Part 60, Subpart OOO, the permit holder shall comply with the following requirements:

A. Title 40 CFR § 60.670(f) (relating to Applicability and Designation of Affected Facility), for Table 1 for Subpart A

B. Title 40 CFR § 60.673(a) - (b) (relating to Reconstruction)

C. Title 40 CFR § 60.676(h) (relating to Reporting and Recordkeeping)

7. The permit holder shall comply with the following requirements for units subject to any subpart of 40 CFR Part 61, unless otherwise stated in the applicable subpart:

A. Title 40 CFR § 61.05 (relating to Prohibited Activities)

B. Title 40 CFR § 61.07 (relating to Application for Approval of Construction or Modification)

C. Title 40 CFR § 61.09 (relating to Notification of Startup)

D. Title 40 CFR § 61.10 (relating to Source Reporting and Request for Waiver of Compliance)

E. Title 40 CFR § 61.12 (relating to Compliance with Standards and Maintenance Requirements)

F. Title 40 CFR § 61.13 (relating to Emissions Tests and Waiver of Emission Tests)

G. Title 40 CFR § 61.14 (relating to Monitoring Requirements)

H. Title 40 CFR § 61.15 (relating to Modification)

I. Title 40 CFR § 61.19 (relating to Circumvention)

8. For facilities where total annual benzene quantity from waste is less than 1 megagram per year and subject to emission standards in 40 CFR Part 61, Subpart FF, the permit holder shall comply with the following requirements:

A. Title 40 CFR § 61.355(a)(1)(iii), (a)(2), (a)(5)(i) - (ii), (a)(6), (b), and (c)(1) - (3) (relating to Test Methods, Procedures, and Compliance Provisions), for calculation procedures

B. Title 40 CFR § 61.356(a) (relating to Recordkeeping Requirements)

C. Title 40 CFR § 61.356(b), and (b)(1) (relating to Recordkeeping Requirements)

D. Title 40 CFR § 61.357(a), and (b) (relating to Reporting Requirements)

9. The permit holder shall comply with the requirements of 30 TAC Chapter 113, Subchapter C, § 113.100 for units subject to any subpart of 40 CFR Part 63, unless otherwise stated in the applicable subpart.

Additional Monitoring Requirements

10. The permit holder shall comply with the periodic monitoring requirements as specified in the attached "Periodic Monitoring Summary" upon issuance of the permit. Except for, as applicable, monitoring malfunctions, associated repairs, and required quality assurance or control activities (including, as applicable, calibration checks and required zero and span adjustments), the permit holder shall conduct all monitoring in continuous operation (or shall collect data at all required intervals) at all times that the pollutant-specific emissions unit is operating. The permit holder may elect to collect monitoring data on a more frequent basis and average the data, consistent with the averaging time specified in the "Periodic Monitoring Summary," for purposes of determining whether a deviation has occurred. However, the additional data points must be collected on a regular basis. In no event shall data be collected and used in particular instances to avoid reporting deviations. Deviations shall be reported according to 30 TAC § 122.145 (Reporting Terms and Conditions).

New Source Review Authorization Requirements

11. Permit holder shall comply with the requirements of New Source Review authorizations issued or claimed by the permit holder for the permitted area, including permits, permits by rule, standard permits, flexible permits, special permits, permits for existing facilities including Voluntary Emissions Reduction Permits and Electric Generating Facility Permits issued under 30 TAC Chapter 116, Subchapter I, or special exemptions referenced in the New Source Review Authorization References attachment. These requirements:

A. Are incorporated by reference into this permit as applicable requirements

B. Shall be located with this operating permit

C. Are not eligible for a permit shield

12. The permit holder shall comply with the general requirements of 30 TAC Chapter 106, Subchapter A or the general requirements, if any, in effect at the time of the claim of any PBR.

13. The permit holder shall comply with the following requirements of Air Quality Standard Permits:

    A. Registration requirements listed in 30 TAC § 116.611

    B. General Conditions listed in 30 TAC § 116.615

    C. Applicable requirements of 30 TAC § 116.617 for Pollution Control Projects based on the information contained in the registration application

Compliance Requirements

14. The permit holder shall certify compliance with all permit terms and conditions using, at a minimum, but not limited to, the continuous or intermittent compliance method data from monitoring, recordkeeping, reporting, or testing required by the permit and any other credible evidence or information. The certification period may not exceed 12 months and the certification must be submitted within 30 days after the end of the period being certified.

15. Use of Discrete Emission Credits to Comply with Applicable Requirements:

    A. Unless other wise prohibited, the permit holder may use discrete emission credits to comply with the following applicable requirements listed elsewhere in this permit:

        (i) Title 30 TAC Chapter 115

        (ii) Title 30 TAC Chapter 117

        (iii) If applicable, offsets for Title 30 TAC Chapter 116

        (iv) Temporarily exceed state NSR permit allowables

    B. The permit holder shall comply with the following requirements in order to use the credit to comply with the applicable requirements:

        (i) The permit holder must notify the TCEQ according to 30 TAC § 101.376(d)

        (ii) The discrete emission credits to be used must meet all the geographic, timeliness, applicable pollutant type, and availability requirements listed in 30 TAC Chapter 101, Subchapter H, Division 4

        (iii) The executive director has approved the use of the discrete emission credits according to 30 TAC § 101.376(d)(1)(A)

(iv) The permit holder keeps records of the use of credits towards compliance with the applicable requirements in accordance with 30 TAC §§ 101.372(h) and 122

Protection of Stratospheric Ozone

16. Permit holders at a site subject to Title VI of the FCAA Amendments shall meet the following requirements for protection of stratospheric ozone:

    A. Any on site servicing, maintenance, and repair on refrigeration and nonmotor vehicle air-conditioning appliances using ozone-depleting refrigerants shall be conducted in accordance with 40 CFR Part 82, Subpart F. Permit holders shall ensure that repairs or refrigerant removal are performed only by properly certified technicians using certified equipment. Records shall be maintained as required by 40 CFR Part 82, Subpart F.

    B. Any on site servicing, maintenance, and repair of fleet vehicle air conditioning using ozone-depleting refrigerants shall be conducted in accordance with 40 CFR Part 82, Subpart B. Permit holders shall ensure that repairs or refrigerant removal are performed only by properly certified technicians using certified equipment. Records shall be maintained as required by 40 CFR Part 82, Subpart B.

Permit Location

17. The permit holder shall maintain a copy of this permit and records related to requirements listed in this permit on site.

ATTACHMENTS

Applicable Requirements Summary

Additional Monitoring Requirements

New Source Review Authorization References

APPLICABLE REQUIREMENTS SUMMARY

Note: A "none" entry may be noted for some emission sources in this permit's "Applicable Requirements Summary" under the heading of "Monitoring and Testing Requirements" and/or "Record keeping Requirements" and/or "Reporting Requirements." Such a notation indicates that there are no requirements for the indicated emission source as identified under the respective column heading(s) for the stated portion of the regulation when the emission source is operating under the conditions of the specified SOP Index Number. However, other relevant requirements pursuant to 30 TAC Chapter 122 including Record keeping Terms and Conditions (30 TAC § 122.144), Reporting Terms and Conditions (30 TAC § 122.145), and Compliance Certification Terms and Conditions (30 TAC § 122.146) continue to apply.

Unit Summary

Unit/Group/ Process ID No.	Unit Type	Group/Inclusive Units	SOP Index No.	Regulation	Requirement Driver
GRPKILN		E2-2, E2-4, E2-6, E2-8	63EEE	40 CFR Part 63, Subpart EEE	No changing attributes.
E6-30	COAL PREPARATION PLANTS	N/A	60 Y	40 CFR Part 60, Subpart Y	No changing attributes.
GRPCOAL1	COAL PREPARATION PLANTS	E6-10, E6-11, E6-12, E6-13, E6-14, E6-15, E6-19, E6-20, E6-21, E6-22, E6-23, E6-24, E6-25, E6-26, E6-9	60Y	40 CFR Part 60, Subpart Y	No changing attributes.
GRPCOAL3	COAL PREPARATION PLANTS	E6-27, E6-28, E6-31	60Y	40 CFR Part 60, Subpart Y	No changing attributes.
E1-29	NON-METALLIC MINERAL PROCESSING PLANTS	N/A	63 LLL	40 CFR Part 63, Subpart LLL	No changing attributes.
E2-22	NON-METALLIC MINERAL PROCESSING PLANTS	N/A	63LLL	40 CFR Part 63, Subpart LLL	No changing attributes.
E2-9	NON-METALLIC MINERAL PROCESSING PLANTS	N/A	63 LLL	40 CFR Part 63, Subpart LLL	No changing attributes.
E3-14	NON-METALLIC MINERAL PROCESSING PLANTS	N/A	63LLL	40 CFR Part 63, Subpart LLL	No changing attributes.
E3-21	NON-METALLIC MINERAL PROCESSING PLANTS	N/A	63 LLL	40 CFR Part 63, Subpart LLL	No changing attributes.

Unit Summary

Unit/Group/ Process ID No.	Unit Type	Group/Inclusive Units	SOP Index No.	Regulation	Requirement Driver
E3-55	NON-METALLIC MINERAL PROCESSING PLANTS	N/A	63LLL	40 CFR Part 63, Subpart LLL	No changing attributes.
GRPBAG	NON-METALLIC MINERAL PROCESSING PLANTS	E4-19, E4-20, E4-25	63 LLL	40 CFR Part 63, Subpart LLL	No changing attributes.
GRPBELT	NON-METALLIC MINERAL PROCESSING PLANTS	E1-25, E1-26, E1-28, E1-33, E1-34	60 OOO	40 CFR Part 60, Subpart OOO	No changing attributes.
GRPCLINK	NON-METALLIC MINERAL PROCESSING PLANTS	E3-1, E3-27, E3-28, E3-29, E3-3, E3-30, E3-4, E3-5	63 LLL	40 CFR Part 63, Subpart LLL	No changing attributes.
GRPCOAL1	NON-METALLIC MINERAL PROCESSING PLANTS	E6-10, E6-11, E6-12, E6-13, E6-14, E6-15, E6-19, E6-20, E6-21, E6-22, E6-23, E6-24, E6-25, E6-26, E6-9	63 LLL	40 CFR Part 63, Subpart LLL	No changing attributes.
GRPCOAL2	NON-METALLIC MINERAL PROCESSING PLANTS	E6-1, E6-18, E6-2, E6-3, E6-7, E6-8	63 LLL	40 CFR Part 63, Subpart LLL	No changing attributes.
GRPCOAL3	NON-METALLIC MINERAL PROCESSING PLANTS	E6-27, E6-28, E6-31	63 LLL	40 CFR Part 63, Subpart LLL	No changing attributes.
GRPCOOLER	NON-METALLIC MINERAL PROCESSING PLANTS	E2-101, E2-103, E2-105, E2-107	63 LLL	40 CFR Part 63, Subpart LLL	No changing attributes.

Unit Summary

Unit/Group/ Process ID No.	Unit Type	Group/Inclusive Units	SOP Index No.	Regulation	Requirement Driver
GRPCRSHR	NON-METALLIC MINERAL PROCESSING PLANTS	E1-24, E1-27	60 OOO	40 CFR Part 60, Subpart OOO	No changing attributes.
GRPFNBIN	NON-METALLIC MINERAL PROCESSING PLANTS	E3-25-5, E3-9	63 LLL	40 CFR Part 63, Subpart LLL	No changing attributes.
GRPFNHANDL	NON-METALLIC MINERAL PROCESSING PLANTS	E3-20, E3-22, E3-50, E3-51, E4-12	63 LLL	40 CFR Part 63, Subpart LLL	No changing attributes.
GRPFNMILLS	NON-METALLIC MINERAL PROCESSING PLANTS	E3-16, E3-17, E3-18, E3-19	63 LLL	40 CFR Part 63, Subpart LLL	No changing attributes.
GRPFNSTOR	NON-METALLIC MINERAL PROCESSING PLANTS	E4-11A, E4-23, E4-3, E4-4, E4-5, E4-6, E4-7, E4-8	63 LLL	40 CFR Part 63, Subpart LLL	No changing attributes.
GRPFNSTOR1	NON-METALLIC MINERAL PROCESSING PLANTS	E4-1, E4-2	63 LLL	40 CFR Part 63, Subpart LLL	No changing attributes.
GRPKILN	NON-METALLIC MINERAL PROCESSING PLANTS	E2-2, E2-4, E2-6, E2-8	63 LLL	40 CFR Part 63, Subpart LLL	No changing attributes.
GRPLOAD	NON-METALLIC MINERAL PROCESSING PLANTS	E4-10, E4-16, E4-17, E4-18, E4-21	63 LLL	40 CFR Part 63, Subpart LLL	No changing attributes.

Unit Summary

Unit/Group/ Process ID No.	Unit Type	Group/Inclusive Units	SOP Index No.	Regulation	Requirement Driver
GRPLOAD1	NON-METALLIC MINERAL PROCESSING PLANTS	E4-11, E4-13, E4-22, E4-9	63 LLL	40 CFR Part 63, Subpart LLL	No changing attributes.
GRPMTHANDL	NON-METALLIC MINERAL PROCESSING PLANTS	E1-10, E1-11, E1-23E, E1-23F, E1-23G, E1-23H, E1-7, E1-8, E1-9, E2-10, E3-13, E3-2, E3-31, E3-32, E3-43, E3-43A, E3-45	63 LLL	40 CFR Part 63, Subpart LLL	No changing attributes.
GRPMTTRANS	NON-METALLIC MINERAL PROCESSING PLANTS	E1-16, E1-23, E2-13, E2-13A, E2-15, E2-16, E3-10, E3-11, E3-12, E3-15, E3-23, E3-24, E3-26, E3-33, E3-34, E3-35, E3-37, E3-38, E3-41, E3-42, E3-6, E4-27A, E4-27B, E4-28A	63 LLL	40 CFR Part 63, Subpart LLL	No changing attributes.
GRPMTTRANS1	NON-METALLIC MINERAL PROCESSING PLANTS	E1-23C, E1-23D, E1-30, E1-30A, E1-31, E1-31A, E1-31B, E1-32, E1-32A, E1-32B, E2-10C, E2-10D, E2-10E, E2-10F, E2-10G, E2-11A, E2-11B, E2-14A, E2-17, E2-18, E2-7, E2-7A, E2-7B, E3-25, E3-33A, E3-52, E3-52A, E3-53, E3-54, E3-57, E4-24, E4-26, E4-27, E4-28	63 LLL	40 CFR Part 63, Subpart LLL	No changing attributes.
GRPRAWMILLS	NON-METALLIC MINERAL PROCESSING PLANTS	E1-23A, E1-23B	63 LLL	40 CFR Part 63, Subpart LLL	No changing attributes.
GRPSYNGYP	NON-METALLIC MINERAL PROCESSING PLANTS	E3-55A, E3-55B, E3-55C, E3-55D, E3-55E, E3-55F	63 LLL	40 CFR Part 63, Subpart LLL	No changing attributes.

Applicable Requirements Summary

Unit/Group/Process		SOP Index No.	Pollutant	Emission Limitation/Standard or Equipment Specification		Textual Description (See Special Term and Condition 1.B.)	Monitoring And Testing Requirements	Recordkeeping Requirements (30 TAC § 122.144)	Reporting Requirements (30 TAC § 122.145)
ID No.	Type			Name	Citation				
GRPKILN	EU	63EEE	HAP	40 CFR Part 63, Subpart EEE	[G]§ 63.1204(a) The permit holder shall comply with the applicable limitation, standard and/or equipment specification requirements of 40 CFR Part 63, Subpart EEE.	The permit holder shall comply with the applicable requirements of 40 CFR Part 63, Subpart EEE for hazardous waste burning cement kilns.	[G]§ 63.1204(a) The permit holder shall comply with the applicable monitoring and testing requirements of 40 CFR Part 63, Subpart EEE.	[G]§ 63.1204(a) The permit holder shall comply with the applicable recordkeeping requirements of 40 CFR Part 63, Subpart EEE.	[G]§ 63.1204(a) The permit holder shall comply with the applicable reporting requirements of 40 CFR Part 63, Subpart EEE.
E6-30	EU	60 Y	PM	40 CFR Part 60, Subpart Y	§ 60.252(a)(1)	On / after the §60.8 performance test, no thermal dryer gases containing particulate matter in excess of 0.070 g/dscm (0.031 gr/dscf) shall be discharged into the atmosphere.	§ 60.253(a) § 60.253(a)(1) § 60.253(b) § 60.254(a) § 60.254(b)(1)	None	None
E6-30	EU	60 Y	PM (OPACITY)	40 CFR Part 60, Subpart Y	§ 60.252(a)(2)	On / after the §60.8 performance test, no thermal dryer gases that exhibit 20% opacity or greater shall be discharged into the atmosphere.	§ 60.253(a) § 60.253(a)(1) § 60.253(b) § 60.254(a) § 60.254(b)(2)	None	None
GRPCOAL1	EU	60Y	PM (OPACITY)	40 CFR Part 60, Subpart Y	§ 60.252(c)	Gases, which exhibit 20 % opacity, shall not be discharged into the atmosphere from any coal processing/conveying equipment, coal storage system, or coal transfer/loading system processing coal.	§ 60.254(a) § 60.254(b)(2) ** See Periodic Monitoring Summary	None	None

Applicable Requirements Summary

Unit/Group/Process		SOP Index No.	Pollutant	Emission Limitation/Standard or Equipment Specification		Textual Description (See Special Term and Condition 1.B.)	Monitoring And Testing Requirements	Recordkeeping Requirements (30 TAC § 122.144)	Reporting Requirements (30 TAC § 122.145)
ID No.	Type			Name	Citation				
GRPCOAL3	EU	60Y	PM (OPACITY)	40 CFR Part 60, Subpart Y	§ 60.252(c)	Gases, which exhibit 20% opacity, shall not be discharged into the atmosphere from any coal processing/conveying equipment, coal storage system, or coal transfer/loading system processing coal.	§ 60.254(a) § 60.254(b)(2) ** See Periodic Monitoring Summary	None	None
E1-29	EU	63 LLL	PM (OPACITY)	40 CFR Part 63, Subpart LLL	§ 63.1348 § 63.1350(b)	The owner or operator of specified sources at a facility which is a major source shall not cause to be discharged any gases from these affected sources which exhibit opacity in excess of ten percent.	§ 63.1349(a) § 63.1349(b) [G]§ 63.1349(b)(2) § 63.1349(c) [G]§ 63.1350(a)(4) § 63.1350(j)	§ 63.1349(a) § 63.1349(a)(1) § 63.1349(a)(10) § 63.1349(a)(2) § 63.1349(a)(3) § 63.1349(a)(4) § 63.1349(a)(5) § 63.1349(a)(6) § 63.1349(a)(7) § 63.1349(a)(8) § 63.1349(a)(9) § 63.1355(a) [G]§ 63.1355(b)	§ 63.1350(a) § 63.1350(a)(1) [G]§ 63.1350(a)(4) [G]§ 63.1353(b) [G]§ 63.1354(b)
E2-22	EU	63LLL	PM	40 CFR Part 63, Subpart LLL	§ 63.1343(b)(1) § 63.1350(b)	No owner or operator of the specified source shall cause to be discharged any gases containing PM in excess of 0.15 kg per Mg (0.30 lb per ton) of feed (dry basis) to the kiln as specified.	§ 63.1349(a) § 63.1349(b) § 63.1349(b)(1) § 63.1349(b)(1)(i) § 63.1349(b)(1)(ii) § 63.1349(b)(1)(iv) § 63.1349(c) § 63.1349(e)	§ 63.1349(a) § 63.1349(a)(1) § 63.1349(a)(10) § 63.1349(a)(2) § 63.1349(a)(3) § 63.1349(a)(4) § 63.1349(a)(5) § 63.1349(a)(6) § 63.1349(a)(7) § 63.1349(a)(8) § 63.1349(a)(9) § 63.1355(a) [G]§ 63.1355(b)	§ 63.1350(a) § 63.1350(a)(1) § 63.1350(a)(3) [G]§ 63.1353(b) [G]§ 63.1354(b)

Applicable Requirements Summary

Unit/Group/Process		SOP Index No.	Pollutant	Emission Limitation/Standard or Equipment Specification		Textual Description (See Special Term and Condition 1.B.)	Monitoring And Testing Requirements	Recordkeeping Requirements (30 TAC § 122.144)	Reporting Requirements (30 TAC § 122.145)
ID No.	Type			Name	Citation				
E2-22	EU	63LLL	PM (OPACITY)	40 CFR Part 63, Subpart LLL	§ 63.1343(b)(2) § 63.1350(b) § 63.1350(c)(3)	No owner or operator of the specified source shall cause to be discharged any gases which exhibit opacity greater than 20 percent.	§ 63.1349(a) § 63.1349(b) § 63.1349(b)(1) § 63.1349(b)(1)(v) § 63.1349(c) § 63.1349(e) § 63.1350(c) § 63.1350(c)(1)	§ 63.1349(a) § 63.1349(a)(1) § 63.1349(a)(10) § 63.1349(a)(2) § 63.1349(a)(3) § 63.1349(a)(4) § 63.1349(a)(5) § 63.1349(a)(6) § 63.1349(a)(7) § 63.1349(a)(8) § 63.1349(a)(9) § 63.1355(a) [G]§ 63.1355(b) § 63.1355(c)	§ 63.1350(a) § 63.1350(a)(1) § 63.1350(a)(3) [G]§ 63.1353(b) [G]§ 63.1354(b)
E2-22	EU	63LLL	DIOXINS/ FURANS	40 CFR Part 63, Subpart LLL	§ 63.1343(b)(3)(i) § 63.1344(a) § 63.1344(b) § 63.1350(b) § 63.1350(i)	No owner or operator of the specified source shall cause to be discharged any gases which contain D/F in excess of 0.20 Ng per dscm (8.7 x 10 -11 gr per dscf) (TEQ) corrected to seven percent oxygen.	§ 63.1349(a) § 63.1349(b) § 63.1349(b)(3) § 63.1349(b)(3)(i) § 63.1349(b)(3)(ii) § 63.1349(b)(3)(iii) § 63.1349(b)(3)(iv) § 63.1349(d) § 63.1349(e) § 63.1350(f) § 63.1350(f)(1) § 63.1350(f)(1)(i) § 63.1350(f)(1)(ii) § 63.1350(f)(2) § 63.1350(f)(3) § 63.1350(f)(4) § 63.1350(f)(6)	§ 63.1349(a) § 63.1349(a)(1) § 63.1349(a)(10) § 63.1349(a)(2) § 63.1349(a)(3) § 63.1349(a)(4) § 63.1349(a)(5) § 63.1349(a)(6) § 63.1349(a)(7) § 63.1349(a)(8) § 63.1349(a)(9) § 63.1349(b)(3)(ii) § 63.1349(b)(3)(iv) § 63.1350(f)(1) § 63.1350(f)(2) § 63.1355(a) [G]§ 63.1355(b) § 63.1355(c)	§ 63.1350(a) § 63.1350(a)(1) § 63.1350(a)(3) [G]§ 63.1353(b) [G]§ 63.1354(b)

Applicable Requirements Summary

Unit/Group/Process		SOP Index No.	Pollutant	Emission Limitation/Standard or Equipment Specification		Textual Description (See Special Term and Condition 1.B.)	Monitoring And Testing Requirements	Recordkeeping Requirements (30 TAC § 122.144)	Reporting Requirements (30 TAC § 122.145)
ID No.	Type			Name	Citation				
E2-9	EU	63 LLL	PM (OPACITY)	40 CFR Part 63, Subpart LLL	§ 63.1348 § 63.1350(b)	The owner or operator of specified sources at a facility which is a major source shall not cause to be discharged any gases from these affected sources which exhibit opacity in excess of ten percent.	§ 63.1349(a) § 63.1349(b) [G]§ 63.1349(b)(2) § 63.1349(e) [G]§ 63.1350(a)(4) § 63.1350(j)	§ 63.1349(a) § 63.1349(a)(1) § 63.1349(a)(10) § 63.1349(a)(2) § 63.1349(a)(3) § 63.1349(a)(4) § 63.1349(a)(5) § 63.1349(a)(6) § 63.1349(a)(7) § 63.1349(a)(8) § 63.1349(a)(9) § 63.1355(a) [G]§ 63.1355(b)	§ 63.1350(a) § 63.1350(a)(1) [G]§ 63.1350(a)(4) [G]§ 63.1353(b) [G]§ 63.1354(b)
E3-14	EU	63LLL	PM (OPACITY)	40 CFR Part 63, Subpart LLL	§ 63.1348 § 63.1350(b)	The owner or operator of specified sources at a facility which is a major source shall not cause to be discharged any gases from these affected sources which exhibit opacity in excess of ten percent.	§ 63.1349(a) § 63.1349(b) [G]§ 63.1349(b)(2) § 63.1349(e) [G]§ 63.1350(a)(4) § 63.1350(j)	§ 63.1349(a) § 63.1349(a)(1) § 63.1349(a)(10) § 63.1349(a)(2) § 63.1349(a)(3) § 63.1349(a)(4) § 63.1349(a)(5) § 63.1349(a)(6) § 63.1349(a)(7) § 63.1349(a)(8) § 63.1349(a)(9) § 63.1355(a) [G]§ 63.1355(b)	§ 63.1350(a) § 63.1350(a)(1) [G]§ 63.1350(a)(4) [G]§ 63.1353(b) [G]§ 63.1354(b)

Applicable Requirements Summary

Unit/Group/Process		SOP Index No.	Pollutant	Emission Limitation/Standard or Equipment Specification		Textual Description (See Special Term and Condition 1.B.)	Monitoring And Testing Requirements	Recordkeeping Requirements (30 TAC § 122.144)	Reporting Requirements (30 TAC § 122.145)
ID No.	Type			Name	Citation				
E3-21	EU	63 LLL	PM (OPACITY)	40 CFR Part 63, Subpart LLL	§ 63.1347 § 63.1350(b)	The owner/operator of a new or existing raw mill or finish mill at a major source shall not emit from the mill sweep or air separator pollution control device any gases with opacity in excess of 10%.	§ 63.1349(a) § 63.1349(b) [G]§ 63.1349(b)(2) § 63.1349(c) [G]§ 63.1350(a)(4) § 63.1350(j)	§ 63.1349(a) § 63.1349(a)(1) § 63.1349(a)(10) § 63.1349(a)(2) § 63.1349(a)(3) § 63.1349(a)(4) § 63.1349(a)(5) § 63.1349(a)(6) § 63.1349(a)(7) § 63.1349(a)(8) § 63.1349(a)(9) § 63.1355(a) [G]§ 63.1355(b)	§ 63.1350(a) § 63.1350(a)(1) [G]§ 63.1350(a)(4) [G]§ 63.1353(b) [G]§ 63.1354(b)
E3-55	EU	63LLL	PM (OPACITY)	40 CFR Part 63, Subpart LLL	§ 63.1347 § 63.1350(b)	The owner/operator of a new or existing raw mill or finish mill at a major source shall not emit from the mill sweep or air separator pollution control device any gases with opacity in excess of 10%.	§ 63.1349(a) § 63.1349(b) [G]§ 63.1349(b)(2) § 63.1349(c) [G]§ 63.1350(a)(4) § 63.1350(j)	§ 63.1349(a) § 63.1349(a)(1) § 63.1349(a)(10) § 63.1349(a)(2) § 63.1349(a)(3) § 63.1349(a)(4) § 63.1349(a)(5) § 63.1349(a)(6) § 63.1349(a)(7) § 63.1349(a)(8) § 63.1349(a)(9) § 63.1355(a) [G]§ 63.1355(b)	§ 63.1350(a) § 63.1350(a)(1) [G]§ 63.1350(a)(4) [G]§ 63.1353(b) [G]§ 63.1354(b)

Applicable Requirements Summary

Unit/Group/Process		SOP Index No.	Pollutant	Emission Limitation/Standard or Equipment Specification		Textual Description (See Special Term and Condition 1.B.)	Monitoring And Testing Requirements	Recordkeeping Requirements (30 TAC § 122.144)	Reporting Requirements (30 TAC § 122.145)
ID No.	Type			Name	Citation				
GRPBAG	EU	63 LLL	PM (OPACITY)	40 CFR Part 63, Subpart LLL	§ 63.1348 § 63.1350(b)	The owner or operator of specified sources at a facility which is a major source shall not cause to be discharged any gases from these affected sources which exhibit opacity in excess of ten percent.	§ 63.1349(a) § 63.1349(b) [G]§ 63.1349(b)(2) § 63.1349(c) [G]§ 63.1350(a)(4) § 63.1350(j)	§ 63.1349(a) § 63.1349(a)(1) § 63.1349(a)(10) § 63.1349(a)(2) § 63.1349(a)(3) § 63.1349(a)(4) § 63.1349(a)(5) § 63.1349(a)(6) § 63.1349(a)(7) § 63.1349(a)(8) § 63.1349(a)(9) § 63.1355(a) [G]§ 63.1355(b)	§ 63.1350(a) § 63.1350(a)(1) [G]§ 63.1350(a)(4) [G]§ 63.1353(b) [G]§ 63.1354(b)
GRPBELT	EU	60 OOO	PM	40 CFR Part 60, Subpart OOO	§ 60.672(b)	On/after 60 days after achieving the maximum production rate, but not later than 180 days, no specified facility shall discharge fugitives with >10% opacity, except as provided in §60.676(c)- (e).	§ 60.675(a) [G]§ 60.675(c)(1) [G]§ 60.675(c)(3) § 60.675(g) ** See Periodic Monitoring Summary	None	§ 60.675(g) § 60.676(f) [G]§ 60.676(i)
GRPCLINK	EU	63 LLL	PM (OPACITY)	40 CFR Part 63, Subpart LLL	§ 63.1348 § 63.1350(b)	The owner or operator of specified sources at a facility which is a major source shall not cause to be discharged any gases from these affected sources which exhibit opacity in excess of ten percent.	§ 63.1349(a) § 63.1349(b) [G]§ 63.1349(b)(2) § 63.1349(c) [G]§ 63.1350(a)(4) § 63.1350(j)	§ 63.1349(a) § 63.1349(a)(1) § 63.1349(a)(10) § 63.1349(a)(2) § 63.1349(a)(3) § 63.1349(a)(4) § 63.1349(a)(5) § 63.1349(a)(6) § 63.1349(a)(7) § 63.1349(a)(8) § 63.1349(a)(9) § 63.1355(a) [G]§ 63.1355(b)	§ 63.1350(a) § 63.1350(a)(1) [G]§ 63.1350(a)(4) [G]§ 63.1353(b) [G]§ 63.1354(b)

Applicable Requirements Summary

Unit/Group/Process		SOP Index No.	Pollutant	Emission Limitation/Standard or Equipment Specification		Textual Description (See Special Term and Condition 1.B.)	Monitoring And Testing Requirements	Recordkeeping Requirements (30 TAC § 122.144)	Reporting Requirements (30 TAC § 122.145)
ID No.	Type			Name	Citation				
GRPCOAL1	EU	63 LLL	PM (OPACITY)	40 CFR Part 63, Subpart LLL	§ 63.1348 § 63.1350(b)	The owner or operator of specified sources at a facility which is a major source shall not cause to be discharged any gases from these affected sources which exhibit opacity in excess of ten percent.	§ 63.1349(a) § 63.1349(b) [G]§ 63.1349(b)(2) § 63.1349(c) [G]§ 63.1350(a)(4) § 63.1350(j)	§ 63.1349(a) § 63.1349(a)(1) § 63.1349(a)(10) § 63.1349(a)(2) § 63.1349(a)(3) § 63.1349(a)(4) § 63.1349(a)(5) § 63.1349(a)(6) § 63.1349(a)(7) § 63.1349(a)(8) § 63.1349(a)(9) § 63.1355(a) [G]§ 63.1355(b)	§ 63.1350(a) § 63.1350(a)(1) [G]§ 63.1350(a)(4) [G]§ 63.1353(b) [G]§ 63.1354(b)
GRPCOAL2	EU	63 LLL	PM (OPACITY)	40 CFR Part 63, Subpart LLL	§ 63.1348 § 63.1350(b)	The owner or operator of specified sources at a facility which is a major source shall not cause to be discharged any gases from these affected sources which exhibit opacity in excess of ten percent.	§ 63.1349(a) § 63.1349(b) [G]§ 63.1349(b)(2) § 63.1349(c) [G]§ 63.1350(a)(4) § 63.1350(j)	§ 63.1349(a) § 63.1349(a)(1) § 63.1349(a)(10) § 63.1349(a)(2) § 63.1349(a)(3) § 63.1349(a)(4) § 63.1349(a)(5) § 63.1349(a)(6) § 63.1349(a)(7) § 63.1349(a)(8) § 63.1349(a)(9) § 63.1355(a) [G]§ 63.1355(b)	§ 63.1350(a) § 63.1350(a)(1) [G]§ 63.1350(a)(4) [G]§ 63.1353(b) [G]§ 63.1354(b)

Applicable Requirements Summary

Unit/Group/Process		SOP Index No.	Pollutant	Emission Limitation/Standard or Equipment Specification		Textual Description (See Special Term and Condition 1.B.)	Monitoring And Testing Requirements	Recordkeeping Requirements (30 TAC § 122.144)	Reporting Requirements (30 TAC § 122.145)
ID No.	Type			Name	Citation				
GRPCOAL3	EU	63 LLL	PM (OPACITY)	40 CFR Part 63, Subpart LLL	§ 63.1348 § 63.1350(b)	The owner or operator of specified sources at a facility which is a major source shall not cause to be discharged any gases from these affected sources which exhibit opacity in excess of ten percent.	§ 63.1349(a) § 63.1349(b) [G]§ 63.1349(b)(2) § 63.1349(c) [G]§ 63.1350(a)(4) § 63.1350(j)	§ 63.1349(a) § 63.1349(a)(1) § 63.1349(a)(10) § 63.1349(a)(2) § 63.1349(a)(3) § 63.1349(a)(4) § 63.1349(a)(5) § 63.1349(a)(6) § 63.1349(a)(7) § 63.1349(a)(8) § 63.1349(a)(9) § 63.1355(a) [G]§ 63.1355(b)	§ 63.1350(a) § 63.1350(a)(1) [G]§ 63.1350(a)(4) [G]§ 63.1353(b) [G]§ 63.1354(b)
GRPCOOLER	EU	63 LLL	PM	40 CFR Part 63, Subpart LLL	§ 63.1345(a)(1) § 63.1350(b)	No owner or operator of the specified source shall cause to be discharged any gases which contain particulate matter in excess of 0.050 kg per Mg (0.10 lb per ton) of feed (dry basis) to the kiln.	§ 63.1349(a) § 63.1349(b) § 63.1349(b)(1) § 63.1349(b)(1)(i) § 63.1349(b)(1)(ii) § 63.1349(b)(1)(iii) § 63.1349(c)	§ 63.1349(a) § 63.1349(a)(1) § 63.1349(a)(10) § 63.1349(a)(2) § 63.1349(a)(3) § 63.1349(a)(4) § 63.1349(a)(5) § 63.1349(a)(6) § 63.1349(a)(7) § 63.1349(a)(8) § 63.1349(a)(9) § 63.1355(a) [G]§ 63.1355(b)	§ 63.1350(a) § 63.1350(a)(1) [G]§ 63.1353(b) [G]§ 63.1354(b)

Applicable Requirements Summary

Unit/Group/Process		SOP Index No.	Pollutant	Emission Limitation/Standard or Equipment Specification		Textual Description (See Special Term and Condition 1.B.)	Monitoring And Testing Requirements	Recordkeeping Requirements (30 TAC § 122.144)	Reporting Requirements (30 TAC § 122.145)
ID No.	Type			Name	Citation				
GRPCOOLER	EU	63 LLL	PM (OPACITY)	40 CFR Part 63, Subpart LLL	§ 63.1345(a)(2) § 63.1350(b) § 63.1350(d)(3)	No owner or operator of the specified source shall cause to be discharged any gases which exhibit opacity greater than ten percent.	§ 63.1349(a) § 63.1349(b) § 63.1349(b)(1) § 63.1349(b)(1)(v) § 63.1349(c) § 63.1349(d) § 63.1350(d) § 63.1350(d)(1)	§ 63.1349(a) § 63.1349(a)(1) § 63.1349(a)(10) § 63.1349(a)(2) § 63.1349(a)(3) § 63.1349(a)(4) § 63.1349(a)(5) § 63.1349(a)(6) § 63.1349(a)(7) § 63.1349(a)(8) § 63.1349(a)(9) § 63.1355(a) [G]§ 63.1355(b) § 63.1355(c)	§ 63.1350(a) § 63.1350(a)(1) § 63.1350(a)(3) [G]§ 63.1353(b) [G]§ 63.1354(b)
GRPCRSHR	EU	60 OOO	PM (OPACITY)	40 CFR Part 60, Subpart OOO	§ 60.672(c)	On/after 60 days after achieving the maximum production rate, but not later than 180 days, no crusher at which a capture system is not used shall discharge fugitive emissions with > 15% opacity.	§ 60.675(a) [G]§ 60.675(c)(1) [G]§ 60.675(c)(4) § 60.675(g) ** See Periodic Monitoring Summary	None	§ 60.675(g) § 60.676(f) [G]§ 60.676(i)
GRPFNBIN	EU	63 LLL	PM (OPACITY)	40 CFR Part 63, Subpart LLL	§ 63.1348 § 63.1350(b)	The owner or operator of specified sources at a facility which is a major source shall not cause to be discharged any gases from these affected sources which exhibit opacity in excess of ten percent.	§ 63.1349(a) § 63.1349(b) [G]§ 63.1349(b)(2) § 63.1349(c) [G]§ 63.1350(a)(4) § 63.1350(j)	§ 63.1349(a) § 63.1349(a)(1) § 63.1349(a)(10) § 63.1349(a)(2) § 63.1349(a)(3) § 63.1349(a)(4) § 63.1349(a)(5) § 63.1349(a)(6) § 63.1349(a)(7) § 63.1349(a)(8) § 63.1349(a)(9) § 63.1355(a) [G]§ 63.1355(b)	§ 63.1350(a) § 63.1350(a)(1) [G]§ 63.1350(a)(4) [G]§ 63.1353(b) [G]§ 63.1354(b)

Applicable Requirements Summary

Unit/Group/Process		SOP Index No.	Pollutant	Emission Limitation/Standard or Equipment Specification		Textual Description (See Special Term and Condition 1.B.)	Monitoring And Testing Requirements	Recordkeeping Requirements	Reporting Requirements
ID No.	Type			Name	Citation			(30 TAC § 122.144)	(30 TAC § 122.145)
GRPFNHANDL	EU	63 LLL	PM (OPACITY)	40 CFR Part 63, Subpart LLL	§ 63.1348 § 63.1350(b)	The owner or operator of specified sources at a facility which is a major source shall not cause to be discharged any gases from these affected sources which exhibit opacity in excess of ten percent.	§ 63.1349(a) § 63.1349(b) [G]§ 63.1349(b)(2) § 63.1349(c) [G]§ 63.1350(a)(4) § 63.1350(j)	§ 63.1349(a) § 63.1349(a)(1) § 63.1349(a)(10) § 63.1349(a)(2) § 63.1349(a)(3) § 63.1349(a)(4) § 63.1349(a)(5) § 63.1349(a)(6) § 63.1349(a)(7) § 63.1349(a)(8) § 63.1349(a)(9) § 63.1355(a) [G]§ 63.1355(b)	§ 63.1350(a) § 63.1350(a)(1) [G]§ 63.1350(a)(4) [G]§ 63.1353(b) [G]§ 63.1354(b)
GRPFNMILLS	EU	63 LLL	PM (OPACITY)	40 CFR Part 63, Subpart LLL	§ 63.1347 § 63.1350(b)	The owner/operator of a new or existing raw mill or finish mill at a major source shall not emit from the mill sweep or air separator pollution control device any gases with opacity in excess of 10%.	§ 63.1349(a) § 63.1349(b) [G]§ 63.1349(b)(2) § 63.1349(c) [G]§ 63.1350(a)(4) § 63.1350(j)	§ 63.1349(a) § 63.1349(a)(1) § 63.1349(a)(10) § 63.1349(a)(2) § 63.1349(a)(3) § 63.1349(a)(4) § 63.1349(a)(5) § 63.1349(a)(6) § 63.1349(a)(7) § 63.1349(a)(8) § 63.1349(a)(9) § 63.1355(a) [G]§ 63.1355(b)	§ 63.1350(a) § 63.1350(a)(1) [G]§ 63.1350(a)(4) [G]§ 63.1353(b) [G]§ 63.1354(b)

Applicable Requirements Summary

Unit/Group/Process		SOP Index No.	Pollutant	Emission Limitation/Standard or Equipment Specification		Textual Description (See Special Term and Condition 1.B.)	Monitoring And Testing Requirements	Recordkeeping Requirements (30 TAC § 122.144)	Reporting Requirements (30 TAC § 122.145)
ID No.	Type			Name	Citation				
GRPFNSTOR	EU	63 LLL	PM (OPACITY)	40 CFR Part 63, Subpart LLL	§ 63.1348 § 63.1350(b)	The owner or operator of specified sources at a facility which is a major source shall not cause to be discharged any gases from these affected sources which exhibit opacity in excess of ten percent.	§ 63.1349(a) § 63.1349(b) [G]§ 63.1349(b)(2) § 63.1349(c) [G]§ 63.1350(a)(4) § 63.1350(j)	§ 63.1349(a) § 63.1349(a)(1) § 63.1349(a)(10) § 63.1349(a)(2) § 63.1349(a)(3) § 63.1349(a)(4) § 63.1349(a)(5) § 63.1349(a)(6) § 63.1349(a)(7) § 63.1349(a)(8) § 63.1349(a)(9) § 63.1355(a) [G]§ 63.1355(b)	§ 63.1350(a) § 63.1350(a)(1) [G]§ 63.1350(a)(4) [G]§ 63.1353(b) [G]§ 63.1354(b)
GRPFNSTOR1	EU	63 LLL	PM (OPACITY)	40 CFR Part 63, Subpart LLL	§ 63.1348 § 63.1350(b)	The owner or operator of specified sources at a facility which is a major source shall not cause to be discharged any gases from these affected sources which exhibit opacity in excess of ten percent.	§ 63.1349(a) § 63.1349(b) [G]§ 63.1349(b)(2) § 63.1349(c) [G]§ 63.1350(a)(4) § 63.1350(j)	§ 63.1349(a) § 63.1349(a)(1) § 63.1349(a)(10) § 63.1349(a)(2) § 63.1349(a)(3) § 63.1349(a)(4) § 63.1349(a)(5) § 63.1349(a)(6) § 63.1349(a)(7) § 63.1349(a)(8) § 63.1349(a)(9) § 63.1355(a) [G]§ 63.1355(b)	§ 63.1350(a) § 63.1350(a)(1) [G]§ 63.1350(a)(4) [G]§ 63.1353(b) [G]§ 63.1354(b)

Applicable Requirements Summary

Unit/Group/Process		SOP Index No.	Pollutant	Emission Limitation/Standard or Equipment Specification		Textual Description (See Special Term and Condition 1.B.)	Monitoring And Testing Requirements	Recordkeeping Requirements (30 TAC § 122.144)	Reporting Requirements (30 TAC § 122.145)
ID No.	Type			Name	Citation				
GRPKILN	EU	63 LLL	PM	40 CFR Part 63, Subpart LLL	§ 63.1343(b)(1) § 63.1350(b)	No owner or operator of the specified source shall cause to be discharged any gases containing PM in excess of 0.15 kg per Mg (0.30 lb per ton) of feed (dry basis) to the kiln as specified.	§ 63.1349(a) § 63.1349(b) § 63.1349(b)(1) § 63.1349(b)(1)(i) § 63.1349(b)(1)(ii) § 63.1349(b)(1)(iii) § 63.1349(c) § 63.1349(e)	§ 63.1349(a) § 63.1349(a)(1) § 63.1349(a)(10) § 63.1349(a)(2) § 63.1349(a)(3) § 63.1349(a)(4) § 63.1349(a)(5) § 63.1349(a)(6) § 63.1349(a)(7) § 63.1349(a)(8) § 63.1349(a)(9) § 63.1355(a) [G]§ 63.1355(b)	§ 63.1350(a) § 63.1350(a)(1) § 63.1350(a)(3) [G]§ 63.1353(b) [G]§ 63.1354(b)
GRPKILN	EU	63 LLL	PM (OPACITY)	40 CFR Part 63, Subpart LLL	§ 63.1343(b)(2) § 63.1350(b) § 63.1350(c)(3)	No owner or operator of the specified source shall cause to be discharged any gases which exhibit opacity greater than 20 percent.	§ 63.1349(a) § 63.1349(b) § 63.1349(b)(1) § 63.1349(b)(1)(v) § 63.1349(c) § 63.1349(e) § 63.1350(c) § 63.1350(c)(1)	§ 63.1349(a) § 63.1349(a)(1) § 63.1349(a)(10) § 63.1349(a)(2) § 63.1349(a)(3) § 63.1349(a)(4) § 63.1349(a)(5) § 63.1349(a)(6) § 63.1349(a)(7) § 63.1349(a)(8) § 63.1349(a)(9) § 63.1355(a) [G]§ 63.1355(b) § 63.1355(c)	§ 63.1350(a) § 63.1350(a)(1) § 63.1350(a)(3) [G]§ 63.1353(b) [G]§ 63.1354(b)

Applicable Requirements Summary

Unit/Group/Process		SOP Index No.	Pollutant	Emission Limitation/Standard or Equipment Specification		Textual Description (See Special Term and Condition 1.B.)	Monitoring And Testing Requirements	Recordkeeping Requirements (30 TAC § 122.144)	Reporting Requirements (30 TAC § 122.145)
ID No.	Type			Name	Citation				
GRPKILN	EU	63 LLL	DIOXINS/FURANS	40 CFR Part 63, Subpart LLL	§ 63.1343(b)(3)(i) § 63.1344(a) § 63.1344(b) § 63.1350(b) § 63.1350(i)	No owner or operator of the specified source shall cause to be discharged any gases which contain D/F in excess of 0.20 Ng per dscm (8.7 x 10 -11 gr per dscf) (TEQ) corrected to seven percent oxygen.	§ 63.1349(a) § 63.1349(b) § 63.1349(b)(3) § 63.1349(b)(3)(i) § 63.1349(b)(3)(ii) § 63.1349(b)(3)(iii) § 63.1349(b)(3)(iv) § 63.1349(d) § 63.1349(e) § 63.1350(f) § 63.1350(f)(1) § 63.1350(f)(1)(i) § 63.1350(f)(1)(ii) § 63.1350(f)(2) § 63.1350(f)(3) § 63.1350(f)(4) § 63.1350(f)(6)	§ 63.1349(a) § 63.1349(a)(1) § 63.1349(a)(10) § 63.1349(a)(2) § 63.1349(a)(3) § 63.1349(a)(4) § 63.1349(a)(5) § 63.1349(a)(6) § 63.1349(a)(7) § 63.1349(a)(8) § 63.1349(a)(9) § 63.1349(b)(3)(ii) § 63.1349(b)(3)(iv) § 63.1350(f)(1) § 63.1350(f)(2) § 63.1355(a) [G]§ 63.1355(b) § 63.1355(c)	§ 63.1350(a) § 63.1350(a)(1) § 63.1350(a)(3) [G]§ 63.1353(b) [G]§ 63.1354(b)
GRPLOAD	EU	63 LLL	PM (OPACITY)	40 CFR Part 63, Subpart LLL	§ 63.1348 § 63.1350(b)	The owner or operator of specified sources at a facility which is a major source shall not cause to be discharged any gases from these affected sources which exhibit opacity in excess of ten percent.	§ 63.1349(a) § 63.1349(b) [G]§ 63.1349(b)(2) § 63.1349(c) [G]§ 63.1350(a)(4) § 63.1350(j)	§ 63.1349(a) § 63.1349(a)(1) § 63.1349(a)(10) § 63.1349(a)(2) § 63.1349(a)(3) § 63.1349(a)(4) § 63.1349(a)(5) § 63.1349(a)(6) § 63.1349(a)(7) § 63.1349(a)(8) § 63.1349(a)(9) § 63.1355(a) [G]§ 63.1355(b)	§ 63.1350(a) § 63.1350(a)(1) [G]§ 63.1350(a)(4) [G]§ 63.1353(b) [G]§ 63.1354(b)

Applicable Requirements Summary

Unit/Group/Process		SOP Index No.	Pollutant	Emission Limitation/Standard or Equipment Specification		Textual Description (See Special Term and Condition 1.B.)	Monitoring And Testing Requirements	Recordkeeping Requirements (30 TAC § 122.144)	Reporting Requirements (30 TAC § 122.145)
ID No.	Type			Name	Citation				
GRPLOAD1	EU	63 LLL	PM (OPACITY)	40 CFR Part 63, Subpart LLL	§ 63.1348 § 63.1350(b)	The owner or operator of specified sources at a facility which is a major source shall not cause to be discharged any gases from these affected sources which exhibit opacity in excess of ten percent.	§ 63.1349(a) § 63.1349(b) [G]§ 63.1349(b)(2) § 63.1349(e) [G]§ 63.1350(a)(4) § 63.1350(j)	§ 63.1349(a) § 63.1349(a)(1) § 63.1349(a)(10) § 63.1349(a)(2) § 63.1349(a)(3) § 63.1349(a)(4) § 63.1349(a)(5) § 63.1349(a)(6) § 63.1349(a)(7) § 63.1349(a)(8) § 63.1349(a)(9) § 63.1355(a) [G]§ 63.1355(b)	§ 63.1350(a) § 63.1350(a)(1) [G]§ 63.1350(a)(4) [G]§ 63.1353(b) [G]§ 63.1354(b)
GRPMTHANDL	EU	63 LLL	PM (OPACITY)	40 CFR Part 63, Subpart LLL	§ 63.1348 § 63.1350(b)	The owner or operator of specified sources at a facility which is a major source shall not cause to be discharged any gases from these affected sources which exhibit opacity in excess of ten percent.	§ 63.1349(a) § 63.1349(b) [G]§ 63.1349(b)(2) § 63.1349(e) [G]§ 63.1350(a)(4) § 63.1350(j)	§ 63.1349(a) § 63.1349(a)(1) § 63.1349(a)(10) § 63.1349(a)(2) § 63.1349(a)(3) § 63.1349(a)(4) § 63.1349(a)(5) § 63.1349(a)(6) § 63.1349(a)(7) § 63.1349(a)(8) § 63.1349(a)(9) § 63.1355(a) [G]§ 63.1355(b)	§ 63.1350(a) § 63.1350(a)(1) [G]§ 63.1350(a)(4) [G]§ 63.1353(b) [G]§ 63.1354(b)

Applicable Requirements Summary

Unit/Group/Process		SOP Index No.	Pollutant	Emission Limitation/Standard or Equipment Specification		Textual Description (See Special Term and Condition 1.B.)	Monitoring And Testing Requirements	Recordkeeping Requirements (30 TAC § 122.144)	Reporting Requirements (30 TAC § 122.145)
ID No.	Type			Name	Citation				
GRPMTTRANS	EU	63 LLL	PM (OPACITY)	40 CFR Part 63, Subpart LLL	§ 63.1348 § 63.1350(b)	The owner or operator of specified sources at a facility which is a major source shall not cause to be discharged any gases from these affected sources which exhibit opacity in excess of ten percent.	§ 63.1349(a) § 63.1349(b) [G]§ 63.1349(b)(2) § 63.1349(c) [G]§ 63.1350(a)(4) § 63.1350(j)	§ 63.1349(a) § 63.1349(a)(1) § 63.1349(a)(10) § 63.1349(a)(2) § 63.1349(a)(3) § 63.1349(a)(4) § 63.1349(a)(5) § 63.1349(a)(6) § 63.1349(a)(7) § 63.1349(a)(8) § 63.1349(a)(9) § 63.1355(a) [G]§ 63.1355(b)	§ 63.1350(a) § 63.1350(a)(1) [G]§ 63.1350(a)(4) [G]§ 63.1353(b) [G]§ 63.1354(b)
GRPMTTRANS1	EU	63 LLL	PM (OPACITY)	40 CFR Part 63, Subpart LLL	§ 63.1348 § 63.1350(b)	The owner or operator of specified sources at a facility which is a major source shall not cause to be discharged any gases from these affected sources which exhibit opacity in excess of ten percent.	§ 63.1349(a) § 63.1349(b) [G]§ 63.1349(b)(2) § 63.1349(c) [G]§ 63.1350(a)(4) § 63.1350(j)	§ 63.1349(a) § 63.1349(a)(1) § 63.1349(a)(10) § 63.1349(a)(2) § 63.1349(a)(3) § 63.1349(a)(4) § 63.1349(a)(5) § 63.1349(a)(6) § 63.1349(a)(7) § 63.1349(a)(8) § 63.1349(a)(9) § 63.1355(a) [G]§ 63.1355(b)	§ 63.1350(a) § 63.1350(a)(1) [G]§ 63.1350(a)(4) [G]§ 63.1353(b) [G]§ 63.1354(b)

Applicable Requirements Summary

Unit/Group/Process		SOP Index No.	Pollutant	Emission Limitation/Standard or Equipment Specification		Textual Description (See Special Term and Condition 1.B.)	Monitoring And Testing Requirements	Recordkeeping Requirements (30 TAC § 122.144)	Reporting Requirements (30 TAC § 122.145)
ID No.	Type			Name	Citation				
GRPRAWMILLS	EU	63 LLL	PM (OPACITY)	40 CFR Part 63, Subpart LLL	§ 63.1347 § 63.1350(b)	The owner/operator of a new or existing raw mill or finish mill at a major source shall not emit from the mill sweep or air separator pollution control device any gases with opacity in excess of 10%.	§ 63.1349(a) § 63.1349(b) [G]§ 63.1349(b)(2) § 63.1349(c) [G]§ 63.1350(a)(4) § 63.1350(j)	§ 63.1349(a) § 63.1349(a)(1) § 63.1349(a)(10) § 63.1349(a)(2) § 63.1349(a)(3) § 63.1349(a)(4) § 63.1349(a)(5) § 63.1349(a)(6) § 63.1349(a)(7) § 63.1349(a)(8) § 63.1349(a)(9) § 63.1355(a) [G]§ 63.1355(b)	§ 63.1350(a) § 63.1350(a)(1) [G]§ 63.1350(a)(4) [G]§ 63.1353(b) [G]§ 63.1354(b)
GRPSYNGYP	EU	63 LLL	PM (OPACITY)	40 CFR Part 63, Subpart LLL	§ 63.1348 § 63.1350(b)	The owner or operator of specified sources at a facility which is a major source shall not cause to be discharged any gases from these affected sources which exhibit opacity in excess of ten percent.	§ 63.1349(a) § 63.1349(b) [G]§ 63.1349(b)(2) § 63.1349(c) [G]§ 63.1350(a)(4) § 63.1350(j)	§ 63.1349(a) § 63.1349(a)(1) § 63.1349(a)(10) § 63.1349(a)(2) § 63.1349(a)(3) § 63.1349(a)(4) § 63.1349(a)(5) § 63.1349(a)(6) § 63.1349(a)(7) § 63.1349(a)(8) § 63.1349(a)(9) § 63.1355(a) [G]§ 63.1355(b)	§ 63.1350(a) § 63.1350(a)(1) [G]§ 63.1350(a)(4) [G]§ 63.1353(b) [G]§ 63.1354(b)

ADDITIONAL MONITORING REQUIREMENTS

Periodic Monitoring Summary

UNIT/GROUP/PROCESS INFORMATION	
ID No.: GRPBELT	Applicable Form: OP-UA09
APPLICABLE REGULATORY REQUIREMENT	
Name: 40 CFR Part 60, Subpart OOO	SOP Index No.: 60 OOO
Pollutant: PM	Main Standard: § 60.672(b)
MONITORING INFORMATION	
Indicator: Opacity	
Minimum Frequency: Once per quarter	
Averaging Period: Six-minute	
Deviation Limit: Maximum 10 percent opacity	
Periodic Monitoring Text: Opacity shall be monitored, by a certified observer, for at least one, six-minute period, in accordance with Title 40 Code of Federal Regulations Part 60 (40 CFR Part 60), Appendix A, Test Method 9. The deviation limit is the maximum opacity corresponding to the underlying applicable requirement. If there is no applicable or corresponding opacity limit, a maximum opacity shall be established using the most recent performance test. Any opacity readings that are above the opacity limit from the underlying applicable requirement shall be reported as a deviation.	

Periodic Monitoring Summary

UNIT/GROUP/PROCESS INFORMATION	
ID No.: GRPCRSHR	Applicable Form: OP-UA09
APPLICABLE REGULATORY REQUIREMENT	
Name: 40 CFR Part 60, Subpart OOO	SOP Index No.: 60 OOO
Pollutant: PM (OPACITY)	Main Standard: § 60.672(c)
MONITORING INFORMATION	
Indicator: Opacity	
Minimum Frequency: Once per quarter	
Averaging Period: Six-minute	
Deviation: Maximum 15 percent opacity	
Periodic Monitoring Text: Opacity shall be monitored, by a certified observer, for at least one, six-minute period, in accordance with Title 40 Code of Federal Regulations Part 60 (40 CFR Part 60), Appendix A, Test Method 9. The deviation limit is the maximum opacity corresponding to the underlying applicable requirement. If there is no applicable or corresponding opacity limit, a maximum opacity shall be established using the most recent performance test. Any opacity readings that are above the opacity limit from the underlying applicable requirement shall be reported as a deviation.	

Periodic Monitoring Summary

UNIT/GROUP/PROCESS INFORMATION	
ID No.: GRPCOAL1	Applicable Form: OP-UA08
APPLICABLE REGULATORY REQUIREMENT	
Name: 40 CFR Part 60, Subpart Y	SOP Index No.: 60Y
Pollutant: PM (OPACITY)	Main Standard: § 60.252(c)
MONITORING INFORMATION	
Indicator: Opacity	
Minimum Frequency: Once per quarter	
Averaging Period: Six-minute	
Deviation Limit: Maximum 10 percent opacity	
Periodic Monitoring Text: Opacity shall be monitored, by a certified observer, for at least one, six-minute period, in accordance with Title 40 Code of Federal Regulations Part 60 (40 CFR Part 60), Appendix A, Test Method 9. The deviation limit is the maximum opacity corresponding to the underlying applicable requirement. If there is no applicable or corresponding opacity limit, a maximum opacity shall be established using the most recent performance test. Any opacity readings that are above the opacity limit from the underlying applicable requirement shall be reported as a deviation.	

Periodic Monitoring Summary

UNIT/GROUP/PROCESS INFORMATION	
ID No.: GRPCOAL3	Applicable Form: OP-UA08
APPLICABLE REGULATORY REQUIREMENT	
Name: 40 CFR Part 60, Subpart Y	SOP Index No.: 60Y
Pollutant: PM (OPACITY)	Main Standard: § 60.252(c)
MONITORING INFORMATION	
Indicator: PM (Opacity)	
Minimum Frequency: Once per quarter	
Averaging Period: Six-minute	
Deviation Limit: Maximum 10 percent opacity	
Periodic Monitoring Text: Opacity shall be monitored, by a certified observer, for at least one, six-minute period, in accordance with Title 40 Code of Federal Regulations Part 60 (40 CFR Part 60), Appendix A, Test Method 9. The deviation limit is the maximum opacity corresponding to the underlying applicable requirement. If there is no applicable or corresponding opacity limit, a maximum opacity shall be established using the most recent performance test. Any opacity readings that are above the opacity limit from the underlying applicable requirement shall be reported as a deviation.	

NEW SOURCE REVIEW AUTHORIZATION REFERENCES

New Source Review Authorization References

The New Source Review authorizations listed in the table below are applicable requirements under 30 TAC Chapter 122 and enforceable under this operating permit.

PSD Permits	**NA Permits**
PSD Permit No.: PSD-TX-632M1	NA Permit No.:
Title 30 TAC Chapter 116 Permits, Special Permits, and Other Authorizations (Other Than Permits By Rule, PSD Permits, or NA Permits) for the Application Area.	
Authorization No.: 1360A	Authorization No.: 53424
Authorization No.: 56271	Authorization No.: 6698
Permits By Rule (30 TAC Chapter 106) for the Application Area	
Number: 106	Version No./Date: 04/01/1991
Number: 106.144	Version No./Date: 05/26/1999
Number: 211	Version No./Date: 04/13/1994
Number: 106.261	Version No./Date: 02/15/2001
Number: 106.261	Version No./Date: 03/08/2001
Number: 106.261	Version No./Date: 05/01/2001
Number: 106.261	Version No./Date: 02/25/2002
Number: 106.261	Version No./Date: 12/19/2002
Number: 106.478	Version No./Date: 08/16/2001
Municipal Solid Waste and Industrial Hazardous Waste Permits With an Air Addendum	
Permit No.:	Permit No.:
Permit No.:	Permit No.:
Permit No.:	Permit No.:

New Source Review Authorization References by Emissions Unit

The following is a list of New Source Review (NSR) authorizations for emission units listed elsewhere in this operating permit. The NSR authorizations are applicable requirements under 30 TAC Chapter 122 and enforceable under this operating permit.

Unit/Group/Process ID No.	Emission Unit Name/Description	New Source Review Authorization
E1-10	MILL SCALE PILE, DROP FUGITIVE	106.261/02/25/2002
E1-11	SAND PILE, DROP FUGITIVE	106.261/02/25/2002
E1-16	LIMESTONE BELT TRANSFER DROP	1360A, PSD-TX-632M1
E1-23A	RAW MILL #1	106.261/02/25/2002
E1-23B	RAW MILL #2	106.261/02/25/2002
E1-23C	KILN FEED DROP TO RAW MILL 1 FEED	106.261/12/19/2002
E1-23D	KILN FEED DROP TO RAW MILL 2 FEED	106.261/12/19/2002
E1-23E	WEIGH FEEDER #1 DROP TO RAW MILL BELT	106.261/02/25/2002
E1-23F	WEIGH FEEDER #2 DROP TO RAW MILL BELT	106.261/02/25/2002
E1-23G	WEIGH FEEDER #3 DROP TO RAW MILL BELT	106.261/02/25/2002
E1-23H	WEIGH FEEDER #3 DROP TO RAW MILL BELT	106.261/02/25/2002
E1-23	RAW MATERIAL DROP TO STORAGE AREA	1360A, PSD-TX-632M1
E1-24	PRIMARY CRUSHER	1360A, PSD-TX-632M1
E1-25	TRANSFER POINT #1	1360A, PSD-TX-632M1
E1-26	TRANSFER POINT #2	1360A, PSD-TX-632M1
E1-27	SECONDARY CRUSHER	1360A, PSD-TX-632M1

New Source Review Authorization References by Emissions Unit

Unit/Group/Process ID No.	Emission Unit Name/Description	New Source Review Authorization
E1-28	OVERLAND CONVEYOR DIVERTER DROP	1360A, PSD-TX-632M1
E1-29	LIMESTONE STORAGE DOME DROPS	1360A, PSD-TX-632M1
E1-30A	BELT TRANSFER TO OVERLAND CONVEYOR	106.261/03/08/2001
E1-30	UNDERGROUND BELT BAGHOUSE	1360A, PSD-TX-632M1
E1-31A	LIMESTONE TRANSFER BAGHOUSE	1360A, PSD-TX-632M1
E1-31B	RAW MATERIAL CIRCULATION BAGHOUSE	1360A, PSD-TX-632M1
E1-31	RAW BINS BAGHOUSE	1360A, PSD-TX-632M1
E1-32A	SAND HOPPER DROP TO BELT	1360A, PSD-TX-632M1
E1-32B	IRON/SAND WEIGH FEEDER DROP	106.261/12/19/2002
E1-32	SAND, DROP TO HOPPER	1360A, PSD-TX-632M1
E1-33	OVERLAND CONVEYOR TANSFER #3	106.261/02/15/2001
E1-34	OVERLAND CONVEYOR TRANSFER #4	106.261/02/15/2001
E1-7	GYPSUM PILE, DROP FUGITIVE	106.261/02/25/2002
E1-8	AHYDRITE PILE, DROP FUGITIVE	106.261/02/25/2002
E1-9	IRON ORE PILE, DROP FUGITIVE	106.261/02/25/2002
E2-101	#1 COOLER BAGHOUSE	1360A, PSD-TX-632M1
E2-103	#2 COOLER BAGHOUSE	1360A, PSD-TX-632M1
E2-105	#3 COOLER BAGHOUSE	1360A, PSD-TX-632M1
E2-107	#4 COOLER BAGHOUSE	1360A, PSD-TX-632M1

New Source Review Authorization References by Emissions Unit

Unit/Group/Process ID No.	Emission Unit Name/Description	New Source Review Authorization
E2-10B	QUARRY CKD BIN BAGHOUSE	1360A, PSD-TX-632M1
E2-10C	CKD BIN BAGHOUSE	1360A, PSD-TX-632M1
E2-10	CKD LOADOUT, DROP FUGITIVE	1360A, PSD-TX-632M1
E2-10D	KILN DUST TO SCRUBBER BAGHOUSE	1360A, PSD-TX-632M1
E2-10E	CKD MIXER WET COLLECTOR	106.261/03/08/2001
E2-10F	BYPASS DUST TRUCK LOADOUT FUGITIVE	106.261/03/08/2001
E2-10G	CKD PUG MILL	106.261/12/19/2002
E2-11A	DUST BIN BAGHOUSE	1360A, PSD-TX-632M1
E2-11B	LIME SILO BAGHOUSE	1360A, PSD-TX-632M1
E2-13A	LOADER DROP TO GRIZZLY SCREEN	1360A, PSD-TX-632M1
E2-13	IRON ADDITIVE DROP TO PILE	1360A, PSD-TX-632M1
E2-14A	STEEL SLAG GRIZZLY SCREEN	106.261/12/19/2002
E2-15	LOADER DROP TO IRON ADDITIVE HOPPER	1360A, PSD-TX-632M1
E2-16	IRON ADDITIVE FEED SYSTEM BAGHOUSE	1360A, PSD-TX-632M1
E2-17	KILN 5 IRON FEED SYSTEM BAGHOUSE	106.261/03/08/2001
E2-18	IRON ADDITIVE DROP TO PILE	1360A, PSD-TX-632M1
E2-22	MAIN KILN EXHAUST/SCRUBBER	1360A, PSD-TX-632M1
E2-2	KILN NO. 1	1360A, PSD-TX-632M1
E2-4	KILN NO. 2	1360A, PSD-TX-632M1

New Source Review Authorization References by Emissions Unit

Unit/Group/Process ID No.	Emission Unit Name/Description	New Source Review Authorization
E2-6	KILN NO. 3	1360A, PSD-TX-632M1
E2-7A	BLENDING SILO DISCHARGE BAGHOUSE	1360A, PSD-TX-632M1
E2-7	BLENDING SILO BAGHOUSE	1360A, PSD-TX-632M1
E2-7B	PREHEATER TOWER PNEUMATIC FEED BAGHOUSE	1360A, PSD-TX-632M1
E2-8	KILN NO. 4	1360A, PSD-TX-632M1
E2-9	CKD DUST TANK BAGHOUSE	1360A, PSD-TX-632M1
E3-1	#4 CLINKER ELEVATOR BAGHOUSE	1360A, PSD-TX-632M1
E3-10	CLINKER SILOS 15-18	1360A, PSD-TX-632M1
E3-11	BELT TRANSFER 707 TAIL PULLEY	1360A, PSD-TX-632M1
E3-12	BELT TRANSFER HEAD WHEEL 703, 704, 721	1360A, PSD-TX-632M1
E3-13	NORTH CLINKER PILE, DROP FUGITIVE	106.261/02/25/2002
E3-14	FLYASH TANK BAGHOUSE	1360A, PSD-TX-632M1
E3-15	TRANSFER HEAD PULLEY 702 PAN; 748 DRAG	1360A, PSD-TX-632M1
E3-16	FINISH MILL #1 BAGHOUSE	1360A, PSD-TX-632M1
E3-17	FINISH MILL #2 BAGHOUSE	1360A, PSD-TX-632M1
E3-18	FINISH MILL #3 BAGHOUSE	1360A, PSD-TX-632M1
E3-19	FINISH MILL #4 BAGHOUSE	1360A, PSD-TX-632M1
E3-2	#3 TUNNEL BAGHOUSE	1360A, PSD-TX-632M1
E3-20	FINISH MILL NO. 5 FEED BAGHOUSE	6698

New Source Review Authorization References by Emissions Unit

Unit/Group/Process ID No.	Emission Unit Name/Description	New Source Review Authorization
E3-21	FINISH MILL NO. 5 BAGHOUSE STACK	6698
E3-22	TANK SWEEP #5 BAGHOUSE	6698
E3-23	LOWER RECLAIM BELT BAGHOUSE	1360A, PSD-TX-632M1
E3-24	BELT TRANSFER 707, 708, 780	1360A, PSD-TX-632M1
E3-25-5	FM #5 FRINGE BIN BAGHOUSE	1360A, PSD-TX-632M1
E3-25	FM#6 TRANSFER TOWER BAGHOUSE	1360A, PSD-TX-632M1
E3-26	BELT TRANSFER 742, 703, 740, 741	1360A, PSD-TX-632M1
E3-27	#4 TRANSFER BAGHOUSE	1360A, PSD-TX-632M1
E3-28	KILN TUNNEL #4 BAGHOUSE	1360A, PSD-TX-632M1
E3-29	NO. 2 COOLER TUNNEL	1360A, PSD-TX-632M1
E3-3	#2 TUNNEL BAGHOUSE	1360A, PSD-TX-632M1
E3-30	NO. 1 COOLER TUNNEL	1360A, PSD-TX-632M1
E3-31	FINISH TUNNEL #4 BAGHOUSE	1360A, PSD-TX-632M1
E3-32	FINISH TUNNEL #4 BAGHOUSE	1360A, PSD-TX-632M1
E3-33A	CLINKER OUTHAUL TO #6 FINISH	1360A, PSD-TX-632M1
E3-33	CLINKER BARN WEST BAGHOUSE	1360A, PSD-TX-632M1
E3-34	SURGE BIN TRANSFER 713, 715, 717, 718	1360A, PSD-TX-632M1
E3-35	706 DRAG CONVEYOR	1360A, PSD-TX-632M1
E3-37	TRANSFER 700, 704, 701	1360A, PSD-TX-632M1

New Source Review Authorization References by Emissions Unit

Unit/Group/Process ID No.	Emission Unit Name/Description	New Source Review Authorization
E3-38	712 TUNNEL AT CLINKER BUILDING	1360A, PSD-TX-632M1
E3-41	EAST CLINKER DOOR BAGHOUSE	1360A, PSD-TX-632M1
E3-42	WEST CLINKER DOOR BAGHOUSE	1360A, PSD-TX-632M1
E3-43	#4 FEEDER BAGHOUSE	1360A, PSD-TX-632M1
E3-43A	#4 FEEDER BAGHOUSE	56271
E3-45	L.T. AGGREGATE DROP PILE, DROP FUGITIVES	6698
E3-4	N. CLINKER GROUP4 BAGHOUSE	1360A, PSD-TX-632M1
E3-5	#1 TUNNEL BAGHOUSE	1360A, PSD-TX-632M1
E3-50	MILL ADDITIVE DROP TO RAIL HOPPER	1360A, PSD-TX-632M1
E3-51	HOPPER DROP TO BELT	1360A, PSD-TX-632M1
E3-52A	CLINKER DISCHARGE BAGHOUSE	1360A, PSD-TX-632M1
E3-52	PAN CONVEYOR BAGHOUSE	1360A, PSD-TX-632M1
E3-53	CLINKER BELT TRANSFER BAGHOUSE	1360A, PSD-TX-632M1
E3-54	FM#6 BIN BAGHOUSE	1360A, PSD-TX-632M1
E3-55A	LOADER DROP TO GYPSUM HOPPER	106.261/05/01/2002
E3-55B	HOPPER DROP TO CONVEYER	106.261/05/01/2002
E3-55C	CONVEYOR DROP TO BIN FEED CONVEYOR	106.261/05/01/2002
E3-55D	DIN FEED CONVEYOR DROP TO BIN	106.261/05/01/2002
E3-55E	STORAGE BIN DROP TO MILL FEED CONVEYOR	106.261/05/01/2002

New Source Review Authorization References by Emissions Unit

Unit/Group/Process ID No.	Emission Unit Name/Description	New Source Review Authorization
E3-55	FINISH MILL STACK	1360A, PSD-TX-632M1
E3-55F	MILL FEED CONVEYOR DROP TO MILL FEED BELT	106.261/05/01/2002
E3-57	FM#6 CEMENT BAGHOUSE	1360A, PSD-TX-632M1
E3-6	700 AND 703 PAN FROM SURGE BIN	1360A, PSD-TX-632M1
E3-9	FM #1,2 AND 3 FRINGE BIN BAGHOUSE	106.144/05/26/1999
E4-10	RAIL SYSTEM BAGHOUSE	1360A, PSD-TX-632M1
E4-11A	AIRSLIDE BAGHOUSE	56271
E4-11	RAIL LOADING #3 BAGHOUSE	1360A, PSD-TX-632M1
E4-12	FM #6 TRANSFER BAGHOUSE	1360A, PSD-TX-632M1
E4-13	TRUCK LOAD-OUT BAGHOUSE	1360A, PSD-TX-632M1
E4-16	TRUCK LOAD-OUT #2 BAGHOUSE	1360A, PSD-TX-632M1
E4-17	TRUCK LOADOUT #1 BAGHOUSE	1360A, PSD-TX-632M1
E4-18	TRUCK LOADING BAGHOUSE	1360A, PSD-TX-632M1
E4-19	PACKHOUSE ELEVATOR BAGHOUSE	1360A, PSD-TX-632M1
E4-1	FINISH SILO GROUP 3 BAGHOUSE	1360A, PSD-TX-632M1
E4-20	BAGGING MACHINE BAGHOUSE	1360A, PSD-TX-632M1
E4-21	MASONRY RAIL LOADING BAGHOUSE	1360A, PSD-TX-632M1
E4-22	TRUCK LOAD-OUT BAGHOUSE	1360A, PSD-TX-632M1
E4-23	FINISH SILO GROUP 3 BAGHOUSE	56271

New Source Review Authorization References by Emissions Unit

Unit/Group/Process ID No.	Emission Unit Name/Description	New Source Review Authorization
E4-24	#5 BIN BAGHOUSE	1360A, PSD-TX-632M1
E4-25	MASONRY BAGGING BAGHOUSE	1360A, PSD-TX-632M1
E4-26	#6 BIN BAGHOUSE	1360A, PSD-TX-632M1
E4-27A	LOADER DROP TO CLINKER HOPPER	1360A, PSD-TX-632M1
E4-27B	CLINKER SHIPPED, DROP TO BELT	1360A, PSD-TX-632M1
E4-27	TRAVELING RAIL LOADOUT BAGHOUSE	1360A, PSD-TX-632M1
E4-28	#3 LOAD SPOUT BAGHOUSE	1360A, PSD-TX-632M1
E4-28A	CLINKER SHIPPED, DROP TO RAILCAR	106/04/01/1991
E4-2	FINISH SILO GROUP 3 BAGHOUSE	1360A, PSD-TX-632M1
E4-3	FINISH SILO GROUP 4 BAGHOUSE	1360A, PSD-TX-632M1
E4-4	SILO GROUP 3 BAGHOUSE	56271
E4-5	FINISH SILO GROUP 2 BAGHOUSE	1360A, PSD-TX-632M1
E4-6	FINISH SILO GROUP 1 BAGHOUSE	1360A, PSD-TX-632M1
E4-7	FINISH SILO GROUP 1 BAGHOUSE	1360A, PSD-TX-632M1
E4-8	FINISH SILO GROUP 1 BAGHOUSE	1360A, PSD-TX-632M1
E4-9	RAIL LOADING BAGHOUSE	1360A, PSD-TX-632M1
E6-10	COAL CRUSHER	1360A, PSD-TX-632M1
E6-11	COAL BELT TO #4 COAL BIN	1360A, PSD-TX-632M1
E6-12	COAL BELT TO #3 COAL BIN	1360A, PSD-TX-632M1

New Source Review Authorization References by Emissions Unit

Unit/Group/Process ID No.	Emission Unit Name/Description	New Source Review Authorization
E6-13	COAL BELT TO #2 COAL BIN	1360A, PSD-TX-632M1
E6-14	COAL BELT TO #1 COAL BIN	1360A, PSD-TX-632M1
E6-15	SOLID FUEL DROP TO BELT	1360A, PSD-TX-632M1
E6-15	SOLID FUEL, DROP TO BELT	1360A, PSD-TX-632M1
E6-18	SOLID FUEL, DROP TO STACKER BELT	1360A, PSD-TX-632M1
E6-19	COAL BIN #4 TO COAL MILL FEED BELT	1360A, PSD-TX-632M1
E6-1	COAL, DROP FROM RAILCAR	1360A, PSD-TX-632M1
E6-20	COAL BIN #3 TO COAL MILL FEED BELT	1360A, PSD-TX-632M1
E6-21	COAL BIN #2 TO COAL MILL FEED BELT	1360A, PSD-TX-632M1
E6-22	COAL BIN #1 COAL MILL FEED BELT	1360A, PSD-TX-632M1
E6-22	COAL BIN #1 TO COAL MILL FEED BELT	1360A, PSD-TX-632M1
E6-23	#4 COAL BELT TO COAL MILL	1360A, PSD-TX-632M1
E6-24	#3 COAL BELT TO COAL MILL	1360A, PSD-TX-632M1
E6-25	#2 COAL BELT TO COAL MILL	1360A, PSD-TX-632M1
E6-26	#1 COAL BELT TO COAL MILL	1360A, PSD-TX-632M1
E6-27	SOLID FUEL CONVEYOR DIVERTER BAGHOUSE	1360A, PSD-TX-632M1
E6-27	SOLID FUEL CONVEYOR DIVERTOR BAGHOUSE	1360A, PSD-TX-632M1
E6-28	SOLID FUEL MILL BIN BAGHOUSE	1360A, PSD-TX-632M1
E6-2	SOLID FUEL, RAIL HOPPER DROP TO BELT	1360A, PSD-TX-632M1

New Source Review Authorization References by Emissions Unit

Unit/Group/Process ID No.	Emission Unit Name/Description	New Source Review Authorization
E6-30	COAL MILL EXHAUST	1360A, PSD-TX-632M1
E6-31	COAL FINES BIN BAGHOUSE	1360A, PSD-TX-632M1
E6-3	SOLID FUEL, BELT DROP TO PILES	1360A, PSD-TX-632M1
E6-7	SOLID FUEL, LOADOUT TO COVERED STORAGE	1360A, PSD-TX-632M1
E6-8	COAL TRUCK DROP TO PILES	1360A, PSD-TX-632M1
E6-8	COAL, TRUCK DROP TO PILE	1360A, PSD-TX-632M1
E6-9	SOLID FUEL LOADER DROP TO HOPPER	1360A, PSD-TX-632M1
E6-9	SOLID FUEL, LOADER DROP TO HOPPER	1360A, PSD-TX-632M1
EA-1	VOC NITROGEN BLANKET VOC VAPOR BALANCE SYSTEM	1360A, PSD-TX-632M1
EA-2	VOC NITROGEN BLANKET VOC VAPOR BALANCE SYSTEM	1360A, PSD-TX-632M1
E-F-1	VOC FUGITIVES WDF	1360A, PSD-TX-632M1
E-F-2	VOC FUGITIVES WDF	1360A, PSD-TX-632M1
E-F-3	VOC FUGITIVES WDF	1360A, PSD-TX-632M1
E-F-4	VOC FUGITIVES WDF	1360A, PSD-TX-632M1
E-F-5	VOC FUGITIVES WDF	1360A, PSD-TX-632M1
EQ-1	VOC FUGITIVES QUENCH SYSTEM	1360A, PSD-TX-632M1
EQ-2	VOC FUGITIVES QUENCH SYSTEM	1360A, PSD-TX-632M1
EQ-3	VOC FUGITIVES QUENCH SYSTEM	1360A, PSD-TX-632M1
EQ-4	VOC FUGITIVES QUENCH SYSTEM	1360A, PSD-TX-632M1

New Source Review Authorization References by Emissions Unit

Unit/Group/Process ID No.	Emission Unit Name/Description	New Source Review Authorization
P-10	6,000 GALLON DIESEL STORAGE TANK	106.478/08/16/2001
P-11	6,000 GALLON 30W OIL STORAGE TANK	106.478/08/16/2001
P-13	1,000 GALLON SALVASOL STORAGE TANK	106.478/08/16/2001
P-14	1,000 GALLON WASTE OIL STORAGE TANK	106.478/08/16/2001
P-18	1,000 GALLON GASOLINE STORAGE TANK	106.478/08/16/2001
P-20	9,500 GALLON DIESEL STORAGE TANK	106.478/08/16/2001
P-21	10,000 GALLON DIESEL STORAGE TANK	106.478/08/16/2001
P-25	12,000 GALLON DIESEL STORAGE TANK	106.478/08/16/2001
P-26	1,000 GALLON DIESEL STORAGE TANK	106.478/08/16/2001
P-5	DIESEL STORAGE TANK	106.478/08/16/2001
P-9	9,000 GALLON DIESEL STORAGE TANK	106.478/08/16/2001
TK-10	WASTE3 TANK	1360A, PSD-TX-632M1
TK-1	WASTE3 TANK	1360A, PSD-TX-632M1
TK-2	WASTE3 TANK	1360A, PSD-TX-632M1
TK-3	WASTE3 TANK	1360A, PSD-TX-632M1
TK-4	WASTE3 TANK	1360A, PSD-TX-632M1
TK-5	WASTE3 TANK	1360A, PSD-TX-632M1
TK-6	WASTE3 TANK	1360A, PSD-TX-632M1
TK-9	WASTE3 TANK	1360A, PSD-TX-632M1

APPENDIX A

ACRONYM LIST

The following abbreviations or acronyms may be used in this permit:

ACFM	actual cubic feet per minute
AMOC	alternate means of control
ARP	Acid Rain Program
ASTM	American Society of Testing and Materials
B/PA	Beaumont/Port Arthur (nonattainment area)
CAM	Compliance Assurance Monitoring
CD	control device
COMS	continuous opacity monitoring system
CVS	closed-vent system
D/FW	Dallas/Fort Worth (nonattainment area)
DR	Designated Representative
ElP	El Paso (nonattainment area)
EP	emission point
EPA	U.S. Environmental Protection Agency
EU	emission unit
FCAA Amendments	Federal Clean Air Act Amendments
FOP	federal operating permit
GF	grandfathered
gr/100 scf	grains per 100 standard cubic feet
HAP	hazardous air pollutant
H/G	Houston/Galveston (nonattainment area)
H_2S	hydrogen sulfide
ID No.	identification number
lb/hr	pound(s) per hour
MMBtu/hr	Million British thermal units per hour
MRRT	monitoring, recordkeeping, reporting, and testing
NA	nonattainment
N/A	not applicable
NADB	National Allowance Data Base
NO_x	nitrogen oxides
NSPS	New Source Performance Standard (40 CFR Part 60)
NSR	New Source Review
ORIS	Office of Regulatory Information Systems
Pb	lead
PBR	Permit By Rule
PM	particulate matter
ppmv	parts per million by volume
PSD	prevention of significant deterioration
RO	Responsible Official
SO_2	sulfur dioxide
TSP	total suspended particulate
TVP	true vapor pressure
U.S.C.	United States Code
VOC	volatile organic compound

ATTACHMENT 6

Holcim Dundee, MI
Title V Permit

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
AIR QUALITY DIVISION

November 26, 2003
REVISED December 9, 2003 and March 25, 2004

NEW SOURCE REVIEW PERMIT TO INSTALL
60-71O

ISSUED TO
HOLCIM (US) INC.

LOCATED AT
15215 DAY ROAD
DUNDEE, MICHIGAN

IN THE COUNTY OF
MONROE

STATE REGISTRATION NUMBER
B1743

The Air Quality Division has approved this Permit to Install, pursuant to the delegation of authority from the Michigan Department of Environmental Quality. This permit is hereby issued in accordance with and subject to Part 5505(1) of Article II, Chapter I, Part 55 (Air Pollution Control) of P.A. 451 of 1994. Pursuant to Air Pollution Control Rule 336.1201(1), this permit constitutes the permittee's authority to install the identified emission unit(s) in accordance with all administrative rules of the Department and the attached conditions. Operation of the emission unit(s) identified in this Permit to Install is allowed pursuant to Rule 336.1201(6).

DATE OF RECEIPT OF ALL INFORMATION REQUIRED BY RULE 203: **MAY 7, 2003**	
DATE PERMIT TO INSTALL APPROVED: **NOVEMBER 26, 2003**	SIGNATURE: **G. VINSON HELLWIG**
DATE PERMIT VOIDED:	SIGNATURE:
DATE PERMIT REVOKED:	SIGNATURE:

NEW SOURCE REVIEW PERMIT TO INSTALL

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Section **Page**

Common Abbreviations / Acronyms Used in this Permit to Install

Common Acronyms		Pollutant/Measurement Abbreviations	
AQD	Air Quality Division	BTU	British Thermal Unit
ANSI	American National Standards Institute	°C	Degrees Celsius
BACT	Best Available Control Technology	CO	Carbon Monoxide
CAA	Clean Air Act	dscf	Dry standard cubic foot
CEM	Continuous Emission Monitoring	dscm	Dry standard cubic meter
CFR	Code of Federal Regulations	°F	Degrees Fahrenheit
COM	Continuous Opacity Monitoring	gr	Grains
EPA	Environmental Protection Agency	Hg	Mercury
EU	Emission Unit	hr	Hour
FG	Flexible Group	H_2S	Hydrogen Sulfide
GACS	Gallon of Applied Coating Solids	HP	Horsepower
GC	General Condition	lb	Pound
HAP	Hazardous Air Pollutant	m	Meter
HVLP	High Volume Low Pressure *	mg	Milligram
ID	Identification	mm	Millimeter
LAER	Lowest Achievable Emission Rate	MM	Million
MACT	Maximum Achievable Control Technology	MW	Megawatts
MAERS	Michigan Air Emissions Reporting System	NOx	Oxides of Nitrogen
MAP	Malfunction Abatement Plan	PM	Particulate Matter
MDEQ	Michigan Department of Environmental Quality	PM-10	Particulate Matter less than 10 microns diameter
MIOSHA	Michigan Occupational Safety & Health Administration	pph	Pound per hour
MSDS	Material Safety Data Sheet	ppm	Parts per million
NESHAP	National Emission Standard for Hazardous Air Pollutants	ppmv	Parts per million by volume
NSPS	New Source Performance Standards	ppmw	Parts per million by weight
NSR	New Source Review	psia	Pounds per square inch absolute
PS	Performance Specification	psig	Pounds per square inch gauge
PSD	Prevention of Significant Deterioration	scf	Standard cubic feet
PTE	Permanent Total Enclosure	sec	Seconds
PTI	Permit to Install	SO_2	Sulfur Dioxide
RACT	Reasonable Available Control Technology	THC	Total Hydrocarbons
SC	Special Condition	tpy	Tons per year
SCR	Selective Catalytic Reduction	μg	Microgram
SRN	State Registration Number	VOC	Volatile Organic Compounds
TAC	Toxic Air Contaminant	yr	Year
VE	Visible Emissions		

* For High Volume Low Pressure (HVLP) applicators, the pressure measured at the HVLP gun air cap shall not exceed ten (10) pounds per square inch gauge (psig).

GENERAL CONDITIONS

1. The process or process equipment covered by this permit shall not be reconstructed, relocated, or modified, unless a Permit to Install authorizing such action is issued by the Department, except to the extent such action is exempt from the Permit to Install requirements by any applicable rule. **[R336.1201(1)]**

2. If the installation, construction, reconstruction, relocation, or modification of the equipment for which this permit has been approved has not commenced within 18 months, or has been interrupted for 18 months, this permit shall become void unless otherwise authorized by the Department. Furthermore, the permittee or the designated authorized agent shall notify the Department via the Supervisor, Permit Section, Air Quality Division, Michigan Department of Environmental Quality, P.O. Box 30260, Lansing, Michigan 48909, if it is decided not to pursue the installation, construction, reconstruction, relocation, or modification of the equipment allowed by this Permit to Install. **[R336.1201(4)]**

3. If this Permit to Install is issued for a process or process equipment located at a stationary source that is not subject to the Renewable Operating Permit program requirements pursuant to R336.1210, operation of the process or process equipment is allowed by this permit if the equipment performs in accordance with the terms and conditions of this Permit to Install. **[R336.1201(6)(b)]**

4. The Department may, after notice and opportunity for a hearing, revoke this Permit to Install if evidence indicates the process or process equipment is not performing in accordance with the terms and conditions of this permit or is violating the Department's rules or the Clean Air Act. **[R336.1201(8), Section 5510 of Act 451, PA 1994]**

5. The terms and conditions of this Permit to Install shall apply to any person or legal entity that now or hereafter owns or operates the process or process equipment at the location authorized by this Permit to Install. If the new owner or operator submits a written request to the Department pursuant to R336.1219 and the Department approves the request, this permit will be amended to reflect the change of ownership or operational control. The request must include all of the information required by subrules (1)(a), (b), and (c) of R336.1219. The written request shall be sent to the District Supervisor, Air Quality Division, Michigan Department of Environmental Quality. **[R336.1219]**

6. Operation of this equipment shall not result in the emission of an air contaminant which causes injurious effects to human health or safety, animal life, plant life of significant economic value, or property, or which causes unreasonable interference with the comfortable enjoyment of life and property. **[R336.1901]**

7. The permittee shall provide notice of an abnormal condition, start-up, shutdown, or malfunction that results in emissions of a hazardous or toxic air pollutant which continue for more than one hour in excess of any applicable standard or limitation, or emissions of any air contaminant continuing for more than two hours in excess of an applicable standard or limitation, as required in Rule 912, to the Department. The notice shall be provided not later than two business days after start-up, shutdown, or discovery of the abnormal condition or malfunction. Written reports, if required, must be filed with the Department within 10 days after the start-up or shutdown occurred, within 10 days after the abnormal conditions or malfunction has been corrected, or within 30 days of discovery of the abnormal condition or malfunction, whichever is first. The written reports shall include all of the information required in Rule 912(5). **[R336.1912]**

8. Approval of this permit does not exempt the permittee from complying with any future applicable requirements which may be promulgated under Part 55 of 1994 PA 451, as amended or the Federal Clean Air Act.

9. Approval of this permit does not obviate the necessity of obtaining such permits or approvals from other units of government as required by law.

10. Operation of this equipment may be subject to other requirements of Part 55 of 1994 PA 451, as amended and the rules promulgated thereunder.

11. Except as provided in subrules (2) and (3) or unless the special conditions of the Permit to Install include an alternate opacity limit established pursuant to subrule (4) of R336.1301, the permittee shall not cause or permit to be discharged into the outer air from a process or process equipment a visible emission of density greater than the most stringent of the following. The grading of visible emissions shall be determined in accordance with R336.1303. **[R336.1301]**

    a) A six-minute average of 20 percent opacity, except for one six-minute average per hour of not more than 27 percent opacity.

    b) A visible emission limit specified by an applicable federal new source performance standard.

    c) A visible emission limit specified as a condition of this permit to install.

12. Collected air contaminants shall be removed as necessary to maintain the equipment at the required operating efficiency. The collection and disposal of air contaminants shall be performed in a manner so as to minimize the introduction of contaminants to the outer air. Transport of collected air contaminants in Priority I and II areas requires the use of material handling methods specified in R336.1370(2). **[R336.1370]**

13. The Department may require the permittee to conduct acceptable performance tests, at the permittee's expense, in accordance with R336.2001 and R336.2003, under any of the conditions listed in R336.2001. **[R336.2001]**

SPECIAL CONDITIONS

Modes of Kiln Operation

The special conditions for this permit are written in two distinct sections according to the mode of operation each kiln is operating under. The two modes the kilns may operate under are defined as "Conventional Mode" or "Alternative Fuels and Materials Mode" ("AFM Mode").

Conventional mode is defined as those times that the kiln is being fired with the following materials, alone or in combination with each other:

- Coal, up to 100% of the total heat input to the kiln
- Petroleum Coke, up to 25% of the total heat input to the kiln
- Tire Derived fuel, less than 4.6 tons per hour, or less than 21% of the total heat input to the kiln.
- Used oil generated both on site and off site that meets the specifications contained in Attachment E including during startup.
- Natural gas
- Silica Gel
- Diesel Fuel

AFM mode is defined as those times that the kiln is being fired with any of the following fuels, alone or in combination with any alternative fuel(s)/material(s) listed in Attachment A and materials listed for Conventional Mode of this permit:

- Petroleum Coke greater than 25% of the total heat input to the kiln.
- Tired Derived Fuel, greater than 4.6 tons per hour, or greater than 21% of the total heat input to the kiln
- Used oil other than that specified under conventional mode above.

Those special conditions listed under SECTION 3. apply at all times that the kilns are operating.

Emission Unit Identification

Emission Unit ID	Emission Unit Description	Stack Identification
EUKILN1	Wet process cement kiln equipped with fabric filter control, carbon injection system, slurry scrubbers, and three regenerative thermal oxidizers.	SV00001
EUKILN2	Wet process cement kiln equipped with fabric filter control, carbon injection system, slurry scrubbers, and three regenerative thermal oxidizers.	SV00001
Changes to the equipment described in this table are subject to the requirements of R336.1201, except as allowed by R336.1278 to R336.1290.		

Flexible Group Identification

Flexible Group ID	Emission Units Included in Flexible Group	Stack Identification
FGKILNS	EUKILN1 and EUKILN2	N/A
FGFACILITY	All equipment at the facility including equipment covered by other permits, grand-fathered equipment and exempt equipment.	N/A

SECTION 1. SPECIAL CONDITIONS FOR KILN(S) OPERATING IN CONVENTIONAL MODE

Emission Limits

1. The particulate emission rate from FGKILNS shall not exceed 0.30 pounds per ton of dry feed.

2. The permittee shall not process more than 2,237,596 tons of dry feed in FGKILNS per year based on a 12 month rolling time period as determined at the end of each calendar month. Dry feed shall be defined as any dry material fed to the kiln, including: limestone, clay, flyash, bottom ash, silica gel by-product, and excluding solid fuels such as coal and petroleum coke.

   a. The dioxin and furan emission rate from FGKILNS shall not exceed 0.2 nanograms Toxic Equivalent "TEQ" per dry standard cubic meter of exhaust gas at 7% O_2. This limit is applicable when the exhaust gas temperature to the fabric filter collector is greater than 400 °F.

   b. The dioxin and furan emission rate from FGKILNS shall not exceed 0.4 nanograms Toxic Equivalent per dry standard cubic meter of exhaust gas at 7% O_2. This limit is applicable when the exhaust gas temperature to the fabric filter collector is less than or equal to 400 °F.

3. The sulfur dioxide emission rate from FGKILNS shall not exceed 11,940 tons per year based on a 12-month rolling period as determined at the end of each calendar month.

4. The nitrogen oxides emissions rate from FGKILNS shall not exceed 3,377 tons per year based on a 12-month rolling period as determined at the end of each calendar month.

5. The carbon monoxide emission rate from FGKILNS shall not exceed 3,515 tons per year based on a 12-month rolling period as determined at the end of each calendar month.

6. The volatile organic compounds (VOC) emission rate from FGKILNS shall not exceed 7,217 tons per year based on a 12-month rolling period as determined at the end of each calendar month.

7. Except as provided in Special Condition No. 29, visible emissions from FGKILNS shall not exceed a 6-minute average of 15 percent opacity in the stack based on the continuous opacity monitoring system. When there is a detached plume from FGKILNS during, but not limited to; visible emission monitor outages, malfunctions and/or calibrations; the visible emissions shall not exceed a 6-minute average of 20 percent opacity at the stack. If the COM downtime during daylight hours exceeds 6 hours, Holcim (US) Inc. staff or representatives certified in reading visible emissions evaluations in accordance with

40 CFR part 60, appendix, A, Method 9, as modified to read only at the top of the kiln stack, shall conduct visual opacity observations in accordance with 40 CFR part 63.1350(c) (Method 9 for 30 minutes).

Operating Requirements

8. Permittee shall not operate FGKILNS unless the fabric filter collectors and either the activated carbon adsorbent injection system or the slurry scrubbers and regenerative thermal oxidizers are installed and operating properly.

9. The fabric filter collectors shall be operating when the fabric filter inlet temperature is between 280 and 475°F. Bypassing of the collectors will be allowed during startup, provided no raw materials are fed to the kiln(s) and firing is either with natural gas, diesel, or used oil. Bypassing of the collectors due to high temperatures (above 475°F.) will be permitted, provided all raw materials and fuels fed to the kiln(s) cease.

10. The maximum amount of TDF fired in FGKILNS combined shall not exceed 4.6 tons per hour based upon a 24-hour average calculated at the end of each hour.

11. The hourly heat input to either kiln from TDF feed shall not exceed 21% of the total heat input to that kiln.

12. The hourly heat input to either kiln from petroleum coke shall not exceed 25% of the total heat input to that kiln.

13. Permittee shall not operate FGKILNS unless the program for continuous fugitive dust control for all plant roadways, the plant yard, all material storage piles and all material handling operations specified in Attachment B has been implemented and is maintained.

14. Permittee shall not operate FGKILNS unless the malfunction abatement plan/preventative maintenance program, specified in Attachment C, for the fabric filter collector emission control system and sorbent and conditioning materials storage injection and handling system has been implemented and is maintained.

15. During times that the carbon injection system is being operated, the nominal amount of carbon injected into each kiln exhaust ahead of the fabric filter collector shall be uniformly distributed throughout the hour, not including startup, and shutdown as defined in Special Condition No. 29, and shall not be less than 295 pounds per hour calculated as a five hour rolling average updated each hour, or less than 280 pounds for any individual hour for each operating kiln. For purposes of calculating the five hour rolling average, all hourly carbon injection feeds in excess of 305 pounds shall be set equal to 305 pounds. Alternate substances and/or injection rates may be established by the Department after an acceptable demonstration has been made by the permittee that compliance with the particulate emission and visible emission limitations will be achieved. Attachment D provides examples of compliance with this permit condition.

Monitoring and Recordkeeping Requirements

16. Permittee shall monitor and record hourly the amount of TDF and coal/coke mixture fired in FGKILNS, and calculate the TDF 24-hour average usage rate in a manner and with instrumentation acceptable to the AQD. All records including the measured TDF and coal/coke mixture hourly usage rate, the calculated TDF and coke hourly heat input rates, and the calculated TDF 24-hour average usage rate shall be kept on file for a period of at least five years and made available to the AQD upon request.

17. Permittee shall monitor and record the kiln feed rate every two hours in a manner and with instrumentation acceptable to the AQD. Permittee shall use the kiln feed rate to calculate bi-hourly production rates. All records shall be kept on file for a period of a least five years and made available to the AQD.

18. Permittee shall monitor and record the gas temperature at the inlet of the kilns' particulate control device on a continuous basis in a manner and with instrumentation acceptable to the Air Quality Division. All records shall be kept on file for a period of at least five years and made available to the AQD upon request.

19. Permittee shall monitor and record the visible emissions from the cement kilns on a continuous basis. The continuous opacity monitoring system (COMS) shall be installed, calibrated, maintained and operated in accordance with the procedures set forth in 40 CFR 60.13 and Performance Specification 1 (PS 1), Appendix B of 40 CFR Part 60. Data collected by the opacity monitoring system shall be collected for a minimum of 95 percent of the operating hours of FGKILNS per month and in a manner and with instrumentation acceptable to the District Supervisor, AQD. The permittee shall use all reasonable measures necessary to operate the continuous opacity monitoring system during periods of startup, shutdown and malfunction. In accordance with 40 CFR Parts 60.7 and 60.13(h) the magnitude, in actual percent opacity, of all six minute averages of opacity greater than 15 percent and the time period represented by such averages and any deficiencies of the opacity monitoring system up-time shall be submitted in an acceptable format to the District Supervisor, AQD, within 30 days following the end of the quarter. Permittee shall perform an annual audit of the COMS using the procedures put forth in U.S. EPA publication No. 450/4-92-010, "Performance Audits Procedures for Opacity Monitors", and all amendments thereto. The results of the annual audit shall be submitted to the District Supervisor within 15 days of receipt. Further, all monitoring data shall be kept on file for a period of at least five years and made available to the District Supervisor upon request.

20. Permittee shall monitor and record the sulfur dioxide and nitrogen dioxide emission from the cement kilns' common exhaust duct or stack on a continuous basis in a manner and with instrumentation acceptable to the AQD. In accordance with 40 CFR 60.7(c) and (d), the permittee shall submit two copies of an excess emission report (EER) and summary report in an acceptable format to the AQD, within 30 days following the end of each calendar quarter. The Summary Report shall follow the format of Figure 1 in 40 CFR 60.7(d) or an alternate format approved by the District Supervisor. The EER shall include the following information.
    a) A report of each exceedance above the limits specified in Special Conditions numbers 3 and 4. This includes the date, time, magnitude, cause and corrective actions of all occurrences during the reporting period.
    b) A report of all periods of CEMS downtime and corrective action.
    c) A report of the total operating time of the cement kilns during the reporting period.
    d) If no exceedances or CEMS downtime occurred during the reporting period, permittee shall report that fact.
    e) A report of any periods that the CEMS exceeds the instrument range.

These monitors and the resulting data shall be used for determining compliance with Special Conditions numbers 3 and 4.

21. Permittee shall keep a record of the monthly usage rate of used oil. Such records shall be kept on file for a period of at least five years and made available to the AQD Division upon request.

Testing Requirements

22. Permittee shall analyze TDF, coal and coke fuels for their individual heat and metal contents on a semi-annual basis, using a method(s) acceptable to the AQD, a testing/analysis procedure(s) protocol shall be submitted to the District Supervisor, AQD, for approval. Metals to be analyzed for should include manganese, mercury and nickel as a minimum. Results of these analyses shall be kept on file for a period of at least five years and made available to the AQD upon request. After two years from the date of approval of this permit the permittee may apply for a change in frequency of testing. The change in testing frequency request shall be submitted to and approved by the District Supervisor, AQD.

23. Permittee shall analyze raw materials fed to FGKILNS for sulfur and metal content on a semi-annual basis using a method(s) acceptable to the AQD, testing/analysis procedure(s) protocol shall be submitted to the District Supervisor, Air Quality Division, for approval. Metals to be analyzed for should include manganese, mercury and nickel as a minimum. Results of these analyses shall be kept on file for a period of at least five years and made available to the AQD upon request. After two years from the date of approval of this permit the permittee may apply for a change in frequency of testing. The change in testing frequency request shall be submitted to and approved by the District Supervisor, AQD.

24. Permittee shall collect and analyze a representative composite sample of all categories of used oil to determine the physical and chemical properties for compliance with the specifications listed in Attachment E. Samples of used oil generated on-site shall be collected at least twice per calendar year with sampling procedures and analytical techniques, including quality assurance procedures, acceptable to the AQD. Samples of used oil generated off-site shall be collected for each load to determine compliance with the specifications in Attachment E in accordance with sampling procedures and analytical techniques, including quality assurance procedures, acceptable to the AQD. Upon request of the AQD, permittee shall collect and analyze representative individual samples of each category of the used oil. All sampling records and analytical results shall be kept on file for a period of at least five years and made available to the AQD upon request.

25. Rules 1001, 1003, and 1004 - Verification of particulate, sulfur dioxide, nitrogen oxides, carbon monoxide, all heavy metals, and VOC emission rates, from FGKILNS by testing, at owner's expense, in accordance with Department requirements, may be required. The testing shall be conducted within 60 days following the receipt of the written notification of the requirement. Verification of emission rates includes the submittal of a complete report of the test results. If testing is required, a complete test plan must be submitted to the AQD. The final plan must be approved by the Division prior to testing and a complete report of test results must be submitted to the Division within 60 days following the last date of testing.

Malfunction Abatement Requirements

26. Raw material input feed to FGKILNS shall cease immediately, consistent with safe operating procedures, upon an initiation of the fabric filter collector bypass. Input feed to FGKILNS shall not restart until the fabric filter collector is back on line and functioning properly.

Miscellaneous Requirements

27. The exhaust gases from FGKILNS shall be discharged unobstructed vertically upwards to the ambient air from a stack with a maximum diameter of 180 inches at an exit point not less than 350 feet above ground level.

28. A complete copy of the carbon specifications supplied by the carbon vendor and a statement of equivalence with the carbon currently in use shall be submitted to the District Supervisor immediately upon delivery of a shipment of carbon from a new vendor.

29. The emission limitations in Special Condition No. 7 shall not be applicable during periods of startup and during periods of shutdown. Startup shall be defined as the period of time when only natural gas, fuel oil or used oil is put to the burner pipe for the purpose of heating up the kiln with no other raw materials or AFM is being introduced. Shutdown shall be defined as a halting of the production process.

SECTION 2. SPECIAL CONDITIONS FOR KILN(S) OPERATING IN AFM MODE

The following conditions apply to: FGKILNS

Emission Limits

	Pollutant/Material	Equipment	Limit	Time Period	Testing/ Monitoring Method	Applicable Requirement
101a	PM	FGKILNS	0.30 lb/ton of dry feed to the kilns	12 month rolling time period as determined at the end of each calendar month	USEPA Method 5, General Condition 13	40 CFR Part 63
101b	Dioxin/Furan	FGKILNS	0.2 ng TEQ/dscm[1]	Test Protocol	General Condition 13, USEPA method 23	40 CFR Part 63
101c	Dioxin/Furan	FGKILNS	0.4 ng TEQ/dscm[2]	Test Protocol	USEPA method 23, General Condition 13	40 CFR Part 63
101d	Mercury	FGKILNS	115 pounds per year	12 month rolling time period as determined at the end of each calendar month	Parametric Operating Monitoring System and Materials Management Plan	R336.1225
101e	Antimony	FGKILNS	0.20 µg/cubic meter[3]	24 hour averaging period	Parametric Operating Monitoring System and Materials Management Plan	R336.1225

[1] Units are nanograms Toxic Equivalent (TEQ) per dry standard cubic meter (dsm) of exhaust gas at 7% O_2. This limit is applicable when the exhaust gas temperature to the fabric filter collector is greater than 400 °F.

[2] Units are nanograms Toxic Equivalent (TEQ) per dry standard cubic meter (dsm) of exhaust gas at 7% O_2. This limit is applicable when the exhaust gas temperature to the fabric filter collector is less than or equal to 400 °F.

	Pollutant/Material	Equipment	Limit	Time Period	Testing/ Monitoring Method	Applicable Requirement
101f	Antimony	FGKILNS	5.6 mg/ cubic meter[4]	Test Protocol	General Condition 13	R336.1225
101g	Arsenic	FGKILNS	0.0002 µg/cubic meter[3]	12 month rolling time period as determined at the end of each calendar month.	Parametric Operating Monitoring System and Materials Management Plan	R336.1225
101h	Arsenic	FGKILNS	67.2 µg/ cubic meter[4]	Test Protocol	General Condition 13	R336.1225
101i	Barium	FGKILNS	5 µg/cubic meter[3]	8 hour averaging period.	Parametric Operating Monitoring System and Materials Management Plan	R336.1225
101j	Barium	FGKILNS	65.2 mg/ cubic meter[4]	Test Protocol	General Condition 13	R336.1225
101k	Beryllium	FGKILNS	0.02 µg/cubic meter[3]	24 hour averaging period.	Parametric Operating Monitoring System and Materials Management Plan	40 CFR Part 52.21
101l	Beryllium	FGKILNS	560 µg/cubic meter[4]	Test Protocol	General Condition 13	R336.1225
101m	Cadmium	FGKILNS	0.0006 µg/ cubic meter[3]	12 month rolling time period as determined at the end of each calendar month.	Parametric Operating Monitoring System and Materials Management Plan	R336.1225

[3] Limit is expressed as a maximum ambient concentration. Compliance with the limit shall be demonstrated by the methodology contained in special condition number 114.

[4] Limit is expressed as an in stack concentration.

	Pollutant/Material	Equipment	Limit	Time Period	Testing/ Monitoring Method	Applicable Requirement
101n	Cadmium	FGKILNS	201.6 µg/ cubic meter[4]	Test Protocol	General Condition 13	R336.1225
101o	Chromium	FGKILNS	0.000083 µg/cubic meter[3]	12 month rolling time period as determined at the end of each calendar month	Parametric Operating Monitoring System and Materials Management Plan, GC 13	R336.1225
101p	Chromium	FGKILNS	27.9 µg/ cubic meter[4]	Test Protocol	General Condition 13	R336.1225
101q	Copper	FGKILNS	2.0 µg/cubic meter[3]	8 hour averaging period	Parametric Operating Monitoring System and Materials Management Plan	R336.1225
101r	Copper	FGKILNS	26.1 mg/ cubic meter[4]	Test Protocol	General Condition 13	R336.1225
101s	Manganese	FGKILNS	0.05 µg/cubic meter[3]	24-hour averaging period	Parametric Operating Monitoring System and Materials Management Plan	R336.1225
101t	Manganese	FGKILNS	1.4 mg/ cubic meter[4]	Test Protocol	General Condition 13	R336.1225
101u	Nickel	FGKILNS	0.0042 µg/cubic meter[3]	12 month rolling time period as determined at the end of each calendar month	Parametric Operating Monitoring System and Materials Management Plan	R336.1225
101v	Nickel	FGKILNS	1.4 mg/ cubic meter[4]	Test Protocol	General Condition 13	R336.1225

	Pollutant/Material	Equipment	Limit	Time Period	Testing/ Monitoring Method	Applicable Requirement
101w	Selenium	FGKILNS	2 µg/cubic meter[3]	8-hour averaging period	Parametric Operating Monitoring System and Materials Management Plan	R336.1225
101x	Selenium	FGKILNS	26.1 mg/ cubic meter[4]	Test Protocol	General Condition 13	R336.1225
101y	Silver	FGKILNS	0.1 µg/cubic meter[3]	8 hour averaging period	Parametric Operating Monitoring System and Materials Management Plan System	R336.1225
101a	Silver	FGKILNS	1.3 mg/ cubic meter[4]	Test Protocol	General Condition 13	R336.1225
101aa	Thallium	FGKILNS	0.1 µg/cubic meter[3]	12 month rolling time period as determined at the end of each calendar month	Parametric Operating Monitoring System and Materials Management Plan	R336.1225
101bb	Thallium	FGKILNS	33.6 mg/ cubic meter[4]	Test Protocol	General Condition 13	R336.1225
101cc	Zinc	FGKILNS	0.1µg/cubic meter[3]	12 month rolling time period as determined at the end of each calendar month	Parametric Operating Monitoring System and Materials Management Plan	R336.1225
101dd	Zinc	FGKILNS	33.6 mg/ cubic meter[4]	Test Protocol	General Condition 13	R336.1225

	Pollutant/Material	Equipment	Limit	Time Period	Testing/ Monitoring Method	Applicable Requirement
101ee	Sulfur dioxide	FGKILNS	11,940 tons per year	12 month rolling time period as determined at the end of each calendar month	Continuous Emission Monitor	R336.1205(1)
101ff	Nitrogen oxides	FGKILNS	3,377 tons per year	12 month rolling time period as determined at the end of each calendar month	Continuous Emission Monitor	R336.1205(1)
101gg	Carbon Monoxide	FGKILNS	3,515 tons per year	12 month rolling time period as determined at the end of each calendar month	CEMS	R336.1205(1)
101hh	Volatile Organic Compounds	FGKILNS	7,217 tons per year	12 month rolling time period as determined at the end of each calendar month.	Continuous Emission Monitor	R336.1205(1)
101ii	2-Naphthylamine	FGKILNS	436.8 µg/ cubic meter[4]	Test Protocol	General Condition 13	R336.1225
101jj	3,3-Dichlorobenzidine	FGKILNS	6.7 mg/ cubic meter[4]	Test Protocol	General Condition 13	R336.1225
101kk	Ethylene Dibromide	FGKILNS	16.8 mg/ cubic meter[4]	Test Protocol	General Condition 13	R336.1225
101ll	Hexachlorobenzene	FGKILNS	6.7 mg/ cubic meter[4]	Test Protocol	General Condition 13	R336.1225

Visible Emission Limits

102. Except as provided in Special condition No. 29, visible emissions from FGKILNS shall not exceed a 6-minute average of 15 percent opacity in the stack based on the continuous opacity monitoring system. When there is a detached plume from FGKILNS during, but not limited to; visible emiss ion monitor outages, malfunctions and/or calibrations; the visible emissions shall not exceed a 6-minute average of 20 percent opacity at the stack. If the COM downtime during daylight hours exceeds 6 hours, Holcim (US) Inc. or representatives certified n performing visible emissions evaluations in accordance with 40 CFR part 60, Appendix A Method 9, (as modified to read only at the top of the kiln stack, shall conduct visible opacity observations in accordance with 40 CFR part 63.1350(c) (Method 9 for 30 minutes). Shutdown shall be defined as a halting of the production process.

Material Usage Limits

103. Permittee shall not process any AFM in FGKILNS which exhibit any of the following characteristics or properties

- Chloride content greater than 5,000 parts per million.
- There shall be no detectable amounts of asbestos in any AFM used in the kilns. Asbestos levels shall be determined from the AFM suppliers' constituent profile.
- The AFM meets any of the criteria established in defining hazardous waste as contained in the Resource Conservation and Recovery Act (RCRA) regulations (40 CFR 261) (see attachment F).
- Radioactive materials
- Biological or infectious wastes, including but not limited to hospital or medical wastes.
- PCB greater than 49 parts per million
- Meets any F, K, P or U Hazardous Waste Listing Descriptions of RCRA 40 CFR 261.
- Heat content less than 4,000 BTU's per pound.
- Municipal solid waste.

104. Permittee shall only inject AFM into the hot end of FGKILNS (i.e. the portion of the kilns from where whole tires are injected to the location where fuels are burned).

105. The permittee shall not process more than 2,237,596 tons of dry feed in FGKILNS per year based on a 12 month rolling time period as determined at the end of each calendar month. Dry feed shall be defined as any dry material fed to the kiln, including: limestone, clay, flyash, bottom ash, silica gel by-product, and excluding solid fuels such as coaland petroleum coke.

Process/Operational Limits

106. The Permittee shall not operate the kilns unless the fabric filter collectors and either the activated carbon adsorbent injection system or the slurry scrubbers and regenerative thermal oxidizers are installed and operating properly **[R336.1225]**.

107. Permittee shall not operate the kilns unless the program for continuous fugitive dust control for all plant roadways, the plant yard, all material storage piles and all material handling operations specified in Attachment B has been implemented and is maintained. **[R336.1901]**

108. Permittee shall not operate the kilns unless the malfunction abatement plan/preventative maintenance program, specified in Attachment C, for the fabric filter collector emission control system and adsorbent and conditioning materials storage injection and handling system has been implemented and is maintained **[R336.1911]**.

109. During times that the carbon injection system is being operated, the nominal amount of carbon injected into each kiln exhaust ahead of the fabric filter collector shall be uniformly distributed throughout the hour, not including startup, and shutdown be less than 295 pounds per hour calculated as a five hour rolling average updated each hour, or less than 280 pounds for any individual hour for each operating kiln. For purposes of calculating the five-hour rolling average, all hourly carbon injection feeds in excess of 305 pounds shall be set equal to 305 pounds. Alternate substances and/or injection rates may be established by the Department after an acceptable demonstration has been made by the permittee that compliance with the particulate emission and visible emission limitations

will be achieved. Attachment D provides examples of compliance with this permit conditions. **[R336.1901]**

110. The Permittee shall only burn AFM in the kilns only when the following conditions are being met
    - The Nitrogen Dioxide, Sulfur Dioxide, Carbon Monoxide, and total hydrocarbon Continuous Emission Monitors are installed and are operating properly
    - The Continuous Opacity Monitor is installed and is operating properly
    - The excess O_2 monitor is installed and operating properly and O_2 as measured at the kiln gas exit is maintained at 0.5% or greater, based upon a 60-minute rolling averaging period, updated each minute.
    - The kiln temperature, as measured in the combustion zone of the kiln is operating at or above, 2100°F or greater based upon a 60-minute rolling averaging period, updated each minute.
    - The device measuring exhaust gas temperature at the inlet to the air pollution control device is installed and is operating properly. The temperature shall be measured on a 3-hour rolling average updated every minute per Portland Cement MACT requirements.
    - A negative pressure is established and maintained at the kiln gas exit, measured as a 60 minute rolling average updated every minute.

    [R336.1201(3), R336.1225]

111. The Permittee shall automatically and immediately discontinue operating in AFM mode per kiln under any one of the following conditions:

    - Clinker production in the kiln is halted.
    - Both the carbon injection system and the slurry scrubber and regenerative thermal oxidizers are malfunctioning
    - During periods of kiln startup, shutdown, or malfunction.
    - During fabric filter collector bypass mode.

    [R336.1201(3) R336.1225]

112. The Permittee shall automatically and immediately take corrective action if there is a measure opacity of 15% or greater. If the measured opacity reading is over two hours in duration the permittee will discontinue the use of AFM.

113. Permittee shall not process any AFM in FGKILNS which has not been through the Qualification Analysis of the "Alternative Fuels and Materials Management Process", Attachment G **[R336.1201(3)]**.

114. Permittee shall not process any AFM in FGKILNS which has not been recorded in the Parametric Operating Monitoring System (POMS) and shown to be in compliance with the appropriate screening levels **[R336.1201(3)]**.

115. Permittee shall not make any changes to the Parametric Operating Monitoring System without the written approval of the District Supervisor **[R336.1201(3)]**..

116. Within 60 days of permit approval, permittee shall provide the District Supervisor with an updated copy of the Parametric Operating Monitoring System which will be used by the facility for recordkeeping and for demonstrating compliance with the appropriate emission limitations. The Parametric Operating Monitoring System shall be based upon the AERMOD dispersion model. The permittee shall modify POMS to incorporate any subsequent EPA approved AERMOD modification

which have impact on the predicted ambient concentrations used in POMS within 90 days of such modification. Any modifications to the POMS shall be provided to the District Supervisor within 60 days of the AERMOD model modifications becoming effective. **[R336.1201(3)].**

Testing

117. Permittee shall test all AFM in accordance with the procedures set forth in Attachment G, "Alternative Fuels and Materials Management Process" **[R336.1201(3)]**.

118. Previous to processing AFM in the kilns, and no later than 90 days of the issuance of this permit, verification of the destruction removal efficiency of either kiln shall be determined, by testing in accordance with Department requirements, will be required. No less than 60 days prior to testing, a complete test plan shall be submitted to the AQD. The final plan must be approved by the AQD prior to testing. The purpose of the testing is to verify that the kiln is capable of achieving a destruction removal efficiency of 99.99%. DRE testing shall be conducted at representative operating conditions, agreed to in the test plan. The test plan shall also address all points on the kiln where alterative fuels and materials will be introduced. The permittee shall not operate in AFM mode until the results of the destruction removal efficiency tests have been approved by the AQD. **[R336.1201(3)]**.

Monitoring

119. Permittee shall monitor visible emission from the cement kilns on a continuous basis. The continuous opacity monitoring system (COMS) shall be installed, calibrated, maintained and operated in accordance with the procedures set forth in 40 CFR 60.13 and Performance Specification 1 (PS 1), Appendix B of 40 CFR Part 60. Data collected by the opacity monitoring system shall be collected for a minimum of 95% of the operating hours of the kilns per month and in a manner and with instrumentation acceptable to the District Supervisor, AQD. The permittee shall use all reasonable measures necessary to operate the continuous monitoring system during periods of startup, shutdown, or malfunction. In accordance with 40 CFR Parts 60.7 and 60.13(h) the magnitude, in actual percent opacity, of all six minute averages of opacity greater than 15% and the time period represented by such averages and any deficiencies of the opacity monitoring system up-time shall be submitted in an acceptable format to the District Supervisor, AQD, with 30 days following the end of the quarter. Permittee shall perform an annual audit of the COMS using the procedures put forth in U.S. EPA publication No. 450/4-92-010, "Performance Audits Procedures for Opacity Monitors", and all amendments thereto. The results of the annual audit shall be submitted to the District Supervisor within 15 days of receipt. Further, all monitoring data shall be kept on file for a period of at least five years and made available to the District Supervisor upon request.

120. Permittee shall monitor and record the sulfur dioxide, nitrogen dioxide, carbon monoxide, and total hydrocarbons emissions from the cement kilns' common exhaust duct or stack on a continuous basis in a manner and with instrumentation acceptable to the AQD. Installation and operation of the sulfur dioxide, nitrogen dioxide, carbon monoxide, and total hydrocarbon continuous emission monitoring systems shall meet the following timelines:
   a). Within 60 calendar days after the issuance of this permit, permittee shall submit two copies of a Monitoring Plan to the AQD, for review and approval. The Monitoring Plan shall include

drawings or specifications showing proposed locations and descriptions of the required CEMS.

b) Within 150 calendar days after the issuance of this permit, the permittee shall submit two copies of a complete test plan for the CEMS to the AQD for approval.
c) Within 90 calendar days after AQD's approval of the test plan, the permittee shall complete the installation and testing of the CEMS.
d) Within 60 days after completion of installation and testing of the CEMS, the permittee shall submit to the AQD two copies of the final report demonstrating CEMS complies with the requirements of Performance Specifications (PS) 2 of Appendix B, 40 CFR Part 60 for NOx and SO2 Performance Specification PS 4B for carbon monoxide and Performance Specification PS 8A for total hydrocarbons.

The sulfur dioxide, nitrogen dioxide, carbon monoxide, and total hydrocarbon CEMS required by this condition shall meet the following requirements:

e) The span value shall be 2.0 times the lowest emission standard or as specified in the federal regulations
f) The CEMS shall be installed, calibrated, maintained, and operated in accordance with the procedures set forth in 40 CFR 60.13 and PS 2 of Appendix B, 40 CFR Part 60 for NOx and SO_2, PS 4B for carbon monoxide and PS 8A for total hydrocarbons.
g) Each calendar quarter, the permittee shall perform and report the Quality Assurance Procedures of the CEMS set forth in Appendix F of 40 CFR Part 60. Within 30 days following the end of each calendar quarter, the Permittee shall submit the results to the AQD in the format of the data assessment report (Figure 1, Appendix F).
i) All monitoring data shall be kept on file for a period of at least five years and made available to the AQD upon request.

In accordance with 40 CFR 60.7(c) and (d), the permittee shall submit two copies of an excess emission report (EER) and summary report in an acceptable format to the AQD, within 30 days following the end of each calendar quarter. The Summary Report shall follow the format of Figure 1 in 40 CFR 60.7(d). The EER shall include the following information.

j) A report of each exceedance above the limits specified in Special Conditions numbers 2 and 3. This includes the date, time, magnitude, cause and corrective actions of all occurrences during the reporting period.
k) A report of all periods of CEMS downtime and corrective action.
l) A report of the total operating time of the cement kilns during the reporting period.
m) If No exceedances or CEMS downtime occurred during the reporting period, permittee shall report that fact.
n) A report of any periods that the CEMS exceeds the instrument range.

These monitors and the resulting data shall be used for determining compliance with Special Conditions 101ee, 101ff, 101gg, and 101hh.

121 The AQD reserves the right to obtain samples of AFM used at the facility and to have sample(s) independently tested.

Recordkeeping/Reporting/Notification

122. Permittee shall keep the following records:
   - Date and time
   - Operating Mode of the kiln(s)
   - Heat input of all AFM used in the kilns and relative contribution of each components heat release.
   - Amount of AFM used.
   - Dry kiln feed rate
   - Visible emissions
   - Oxygen content at the outlet of the kiln
   - Temperature at the inlet of the particulate matter pollution control device
   - SO_2 emission rate
   - NO_x emission rate
   - VOC emission rate
   - CO emission rate
   - Results of AFM Qualitative Analysis.

   All records shall be kept in a format acceptable to the District Supervisor, and shall be kept on file for a period of at least five years.

123. Within 60 days of approval of this permit, the permittee shall submit to the District Supervisor a notification protocol for AFM which qualify for use under the materials management plan. The notification protocol shall have the written approval of the district supervisor.

124. Permittee shall notify the District Supervisor whenever there are unanticipated interruptions in the use of AFM alternative fuels and materials to kilns as a result of any type of malfunction or equipment failure not covered under the facility's startup, shutdown and malfunction abatement plan. The notification of the actions taken must occur within two working days from commencing such actions and shall include:
   - Date
   - Time
   - Materials being fired in the kiln(s)
   - Reason for interrupting AFM to the kiln
   - Corrective action(s) taken to address the malfunction.

Stack/Vent Restrictions

	Stack & Vent ID	Maximum Diameter (inches)	Minimum Height Above Ground Level (feet)	Applicable Requirement
125.	SV00001	180	350	R336.1225
	The exhaust gases shall be discharged unobstructed vertically upwards to the ambient air.			

Miscellaneous Requirements

126. Within 60 days of permit approval, permittee shall submit a Malfunction Abatement Plan/Preventative Maintenance Program for the scrubber/oxidizer controls on the kilns **[R336.1911]**.

SECTION 3. SPECIAL CONDITIONS FOR KILN(S) OPERATING AT ALL TIMES

127. Permittee shall comply with all applicable provisions of R336.1817.

128. Permittee shall comply with all applicable provisions of 40 CFR 63, Subpart LLL.

129. Permittee shall monitor and/or calculate, and record the annual emissions (tons/year) of each regulated NSR pollutant that could increase as a result of this project. Annual emissions, as used in this special condition, means 12 consecutive calendar months beginning with initial operation of either kiln in AFM mode. Annual emissions shall be maintained for a period of at least 5 years after initial use of AFM in either kiln.

130. In the event that annual emissions (tons/year) of each regulated New Source Review (NSR) pollutant (as indicated below) exceeds baseline actual emissions by a significant amount as a result of this project, the permittee shall submit a report to the Administrator. The report shall contain the following information:
- The name, address, and telephone number of the stationary source
- The annual emissions calculated pursuant to Special Condition No. 129 above
- An explanation as to why annual emissions exceeded the pre-construction projected actual emissions.

This information shall be submitted to the administrator within 60 days after the end of such calendar year.

Following are the projected actual emissions for this project:

NSR Pollutant	Baseline Emissions (tons/year)	PSD Significance Level (tons/year)	Baseline + Significance Level (tons/year)
SO_2	11,309.2	40	11,349.2
NO_x	2,400.2	40	2,440.2
CO	3,427.3	100	3,515[1]
VOC	4,187.2	40	4,227.2
PM, total	143.5	25	168.5
PM_{10}, filterable	45.6	15	60.6
Lead	0.1	0.6	0.7

[1] In order for the permittee not to exceed the current allowable limit for CO, the projected actual emissions of CO are capped at the current allowable level.

The values listed in the table above are not emission limits but are only for purposes of indicating when the reporting requirements of this special conditions are applicable.

131. No later than August 1, 2004, Permittee shall conduct POMS validation according to an approved test plan. No less than 60 days prior to testing, a complete test plan shall be submitted to the AQD. The final plan must be approved by the AQD prior to testing. The test results shall be submitted to the

AQD within 60 days of completion of testing. The purpose of the testing is to document the validity of POMS for mercury. POMS shall be the means for assessing compliance with the annual limit in Condition 101d which applies at all times. After initial testing, subsequent tests shall be conducted on a schedule concurrent with the facility's PC MACT kiln testing requirements.

Attachment A
Acceptable Alternative Fuels and Materials

Waste Type	Process of Generation	Examples of Waste
Liquid (non-hazardous)	Waste from machining, lubricating, and cooling operations	• Waste machine oils • Waste machining oils (not emulsioned) • Waste machining emulsions • Synthetic machining oils
Liquid (non-hazardous)	Waste hydraulic oils and brake fluids	• Hydraulic oils (not emulsions) • Emulsions • Hydraulic oils containing only mineral oil • Other hydraulic oils
Liquid (non-hazardous)	Waste engine, gear and lubricating oils	Waste engine, gear and lubricating oils
Liquid (non-hazardous)	Waste insulating and heat transmission oils and other liquids	• Insulating and heat transmission oils and other liquids • Synthetic insulating and heat transmission oils and other liquids • Mineral insulating and heat transmission oils and other liquids
Liquid (non-hazardous)	Bilge Oils	• Bilge oils from inland navigation • Bilge oils from jetty sewers • Bilge oils from other navigation
Liquid (non-hazardous)	Waste from organic dyes and pigments	• Aqueous washing liquids and mother liquors • Aqueous liquids containing adhesive and sealants
Liquid (non-hazardous)	Wastes from the manufacturing of plastics, synthetic rubber and man-made fibers.	Aqueous washing liquids and mother liquors.
Liquid (non-hazardous)	Wastes from the manufacturing of pharmaceuticals.	Aqueous washing liquids and mother liquors.
Liquid (non-hazardous)	Wastes from the manufacturing of fats, grease, detergents, disinfectants and cosmetics	Aqueous washing liquids and mother liquors.
Liquid (non-hazardous)	Waste from oil regeneration	Aqueous liquid waste from oil regeneration
	Agricultural oils and wastes	• Vegetable oil, soy bean oil, canola oil, sunflower oil, etc. • Products from animal and food rendering industry
Liquid (non-hazardous)	Petroleum refinery wastes	Waste oils
Liquid (non-hazardous)	Iron and steel manufacturing wastes	Waste oils and liquids

Liquid (non-hazardous)	Food Processing Wastes	Liquid food processing wastes
Sludges (non-hazardous)	Oil/water separator contents	• Oil/water separator sludges • Interceptor sludges • Desalter sludges or emulsions • Other emulsions
Sludges (non-hazardous)	Waste paint and coatings from manufacturing and productions operations	Paint and coating sludges
Sludges (non-hazardous)	Wastes from the manufacture and application of printing inks	Adhesive and sealants wastes
Sludges (non-hazardous)	Wastes from pulp, paper and cardboard productions and processing	• Sludges from paper recycling • Fiber, pulp, and paper sludges
Sludges (non-hazardous)	Wastes from the manufacturing and application of printing inks.	Ink wastes.
Sludges (non-hazardous)	Wastes from anaerobic treatment of wastes	Anaerobic treatment sludges of municipal and similar wastes
Sludges (non-hazardous)	Wastes from waste water treatment plants	Grease and oil mixture from oil/waste water separation
Sludges (non-hazardous)	Wastes from the manufacturing of fats, grease, soaps, detergents, disinfectants and cosmetics	Sludges
Sludges (non-hazardous)	Wood preservation waste	Waste organic wood preservatives
Sludges (non-hazardous)	Waste from transport and storage tank cleaning	• Oil wastes from marine transport tank cleaning • Oily wastes from railway and tanker truck transport tank cleaning • Oily wastes from storage tank cleaning
Sludges (non-hazardous)	Petroleum refinery waste	Waste water treatment sludges
Sludges (non-hazardous)	Food processing wastes	Food processing waste sludges
Solids (non-hazardous)	Non-metallic wastes from inorganic chemical processes	• Spent activated carbon (except from chlorine production) • Carbon black
Solids (non-hazardous)	Oil/water separator contents	Oil/water separator solids
Solids (non-hazardous)	Absorbents, filter materials, wiping cloths and protective clothing	Absorbents, filter materials, wiping cloths and protective clothing
Solids (non-hazardous)	Wastes from waste water treatment plants	Grease and oil mixture for oil/water separation

Solids (non-hazardous)	Organic packaging wastes	• Paper and cardboard • Plastic • Wooden • Composite packing • Mixed
Solids (non-hazardous)	Wastes from synthetic materials and rubbers manufacturing and processing	Waste plastics, rubbers, and other synthetic materials, including, but not limited to: • Automobile and parts manufacturing • Plastics manufacturing • Tire and rubber manufacturing
Solids (non-hazardous)	Wastes from textile industry	Wastes from unprocessed textile fibers
Solids (non-hazardous)	Agricultural wastes	• Sugar beet waste • Seed corn waste • Animal and food rendering waste • Other organic agriculture wastes
Solids (non-hazardous)	Printer toner waste	Waste printer toner
Solids (non-hazardous)	Wastes from wood processing and the production of furniture products	• Waste bark and cork • Sawdust • Shavings, cuttings
Solids (non-hazardous)	Wastes from pulp, paper and cardboard production and processing	Solids from pulp, paper and cardboard industry.
Solids (non-hazardous)	Waste from water and waste water treatment plants	Solids from water and waste water treatment plants
Solids (non-hazardous)	Salvage and recycling industry	Salvage material[5]
Solids (non-hazardous)	Wastes from the manufacturing and production of construction materials	• Wood waste • Salvage material[5]
Solids (non-hazardous)	Petroleum refinery waste	Waste solids including spent catalyst and caustics
Solids (non-hazardous)	Iron, steel, and foundry wastes	Waste solids
Solids (non-hazardous)	Food processing wastes	Food processing waste solids.

[5] "Salvage material" is defined as items reclaimed before or after mixing/grinding/disposal/storage where multiple components have been mixed together, and the products are easily separated into lesser components and the components were not exposed to asbestos, lead, mercury or PCB containing materials. Specifically excluded from this definition are such materials as "auto fluff". Included in the definition are items such as "oil filter fluff".

Attachment B

FUGITIVE DUST PLAN

Stockpiles			
Equipment Item	**Location**	**Control Methods/Control Equipment**	**Operation**
Limestone	South end of plant under Belt Conveyor #3. Avg. 150,000 tons	Discharge onto pile is from a telescoping spout that has auto controls to raise/lower spout. Dust Suppression system • Residual Foaming Dust Suppressant • Applied after tertiary crusher • Normal Operating Range ➢ Water 800 to 1100 gph ➢ Chemical = 0.8 to 2 gph	Low fines content.
Bottom Ash	South Quarry Stockpile area. Avg. 10,000 tons.	Delivery in covered trucks	High moisture.
Gypsum (Natural and Synthetic)	West of Limestone Stockpile. Average 5,000 tons.	Deliver in covered trucks.	Gypsum 2X size. Very low fines content.
Clinker	Main storage hall. Storage hall capacity 200,000 tons.	Discharge into hall is through gravity controlled discharge doors. Transport conveyors at transfer points are dedusted with baghouse collection. Hall is partially enclosed.	Storage crane bucket operation is restricted to low level discharge.
Outside Clinker	South of Clinker Storage Hall	Clinker forms hard covering which stabilizes the pile.	Very low fines content. Removal of clinker is performed in a manner that minimizes dust generation.
Conditioned Flyash	South Quarry Stockpile Area	Delivery in covered trucks and material has been wetted.	Minimize inventories.
Transport			
Gypsum	From stockpile to feeder 4		Material is purchased as 2X size. Low fines content.
Limestone	Haulage from rockface to primary crusher.		Average (D50) size is 10". Low fines content.
Clay	Haulage is from stripping to clay crusher.		Material contains 9 to 13% moisture.
Top Stripping	Haulage to stripping dump		High moisture material.

Conveying			
Belt 1	Quarry crusher to belt 2		Completely enclosed in an underground tunnel.
Belt 2	Belt 2 to secondary and tertiary crushing	Crushing system dedusted by a baghouse collector.	Completely enclosed in a gallery structure.
Belt 3	Tertiary crushing to stockpile.	Tube Spout and Dust Suppression System	Completely enclosed in a gallery structure.
Belt 4	Reclaim conveyor from stockpile.	Transfer point dedusted by a baghouse collector.	Completely enclosed in a gallery structure.
Belt 5	Reclaim conveyor from secondary building to feed silos	Initial transfer point dedusted by a baghouse collector.	Completely enclosed in a gallery structure.
Belt 6	Short transfer in secondary crusher building to Road Stone Pile	Transfer point dedusted by a baghouse collector	Low fines content.
Belt 7	Short transfer in secondary crusher building to outside silo.	Transfer point dedusted by a baghouse collector.	Low fines content.
Roads			
Quarry Roads	Main Entrance road to quarry. Clay haul road. Stone haul road.	Gravel construction sealed with a road stabilization agent.	Treatment with agent at least 4 times per year.
Temporary road	Road to overburdened dump	Graded regularly and usage of water to control fugitive dust	Once per day and more during dry weather stripping operations. (1)
Landfill Road	Landfill perimeter.	Graded regularly and usage of water to control fugitive dust	Treatment with agent at least 4 times per year.
Main Plant Roads	Main Plant	Concrete construction. Dry sweeper with Vacuum Filter for maintaining clean paved surfaces.	Swept every weekday.(1)
Main Plant Roads	Main Plant	Truck Wash Facility	Operated April.-Oct.
Secondary Roads	Clinker Storage Hall to water plant. Contractor Road to Clinker Cooler Baghouse	Gravel construction sealed with a road stabilization agent.	Treatment with agent at least 4 times per year.
Parking lots	Employee and Visitor Parking Lots.	Concrete construction. Dry sweeper with Vacuum Filter for maintaining clean paved surfaces.	Swept every 2 weeks .(1)

(1) Wet weather may negate these interval requirements.

ATTACHMENT C

MALFUNCTION ABATEMENT PLAN/PREVENTIVE MAINTENANCE PROGRAM

Permit No. 60-71O

1.0 INTRODUCTION

1.1 PLAN REQUIREMENT

This Malfunction Abatement Plan/Preventive Maintenance Program ("Plan") is developed pursuant to the Administrative Rules of the Michigan Department of Natural Resources, Part 9, Rules 910, 911, and 912. The Plan describes the method by which anticipated malfunction situations at the Holcim Inc.'s Dundee Cement Plant ("Dundee") located in Dundee, Michigan, will be managed by the owner, or operator, of the facility. This will constitute the standard operating procedures to be implemented at the Dundee facility.

1.2 PLAN PURPOSE

The purpose of this Plan is to describe the standard operating procedures to be used to abate or minimize potential abnormal conditions that may occur at the facility resulting in an in-stack opacity that exceeds the opacity limitation of 15 percent using a 6-minute average. The Plan consists of two parts: 1) The preventive maintenance program, and 2) The malfunction abatement and equipment monitoring program. The on-duty shift supervisor is responsible for implementing the Plan.

The preventive maintenance program includes the following elements:

- Items or equipment that are to be inspected
- Frequency of inspection
- Method of inspection
- Personnel responsible for overseeing the inspection
- Scheduled maintenance and repairs of equipment
- Major replacement parts that are to be kept in inventory

The malfunction abatement and equipment monitoring program includes the following elements:

- Equipment operating variables that are to be monitored to detect any malfunction or failure
- Normal operating range of these variables
- Description of the method of monitoring
- Personnel responsible for monitoring
- Frequency of monitoring
- Description of the corrective procedures or operational changes aimed at abating a malfunction or equipment failure situation

2.0 FACILITY BACKGROUND

The facility began operation in 1959. The plant produces cement clinker in two rotary kilns using a wet process. The exhaust from each kiln is treated separately by an air pollution control device before it is released vertically upward into the atmosphere through a common single stack that is 350 feet tall and 15 feet in diameter.

The air pollution control system at the Dundee facility consists of a dry injection venturi scrubber followed by fabric filter collectors. Activated carbon is injected into the exhaust gas ahead of the fabric filters at a nominal rate of 295 lbs/hr, consistent with Special Conditions 15 and 109. This control system will maintain particulate emissions below the emission limitation of 0.10 lb/1000 lb stack gas corrected at 6% oxygen. The control device will also allow the company to meet a 6 minute opacity limitation of 15 percent opacity in the stack based on the continuous opacity monitoring system and consistent with the requirement in Special Conditions 19 and 119 .

3.0 PREVENTIVE MAINTENANCE PROGRAM

This program is designed to minimize equipment malfunctions by establishing an inspection schedule for all equipment and accessories associated with the air pollution control system. Table 1 lists the items to be inspected, the frequency of inspection, the person responsible for overseeing the inspection, and the replacement parts kept in inventory. This program will help identify ahead of time any malfunction that may arise, and by conducting an effective maintenance program, equipment malfunctions will be kept to a minimum. The method of inspection and maintenance procedures will be conducted per the vendor's recommendations. During inspection, the following information will be recorded in a log sheet (see attached Inspection Log sheet):

- Items inspected
- Equipment identification number
- Date of inspection
- The condition of the equipment
- General comments pertaining to the necessity for repairs or adjustments
- The initials of the person conducting the inspection

4.0 MALFUNCTION ABATEMENT AND EQUIPMENT MONITORING PROGRAM

This program is intended to identify any abnormal conditions or equipment malfunctions. Table 2 lists the equipment that are anticipated to break down or cause an exceedance of the opacity limitation, the operating variables to be monitored, the normal operating range, the method of monitoring, the frequency of monitoring, the person monitoring the equipment, and the corrective procedures or operational changes that achieve compliance during a malfunction or failure of the equipment. This program helps detecting any malfunctions and initiates the required corrective actions to achieve compliance in a timely manner. During a malfunction event, the following information will be recorded in a log sheet (see attached Repair Log sheet):

- Equipment identification number
- The date the malfunction was detected
- A description of the malfunction
- The time the malfunction was detected
- The time the repair was completed

- A description of the required repair
- The initials of the person conducting the repair

Except during startup as defined in Special Condition 29, Holcim shall undertake an investigation into the cause of any occurrence of opacity of three consecutive 6 minute averages in excess of 10% opacity based on the continuous opacity monitoring system. The results of this investigation shall be recorded in the operating log.

a) If the cause of excessive opacity is general bag failure requiring rebagging, Holcim shall either take the compartment off-line or rebag the faulty compartment in the dust collector within 180 days of the completion of the investigation.
b) If the cause of the excessive opacity is isolated bag failure, Holcim shall take the compartment off-line until repairs are performed within 10 days.

PREVENTIVE MAINTENANCE PROGRAM
TABLE 1

ITEMS INSPECTED		FREQUENCY	RESPONSIBILITY	REPLACEMENT PARTS KEPT IN INVENTORY
Baghouse System (BH1 and BH 2)	Housing and Duct Conditions	Semi-Annual	Maintenance Engineer	bags, kiln exhaust fan motor, programmable controller, Computer , air compressor and motor, damper solenoids, dust pod valves, differential pressure cells, thermocouples, hopper and collect screws, gear reducer and motor, bag bands, tension springs, bag caps, filters, drive belts, reverse air fan motor.
	Bag Condition and Tension	Semi-Annual	Maintenance Engineer	
	Collection Screws	Semi-Annual	Maintenance Engineer	
	Double Tipping Valves	Semi Annual	Maintenance Engineer	
	Hopper Screws	Semi-Annual	Maintenance Engineer	
	Bypass Dampers	Semi-Annual	Maintenance Engineer	
	Seal Air Fan	Semi-Annual	Maintenance Engineer	
	Dust Pods	Semi-Annual	Maintenance Engineer	
	Baghouse Cleaning System	Semi-Annual	Maintenance Engineer	
	Reverse Air Dampers	Semi-Annual	Maintenance Engineer	
	Reverse Air Fans	Semi-Annual	Maintenance Engineer	
	Shakers (Variable Speed Drives)	Semi-Annual	Electrical Engineer	
	Sonic Horns	Semi-Annual	Electrical Engineer	
	Air Compressors LP	Semi-Annual	Maintenance Engineer	
	Kiln Exhaust Fan	Semi-Annual	Maintenance Engineer	
	Electric Motors	Semi-Annual	Electrical Engineer	
	Programmable Controller	Semi-Annual	Electrical Engineer	
	Alarms	Semi-Annual	Electrical Engineer	

PREVENTIVE MAINTENANCE PROGRAM

TABLE 1 (continued)

ITEMS INSPECTED		FREQUENCY	RESPONSIBILITY	REPLACEMENT PARTS KEPT IN INVENTORY
Baghouse System (BH1 and BH 2)	Instrumentation	Semi-Annual	Electrical Engineer	see previous page
	Computer	Semi-Annual	Electrical Engineer	
	Control Logic	Semi-Annual	Electrical Engineer	
	Air Valve Operators	Semi Annual	Maintenance Engineer	
	Air Dryer H.P.	Monthly	Electrical Engineer	
	Filter Regulator Lubricators	Monthly	Maintenance Engineer	
Dry Venturi Scrubber System	Feed System Calibration	Once/shift (minimum)	Kiln Burner Operator	weigh system load cell, weigh system control package, injection air blower motor, silo alleviator bags.
	Scrubber System	Once/shift (minimum)	Kiln Burner Operator	

Notes:

1. Inspection procedures will be based on vendors recommendations
2. Maintenance is performed as necessary when the inspection reveals problems
3. Equipment inspection and maintenance date, equipment name, equipment identification number, repairs resulting from inspection will be recorded in a log sheet (see attached log sheets)

SHIFT INSPECTION LOG SHEET					
Items Inspected	Equipment ID	Inspection Date	Condition	Comment (see note 1)	Initials
Dry Venturi	Feed System				
Scrubber System	Scrubber System				

Note:

1. If repairs are required, fill out the repair log sheet and reference it in the comment column (above)

MONTHLY INSPECTION LOG SHEET					
Items Inspected	Equipment ID	Inspection Date	Condition	Comment (see note 1)	Initials
Baghouse System (BH1 and BH2)	Air Dryer H.P.				
	Filter Regulator Lubricators				

Note:
1. If repairs are required, fill out the repair log sheet and reference it in the comment column (above)

SEMI-ANNUAL INSPECTION LOG SHEET FOR MISCELLANEOUS EQUIPMENT						
Equipment Name	Items Inspected	Equipment I.D.	Inspection Date	Condition	Comment (see note 1)	Initials

Note:
1. If repairs are required, fill out the repair log sheet and reference it in the comment column (above).

SEMI-ANNUAL INSPECTION LOG SHEET						
Items Inspected		Equipment I.D.	Inspection Date	Condition	Comment (see note 1)	Initials
Baghouse System (BH1 and BH2)	House and Duct Conditions					
	Bag Condition and Tension					
	Collection Screws					
	Double Tipping Valves					
	Hopper Screws					
	Bypass Dampers					
	Seal Air Fan					
	Dust Pods					
	Baghouse Cleaning System					
	Reverse Air Dampers					
	Reverse Air Fans					
	Shakers (Variable Speed Drives)					
	Sonic Horns					
	Air Compressors LP					
	Kiln Exhaust Fan					
	Electric Motors					
	Programmable Controller					
	Alarms					
	Instrumentation					
	Computer					
	Control Logic					
	Air Valve Operators					

Note: 1. If repairs are required, fill out the repair log sheet and reference it in the comment column (above).

REPAIR LOG SHEET						
Equipment ID	Date	Malfunction Description	Time Malfunction Detected	Time Repair Completed	Repair Description	Initials

Note:
1. If repair time exceeds two hours, see note 3 of the Abatement and Equipment Monitoring Program

MALFUNCTION ABATEMENT AND EQUIPMENT MONITORING PROGRAM
TABLE 2

Equipment	Operating Variables Monitored	Normal Operating Range	Method of Monitoring	Frequency of Monitoring	Person Monitoring	Corrective Procedure or Operational Change in the Event of a Malfunction or Failure to Achieve Compliance
Baghouse system (BH1 and BH2)	Inlet Gas temperature	280°F to 325°F	Display Screen	Frequently	Kiln Burner Operator	If the malfunction is in one or more compartments, those compartments will be taken out of service until repairs are performed. If the malfunction which results in emissions that exceed the emission limitations for more than two hours, see Note 3.
	Outlet Gas Temperature	275°F to 320°F	Display Screen	Frequently	Kiln Burner Operator	
	Inlet Pressure	-6" W.G. to -8.5" W.G.	Differential Pressure Trend Display	Continuous	Kiln Burner Operator	
	Outlet Pressure	-14" W.G. to -16.5" W.G.			Kiln Burner Operator	
	% Oxygen	0.5 to 2.0%	Strip Chart Recorder	Continuous	Kiln Burner Operator	
	In Stack Opacity	5 to 10%	Strip Chart Recorder	Continuous	Kiln Burner Operator	
Dry Venturi Scrubber (DVS1 and DVS2)	Inlet Gas Temperature	370 - 425°F	Display Screen	Frequently	Kiln Burner Operator	The injection feed system for each source has redundant sources of injection material (2 silos) and load cells for measuring each batch injection. In the event of a problem with the feed system, the operator selects the alternate equipment, and repairs will be made as soon as feasible. Redundancy is also built into the computer control of the system. The number of batches per hour and batch weight setpoint are determined by material density and desired pounds-per-hour (PPH).
	Outlet Gas Temperature	280 - 325°	Display Screen	Frequently	Kiln Burner Operator	
	Tempering Air Damper Position	40 - 100%	Display Screen	Frequently	Kiln Burner Operator	
	Batch Weight	10 - 20 pounds	Display Screen	Frequently	Kiln Burner Operator	
	Batch Time	Based on Batch Weight	Display Screen	Frequently	Kiln Burner Operator	
Dry Venturi Scrubber (DVS1 and DVS2)	Actual PPH Injection	300 pounds	Display Screen	Frequently	Kiln Burner Operator	see previous page
	Total Pounds Injection	Totalizer	Display Screen	Frequently	Kiln Burner Operator	

MALFUNCTION ABATEMENT AND EQUIPMENT MONITORING PROGRAM
TABLE 2

Equipment	Operating Variables Monitored	Normal Operating Range	Method of Monitoring	Frequency of Monitoring	Person Monitoring	Corrective Procedure or Operational Change in the Event of a Malfunction or Failure to Achieve Compliance
	ALARMS					
	Batch Weight UNDER Setpoint		Display Screen & Panalarm	Continuous	Kiln Burner Operator	see previous page
	Batch Weight OVER Setpoint		Display Screen & Panalarm	Continuous	Kiln Burner Operator	
	Selected Equipment OFF		Display Screen & Panalarm	Continuous	Kiln Burner Operator	

Notes:

1. A repair log sheet will be maintained. The log sheet will include: Equipment ID, Date, Time Malfunction Detected, Time Repair Completed, Repair Procedures (see attached Repair Log sheet)

2. The person monitoring the equipment will notify his or her supervisor promptly of any abnormal operating variables that cannot be corrected through normal adjustments and procedures.

3. Pursuant to the Michigan Air Pollution Control Commission Rules, Part 9, Rule 912, emissions that exceed the applicable emission limitations due to abnormal conditions in, or breakdown of, process or control equipment which continue for more than two hours will be reported as soon as possible but not later than 9:00 a.m. of the next working day to the District Supervisor. Within ten days of this occurrence, a detailed report will be submitted to the District Supervisor. The report will include the probably causes, duration of violation, remedial action taken, and the steps that are being undertaken to prevent a reoccurrence. The preventive steps will become a part of the Malfunction Abatement Plan.

ATTACHMENT D

EXAMPLES OF COMPLIANCE WITH OR NON COMPLIANCE
WITH PROPOSED PERMIT CONDITIONS 15 & 109

Permit No. 60-71O

Hourly Carbon Feed Rates (PPH)					5-Hour	
					Rolling	Status
Hour 1	Hour 2	Hour 3	Hour 4	Hour 5	Average	
305	305	305	305	305	305	C[1]
300	300	300	300	300	300	C
295	295	295	295	295	295	C
280	305	305	305	305	300	C
280	300	300	300	300	296	C
280	280	305	305	305	295	C
280	280	280	305	305	290	NC[2]
290	295	295	295	295	294	NC[2]
275	300	300	300	300	295	NC[3]
255	305	305	305	305	295	NC[3]
290	290	290	290	320	293	NC[4]

Notes:
[1] - C indicates Compliance with permit conditions 15 and 109.

[2] - Non Compliance with permit conditions 15 and 109 because the 5 hour rolling average is less than 295 PPH.

[3] - Non Compliance with permit conditions 15 and 109 because the 1 hour in the 5 hour averaging block is less than 280 PPH.

[4] - Non Compliance with permit conditions 15 and 109 because the 5 hour rolling average is less than 295 PPH. Note that the hour 5 feed rate of 320 PPH reverts to 305 PPH for purposes of calculating the 5 hour rolling average.

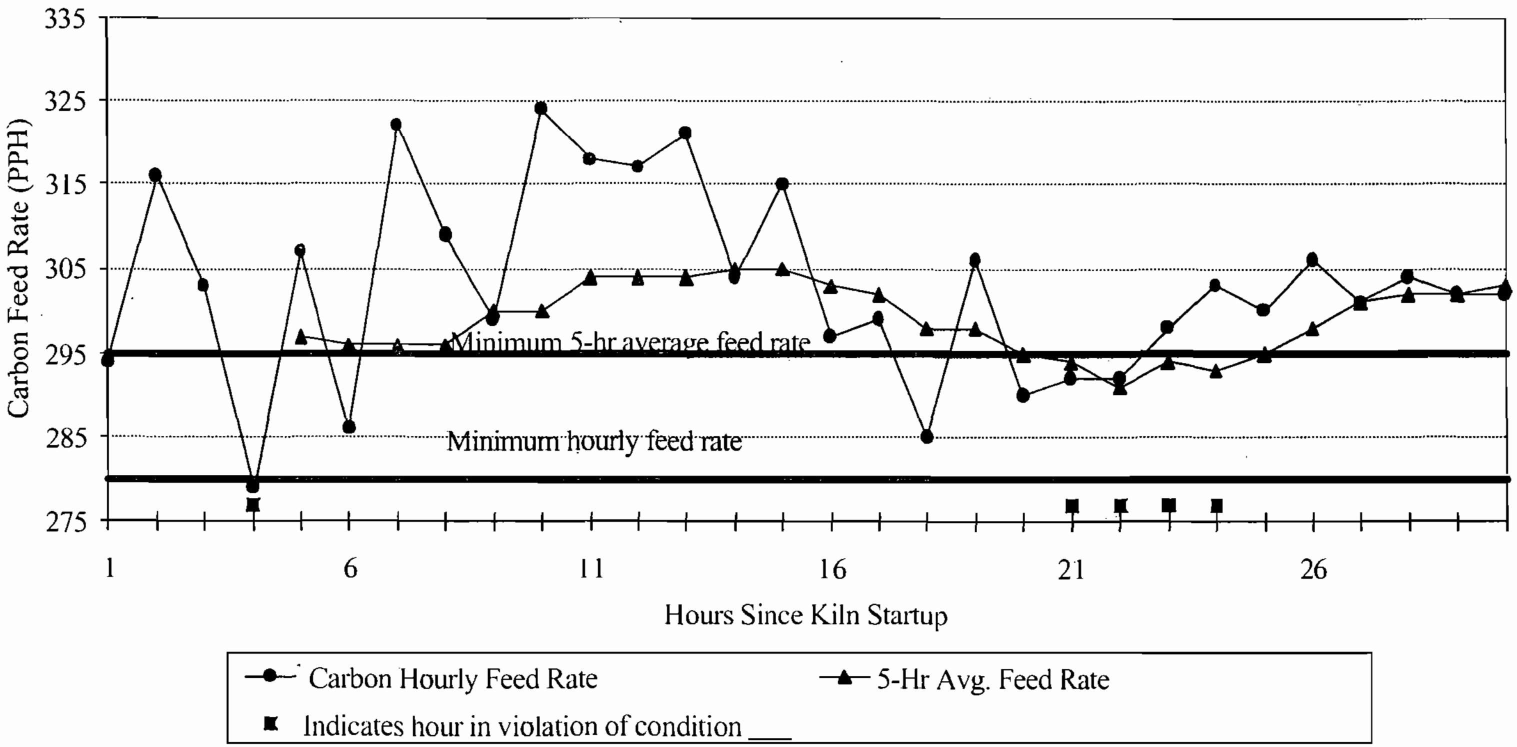
EXAMPLE OF COMPLIANCE WITH PROPOSED PERMIT
CONDITIONS 15 & 109 DURING STARTUP

Hours Since Kiln Startup	Carbon Hourly Feed Rate (PPH)	5-Hr Avg. Feed Rate (PPH)	Hourly Feed Rate Status	5-hr Avg.
1	294		PASS	
2	316		PASS	
3	303		PASS	
4	279		*FAIL*	
5	307	297	PASS	PASS
6	286	296	PASS	PASS
7	322	296	PASS	PASS
8	309	296	PASS	PASS
9	299	300	PASS	PASS
10	324	300	PASS	PASS
11	318	304	PASS	PASS
12	317	304	PASS	PASS
13	321	304	PASS	PASS
14	304	305	PASS	PASS
15	315	305	PASS	PASS
16	297	303	PASS	PASS
17	299	302	PASS	PASS
18	285	298	PASS	PASS
19	306	298	PASS	PASS
20	290	295	PASS	PASS
21	292	294	PASS	*FAIL*
22	292	291	PASS	*FAIL*
23	298	294	PASS	*FAIL*
24	303	293	PASS	*FAIL*
25	300	295	PASS	PASS
26	306	298	PASS	PASS
27	301	301	PASS	PASS
28	304	302	PASS	PASS
29	302	302	PASS	PASS
30	302	303	PASS	PASS

Compliance with proposed permit conditions evaluated using the following parameters

Compliance parameter	PPH
Minimum hourly feed rate	280
Maximum hourly feed rate for averaging	305
Minimum 5 hour average feed rate	295

EXAMPLE OF COMPLIANCE WITH PERMIT CONDITIONS 15 & 109 AFTER KILN STARTUP



Note: Rolling average calculated using the cabon feed rates for the five most recent hours. If an hourly feed rate was above 305 PPH, it was replaced with 305 to calculate the rolling average.

Attachment E
Used Oil Specifications

Constituent/Property	**Allowable Level**
Arsenic	=5 parts per million (ppm) by weight
Cadmium	=2 parts per million
Chromium	=10 parts per million
Lead	=100 parts per million
Flash Point	=100°F
Total Halogens	=1,000 parts per million
PCB's	=1 part per million

These values are maximums, except for flash point, which is a minimum. A halogen level exceeding 1,000 ppm is presumed to be a hazardous waste unless otherwise demonstrated. Used oil that has been contaminated with any halogenated solvents shall not be used as supplemental fuel.

Attachment F

Definition of Hazardous Waste

A chemical waste is considered to be hazardous if the waste exhibits any of the following characteristics:

Ignitability

A substance is considered to be ignitable if it exhibits any of the following properties

1. It is a liquid, other than an aqueous solution containing less then 24% alcohol by volume and has a flash point less than 60°C (140°F), as determined by the Pensky-Martens Closed Cup Tester.
2. It is not a liquid and is capable, under standard temperature and pressure, of causing fire through friction, absorption of moisture or spontaneous chemical changes and, when ignited, burns so vigorously and persistently that it creates a hazard.
3. It is a flammable compressed gas.
4. It is an oxidizer such as chlorates, permanganates, inorganic peroxides, or nitrates that yield oxygen readily to stimulate the combustion of organic matter.

Corrosivity

A substance is considered to be corrosive if it exhibits any of the following properties:

1. It is aqueous and has a pH less than or equal to 2 or great than or equal to 12.5 as determined by a pH meter using either an EPA or equivalent test method.
2. It is a liquid and corrodes steel (SAE 1020) at a rate great than 6.35 mm/year at 55°C.

Reactivity

A substance is considered to be reactive if it exhibits any of the following properties:

1. It is normally unstable and readily undergoes violating 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 of 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 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 by 49 CFR 173.53, or a class B explosive as defined in 49 CFR 173.88

Toxicity Characteristic Leaching Procedure (TCLP)

This characteristic identifies wastes from which certain toxic materials could be leached into groundwater supplies and is defined by a prescribed test procedure for water extraction of the waste. The extract is analyzed for concentrations of eight elements or ions; Arsenic, Barium, Cadmium, Chromium (VI), Lead, Mercury, Selenium, and Silver: and the thirty–one organic substances listed below.

Benzene
Carbon Tetrachloride
Chlordane
Chlorobenzene
Chloroform
o-Cresol
m-Cresol
p-Cresol
1,4-Dichlorobenzene
1,2-Dichloroethylene
1,1-Dichloroethylene
2,4-Dinitrotoluene
Endrin
Heptachlor
Hexachlorobenzene
Hexachloro-1,3-butadiene
Hexachloroethane
Lindane
Methoxychlor
Methyl ethyl ketone
Nitrobenzene
Pentachlorphenol
Pyridine
Tetrachloroethylene
Toxaphene
Trichloroethylene
2, 4, 5-Trichlorophenol
2, 4, 6-Trichlorophenol
Vinyl chloride
2, 4 – D
2, 4, 5-TP Silvex

Attachment G

ALTERNATIVE FUELS AND MATERIALS MANAGEMENT PROCESS

Executive Summary

The Dundee Plant of Holcim (US) Inc., located in Monroe County, Michigan, is supplying additional information to clarify the Alternative Fuels and Materials Management Program. The AFM Management Program would be used to assure all non-hazardous alternative fuels and materials are having a quality control process through the three (3) process controls prior to Co-processing these AFM into the kiln. The three(3) quality process control are: Potential AFM Qualification Analysis, Individual Shipments, and POMS Control.

In the Qualification Analysis Process, the potential AFM is thoroughly reviewed for non-hazardous characteristics, consistency with generator information, requirements for handling and storage, ability to meet POMS requirements, internal use fitness for use, and approval by the plant manager. Basically this is the first screening level for the potential use of the AFM from a specific source.

The Individual Shipment Module will screen the incoming AFM to assure conformance with the non-hazardous characteristics and to verify that the characteristics of the material are the same as analyzed previously.

Finally, the POMS Control Module will control the final AFM blend ready to be co-processed in to the kiln, and to assure a consistent quality of the AFM stream.

The proposed AFM Management Process will be used for all AFM assuring a controlled and documented system, and will provide a system easily audited by MDEQ.

1. AFM MANAGEMENT PROCESS

The AFM Management Program (see Figure 1) would be used to assure all non-hazardous fuels and materials are thoroughly reviewed using the three (3) process controls prior to co-processing. The three- (3) process controls are: Potential AFM Pre-Qualification Analysis, Individual Shipments, and POMS Control.

1.1 QUALIFICATION ANALYSIS

In the Potential AFM Qualification Analysis process control (see Figure 2), the potential AFM is thoroughly reviewed prior to being approved for its usage. This module has many steps included to assure that all potential issues can be identified and considered in the ultimate use, or rejected from consideration. The steps are:

1) AFM Generator identified as a potential candidate.
   Generator is a producer of a non-hazardous industrial waste (e.g. car that generates used oil).
   In this step, a Generator, could be previously identified by the Plant, or can be a company, which ask for an environmental way of disposal of their by-products.
   At this point all the information related with this potential AFM must be documented in a proper manner, following a consecutive order on the file numbering.

2) Non-Hazardous review performed.
   The potential AFM must be analyzed under the MI Act 451 Part III, [40 CFR Part 261], to determine if the material is considered a non-hazardous waste material. In case that this material falls under the hazardous waste classification, the AFM candidate must be rejected and documented in their respective file.

3) Complete AFM Profile Form to identify generator information and additional chemical characteristics.
   See attached Holcim Material Profile (Attachment A)

4) Completeness checks of AFM Profile Form.
   At this point the evaluation of the Profile must have: (1) The business activity or process type of waste generation, (2) Storage and current treatment,
   (3) physical and chemical characteristics of the AFM candidate, (4) Health and Safety data (MSDS if available), (5) Existing stock volumes and m onthly generated volumes, (6) Transport conditions

5) Perform analysis of AFM candidate for consistency with AFM Profile Form.
   Take a representative sample from the projected generated volume, and run a laboratory test to confirm the data provided at the Profile. If the laboratory results shows a sustainable difference with the

data provided from the Generator and the AFM results hazardous the candidate must be rejected, documenting with all this information.

6) Review the handling and storage requirements based on chemical characteristics to determine cost/benefit.
The AFM candidate must be reviewed under the applicable regulations for its handling requirements, storage conditions, and under the MSHA rules.
Once that all this requirements are reviewed, a cost-benefit evaluation must be performed in order to determine the feasibility of accepting this AFM at the Plant.

7) Perform applicable requirement review using the POMS
Feed the Parametric Operating Monitoring System with the information of the AFM candidate and determine if the material is suitable to co-process in the kiln

8) Perform an internal acceptance review including Quality Department, Environmental Health and Safety Department, and the Kiln Processing Area.
A process review must be performed in all the areas related with the cement manufacturing process at the plant level. At this material the AFM candidate can be rejected for any of the involved areas.

9) Present to Plant Manager for AFM approval.
With all the 8 steps documented, the file is submitted to the Plant Manager for review and further approval or rejection

10) Address financial and logistics issues with AFM Generator.
At this point a financial analysis is performed in order to determine the disposal fee.

11) Approved AFM
A contract and arrangement for AFM deliveries must be created.

At any point in the above process, the AFM Candidate could be rejected from consideration in the AFM Program, for every AFM candidate there has to be a file, even if the material is rejected all of the information must be documented.

1.2 INDIVIDUAL SHIPMENTS

The Individual Shipment Module (see Figure 1) will provide on-site screening of the incoming AFM to assure conformance with the AFM Profile characteristics. Individual shipments will have a fingerprint analysis performed to verify that the AFM received meets the original characteristics defined in the Qualification Analysis process control. AFM that passes the fingerprint analysis will be accepted on-site. AFM that fails the fingerprint analysis will be rejected and the proper notifications made to the appropriate MDEQ agency and the AFM Generator.

Periodic quality control checks will be performed to assure that the fingerprint analysis accurately identifies the AFM characteristics.

Every load of AFM that comes to the plant must be documented with a consecutive number indicating all the information that corresponds to that shipment.

1.3 PARAMETRIC OPERATING AND MONITORING SYSTEM ("POMS") Control

The POMS Control Module (see Figure 1) will control the final AFM blend previous to be co-processed in to the kiln. Each individual shipment that passes the fingerprint analysis will be blended with other approved AFM. The final blend will be input into the POMS for final confirmation with applicable requirements.

An analysis of the blending material must be perform in order to assure the compliance with all applicable regulations and process control, to assure health and safety standards and to prevent any environmental risks.

Once confirmed using POMS, the AFM will be co-processed in to the kiln

2. SUMMARY

The AFM Management Plan is a systematic approach that will review and check all potential AFM candidates. All AFM received by Holcim will be pre-approved according to procedures identified in Holcim's AFM Management Process. By taking a potential AFM through the Qualification Analysis Module, Holcim will insure that the approved AFM will be non-hazardous, and storage and handling requirements identified. The analysis of individual shipments will verify conformance with previous approval. A final use of the POMS will control and document the introduction of the AFM in the kiln co-processing.

ATTACHMENT
A. HOLCIM PROFILE FORM

Holcim

MATERIAL PROFILE FORM

Profile No. _______________

I. General Information

1. Material Common Name: ____________________

2. Provide a description of the process(es) generating this material:

____

____

3. Estimated Volume of Material available (total & per month): __________ Units: ________

4. Location of Material: ____________________

II. Generator Information

1. Generator Name: ____________ 2. Telephone No.: ____________

3. Address: ____________ 4. Fax No.: ____________

____________ 5. Email Address: ____________

6. Contact: ____________ 7. Title: ____________

III. Billing Information

1. Invoicing Name:____________________ 2. Telephone No.:____________________

3. Address:____________________ 4. Fax No:____________________

____________________ 5. Email Address:____________________

6. Contact:____________________ 6. Title:____________________

7. Purchase Order No.____________________

IV. Sampling Information

Sample Instructions:

1. A representative one-quart sample of the material must accompany this profile form to initiate the approval process.
2. The sample taken should be representative of the material intended for shipment.
3. Sampling of the material should be completed as per standard regulatory guidelines.
4. Sampling equipment used must be those specified in standard regulatory guidance.
5. The sample label must include generator name, profile number and material description.
6. A completed sample custody transfer record must accompany the sample.

Sampling completed by (print):____________________

Sampler signature: ____________________

Date sample was collected: ____________________

V. Physical Characteristics

1. Select one or more general descriptions for the material at 70° F:

	Powdery Solid		Sludge (non pumpable)
	Dry Solid		Liquid (pumpable)
	Solids with free liquid		Liquid (multi-phase)
	Debris or Other		Soils

Describe additional physical characteristics:____________________

____

2. Does the waste have a characteristic odor(s)? ( ) Strong ( ) Moderate ( ) Slight ( ) None

Describe characteristic odor(s):______________________________

3. Color description:______________________________

4. Heat value (Btu/lb):______________________________

5. Density:______________ Units:______________

6. pH:______________ Water Extract pH:______________

7. Flash Point (°F):______________

8. Reactive with air or water? ( ) Yes ( ) No

VI. Chemical Parameters

1. Based upon lab analyses and/or knowledge of the process(es) generating the material, list the chemical components with the minimum and maximum concentrations expected.

Constituent	Minimum	Maximum

Total		

2. Water Content (%):________________ 3. Sulfur Content (ppm):________________

4. Halogen Content (ppm):________________

5. Total Metal Concentration (MI Air Toxics):

Metal Constituent (mg/Kg)	Minimum	Maximum
Antimony (Sb)		
Arsenic (As)		
Barium (Ba)		
Beryllium (Be)		
Cadmium (Cd)		
Chromium (Cr)		
Copper (Cu)		
Lead (Pb)		
Manganese (Mn)		
Mercury (Hg)		
Nickel, soluble salts (Ni)		
Selenium (Se)		
Silver (Ag)		
Thallium (Tl)		
Zinc (Zn)		

VII. Material Hazards

1. Based upon RCRA Hazardous Waste Regulations (40 CFR 261):

Does this waste meet any F, K, P or U Hazardous Waste Listing Description(s)? ( ) Yes ( ) No

List any applicable Listed Waste Code(s):______________________________

Does this waste exhibit Ignitability (D001), Corrosivity (D002) or Reactivity (D003)? ( ) Yes ( ) No

List any applicable Characteristic Waste Code(s):______________________________

Does this waste contain cyanide amenable to chlorination above 250 ppm? ( ) Yes ( ) No

Does this waste contain reactive sulfide above 500 ppm? ( ) Yes ( ) No

Is this a California List hazardous waste containing halogenated organic compounds found in Appendix III of 40 CFR 268 in total concentrations greater than or equal to 1000 mg/L? ( ) Yes ( ) No

2. Does the waste exhibit Toxicity characteristics defined by the Toxicity Characteristic Leaching Procedure (TCLP) test (See 40 CFR 261.24, Table 1, D004 – D043)? ( ) Yes ( ) No

3. Other regulated waste materials:

Does the waste contain any radioactive material? ( ) Yes ( ) No

Does the waste contain any biological or infectious waste(s)? ( ) Yes ( ) No

Does the waste contain asbestos? ( ) Yes ( ) No

Does this waste contain PCBs greater than 49 ppm? ( ) Yes ( ) No

If "Yes" indicate which TCLP constituent has been tested (Attach laboratory results). For those constituents not tested mark "No". If the reason that the waste has not been tested is because the constituent is not believed to be applicable to the material mark "N/A". Either "Yes", "No" or "N/A" **MUST** be checked for each and every constituent.

Code	Constituent	40 CFR, Part 261.24 Regulatory Limit (mg/l)	MI R 299.4114 Regulatory Limit (mg/l)	TCLP Analytical Test Level (mg/l)	Testing: Yes, No, N/A
Metals					
D004	Arsenic	5.0	0.5		
D005	Barium	100.0	10.0		
D006	Cadmium	1.0	0.1		
D007	Chromium	5.0	0.5		
	Copper	N/A	10.0		
D008	Lead	5.0	0.5		
	Manganese	N/A	0.5		
D009	Mercury (inorganic)	0.2	0.02		
	Nickel (soluble salts)	N/A	1.0		
D010	Selenium	1.0	0.1		
D011	Silver	5.0	0.5		
	Zinc	N/A	50.0		
Organics					
D012	Endrin	0.02			
D013	Lindane	0.04			
D014	Methoxychlor	10.0			
D015	Toxaphene	0.5			
D016	2,4-D	10.0			
D017	2,4,5-TP	1.0			
D018	Benzene	0.5	0.05		
D019	Carbon Tetrachloride	0.5	0.05		
D020	Chlordane	0.03			

D021	Chlorobenzene	100.0	10.0		
D022	Chloroform	6.0	0.6		
D023	o-Cresol	200.0	20.0		
D024	m-Cresol	200.0	20.0		
D025	p-Cresol	200.0	20.0		
D026	Cresol	200.0	20.0		
D027	1,4-Dichlorobenzene	7.5	0.75		
D028	1,2-Dichloroethane	0.5	0.05		
D029	1,1-Dichloroethylene	0.7	0.07		
D030	2,4-Dinitrotoluene	0.13			
D031	Heptachlor	0.008			
D032	Hexachlorobenzene	0.13			
D033	Hexachlorobutadiene	0.5			
D034	Hexachloroethane	3.0			
D035	Methyl Ethyl Ketone	200.0	10.0		
D036	Nitrobenzene	2.0			
D037	Pentachlorophenol	100.0	10.0		
D038	Pyridine	5.0			
D039	Tetrachloroethylene	0.7	0.07		
D040	Tricholorethylene	0.5	0.05		
D041	2,4,5-Trichlorophenol	400.0	40.0		
D042	2,4,6-Trichlorophenol	2.0	0.2		
D043	Vinyl Chloride	0.2	0.02		

VIII. List Of Attachments

List and attach all analytical data, MSDSs or other information that will help to characterize this waste material.

Informational Instructions:

1. All forwarded analytical data must be applicable to the actual material intended to be shipped and come from a representative sample of that material.
2. Please attach all applicable QA/QC and chain of custody documentation for the sample data must also be forwarded with the data.
3. Please attach information about the laboratory conducting of any of the reported analyses including the name, address, phone number and laboratory contact.

Attachment	Description

IX. Generator Certifications

I, the Supplier, certify, represent and warrant that the material presented and described herein is not a listed or characteristic hazardous waste and that the information presented in this profile and any attachment is complete and accurate to the best of my knowledge. I further certify that the analytical data and other information submitted with this AFR profile is applicable to the material intended for shipment and was obtained according to proper sampling and analytical guidelines.

I further certify, represent and warrant that, to the best of its knowledge, there have been no changes in the process generating the waste that would alter the characterization of the material described herein and in any of the attachments.

I certify that based upon my knowledge of the waste material and the process generating the waste, the TCLP constituents listed as N/A in Section VI Material Hazards are not present in the waste in concentrations above hazardous classification levels.

I understand that it is my obligation to immediately inform Holcim of any changes in the generating process that may alter the characteristics of the material described herein.

For brokered account, the brokering agent must include a signed affidavit from the generating company authorizing the broker to act as the representative of the generating company for the purpose of profiling the waste material and contracting with Holcim for it deliver to the facility.

Date:____________________

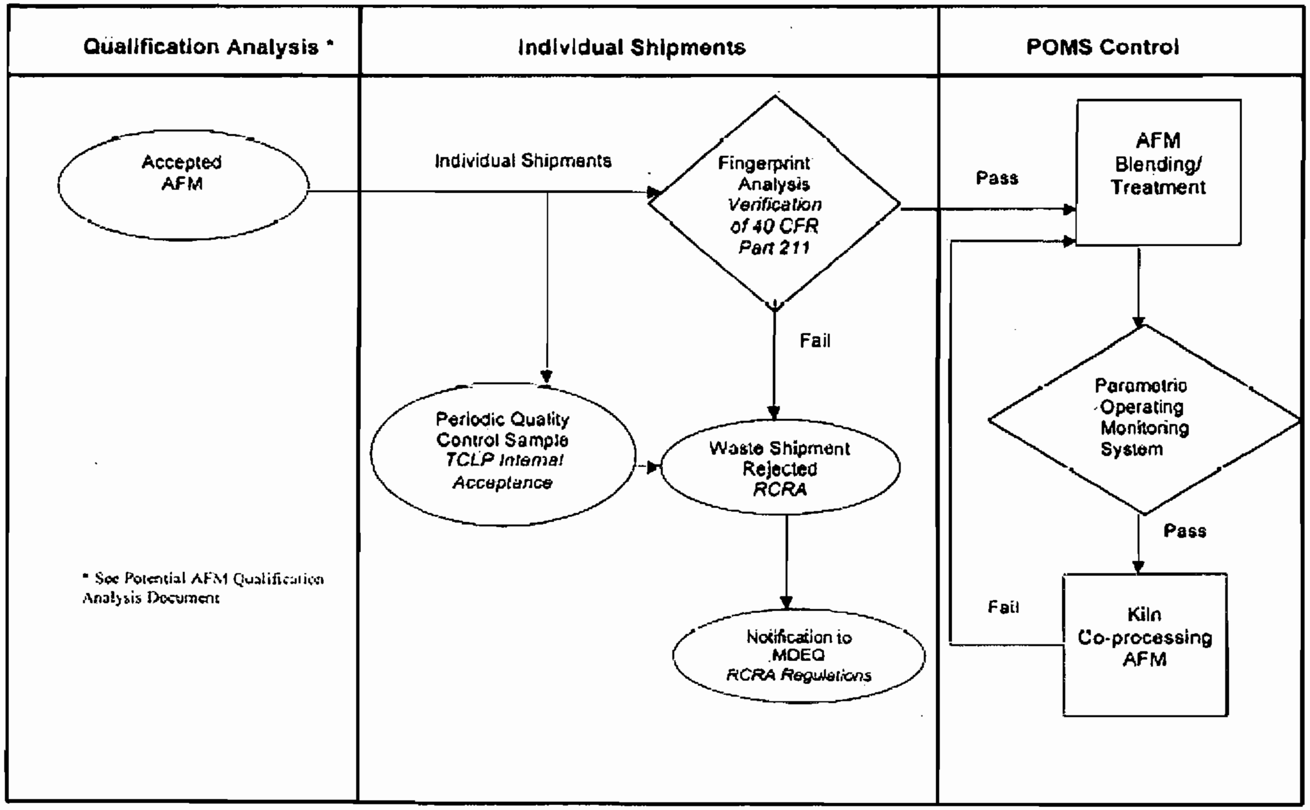
Name:____________________________ Signature:__________________________

Company:__________________________ Title:______________________________

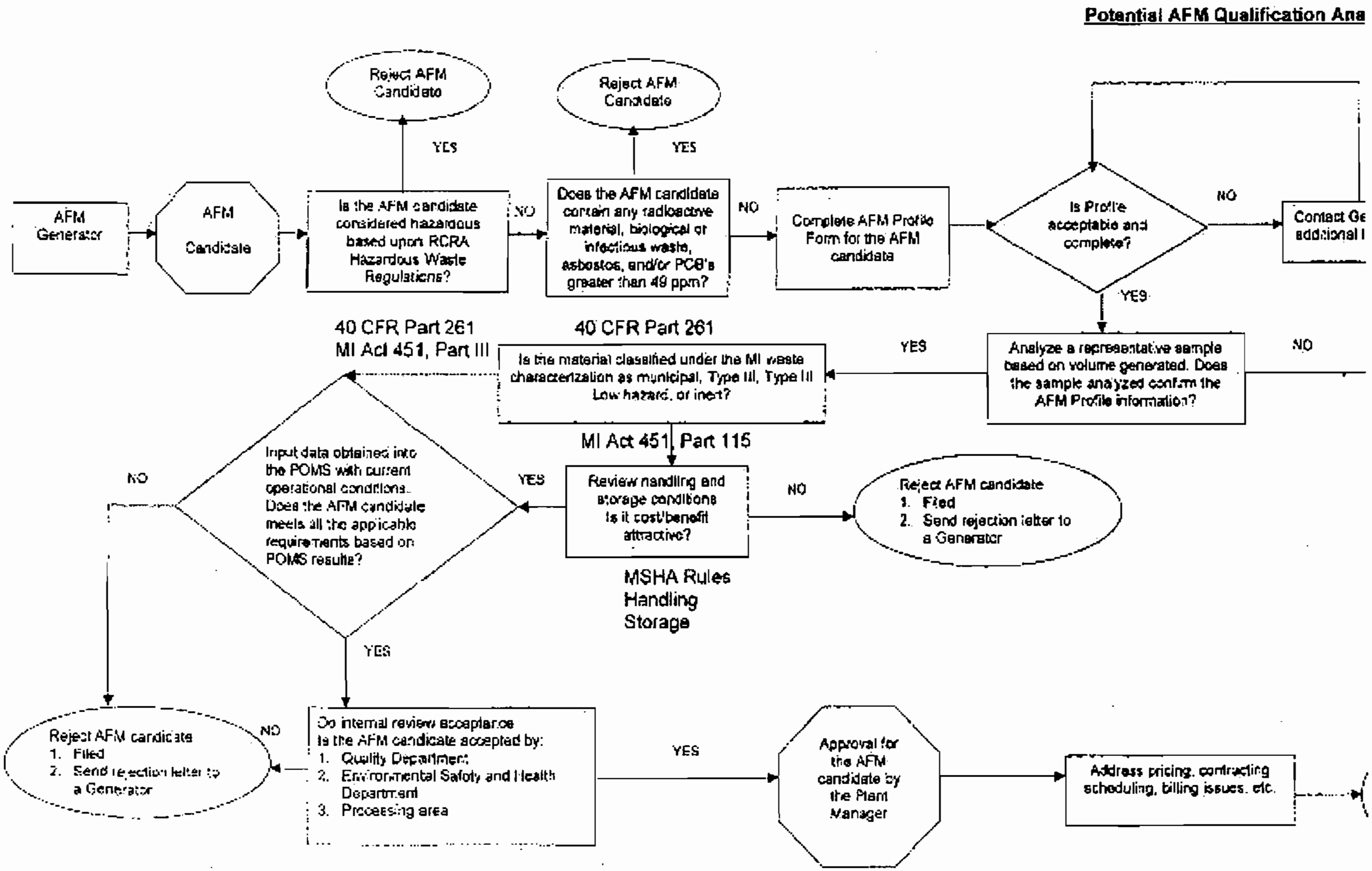
Holcim's Acceptance is based on the information provided by your company on this Certification Form, the associated test data and other representations of your company. Your company shall absolutely and unconditionally protect, defend, indemnify and save harmless Holcim and its present and future officers, directors, shareholders, agents and employees of Holcim from and against any and all fines, loss, damage, injury, liability to or death of any person, costs of response to any governmental inquiry, request, or requirement or for loss of or damage to property or for loss or damage arising from attachments, liens or claims of material men or laborers, claims and reasonable attorneys' fees and costs relating to any of the foregoing ("Claims"), resulting from Company's activities, from Company's tender of Non-conforming Materials or from Company's breach of the Agreement, whether or not Holcim, or its officers, directors, shareholders, agents or employees was or is claimed to be concurrently or comparatively negligent, and regardless of whether liability without fault is imposed, or sought to be imposed, on Holcim. The foregoing indemnification shall not apply to the extent that such indemnity is void or otherwise unenforceable under applicable law in effect on or validly retroactive to the date of this Agreement, or the date of the claim, and shall not apply where such Claims are the result of the sole negligence or willful misconduct of Holcim. It is intended that the foregoing indemnity shall be broad and comprehensive. This indemnity shall survive the expiration or other termination of this Agreement. This indemnity is for the sole benefit of Holcim and not for the benefit of any third party.

Figures
1 AFM Management Program

AFM Management Program



2 Potential AFM Qualification Analysis



Attachment H –EXAMPLE

	Kiln 1 Input								Kiln 2 Input							
Type of Material Input through Kiln:	Slurry	Silica Gel	Fly Ash					TOTAL	Slurry	Silica Gel	Fly Ash	CKD In				TOTAL
Material Input through Kiln Wet (tons per day):	4024.11	0	0						4024.11	0	0					
Material Input through Kiln Wet (Kg per day):	3651642	0	0	0	0	0	0		3651642	0	0					
% Moisture (w/w):	27%	36%	18%						27%	36%	18%					
Heating Value (Btu/lb):	0	6000	0						0	6000	0					
	Kiln 1 Hours of Operation:			24					Kiln 2 Hours of Operation:			24				
Pollutants	Concentration (mg/kg Dry)							g/s	Concentration (mg/kg Dry)							g/s
Arsenic (As)	6.4	12	325					0.197459	6.4	12	325					0.197459
Antimony (Sb)	1.1	0.93	5					0.033938	1.1	0.93	5					0.033938
Aluminum (Al)								0								0
Barium (Ba)	99	270	1700					3.054446	99	270	1700					3.054446
Beryllium (Be)	0.66	0.72	14					0.020363	0.66	0.72	14					0.020363
Chromium (Cr)	15	10	109					0.462795	15	10	109					0.462795
Cobalt (Co)	4.4	4.1	20					0.135753	4.4	4.1	20					0.135753
Cadmium (Cd)	0.19	0.18	59					0.005862	0.19	0.18	59					0.005862
Copper (Cu)	22	14000	114					0.678766	22	14000	114					0.678766
Calcium (Ca)								0								0
Chloride (Cl^-)	220	120000	290					6.787659	220	120000	290					6.787659
Chlorine (Cl_2)	10	91000	10					0.30853	10	91000	10					0.30853
Fluoride (F^-)								0								0
Iron (Fe)								0								0
Hydrogen chloride (HCl)								0								0
Lead (Pb)	5.6	7.9	651	16000				0.172777	5.6	7.9	651					0.172777
Magnesium (Mg)	13000	12000	19000					401.0889	13000	12000	19000					401.0889
Manganese (Mn)	240	200	5077					7.404719	240	200	5077					7.404719
Mercury (Hg)	0.1	0.34	490					0.003085	0.1	0.34	490					0.003085
Nickel (Ni)	27	35	81					0.833031	27	35	81					0.833031
Selenium (Se)	2.1	6.5	101					0.064791	2.1	6.5	101					0.064791
Silver (Ag)								0								0
Thallium (Tl)								0								0
Titanium (Ti)								0								0
Zinc (Zn)	26	370	1507					0.802178	26	370	1507					0.802178
Potassium (K)								0								0
Ammonia (NH_3)								0								0
Ammonium (NH_4^-)								0								0
Nitrate (NO_3^{2-})								0								0
Sodium (Na)								0								0
Sulfur trioxide (SO_3)								0								0
Sulfate (SO_4^{2-})								0								0
% Sulfur		8.6%								8.6%						
Total Halogen		54000								54000						

Pollutants	ITSL (μg/m³)	IRSL (μg/m³)	Avg. Period	Notes	SLTS Max. Emission Rate g/s[1]	Raw Material Input g/s	Fuel Input g/s	% Retained in Product	% Control Efficiency of APC	Facility Baseline Emissions g/s	Net Emissions to Atmosphere g/s	Compliance (Yes/No)	% Below Max.
Arsenic (As)		0.0002	1-yr		8.03E-02	0.394918	1.509018	99.8868%	0%	0	0.002155256	Yes	97.3%
Antimony (Sb)	0.2		24-hr		2.87E+00	0.067877	0.007619	99.7690%	0%	0	0.000174394	Yes	100.0%
Aluminum (Al)	0.1		1-yr	4	4.02E+01	0	0	0.0000%	0%	0	0	Yes	100.0%
Barium (Ba)	5		8-hr		3.10E+01	6.108893	0.227406	99.8781%	0%	0	0.007723948	Yes	100.0%
Beryllium (Be)	0.02		24-hr		2.87E-01	0.040726	0.011655	99.8681%	0%	0	6.90911E-05	Yes	100.0%
Chromium (Cr)	0.1		24-hr		1.43E+00	0.92559	0.188039	99.8553%	0%	0	0.001611422	Yes	99.9%
Chromium (Cr)		0.000083	1-yr		3.33E-02	0.92559	0.188039	99.8553%	0%	0	0.001611422	Yes	95.2%
Cobalt (Co)	0.2		8-hr		1.24E+00	0.271506	0.217045	0.0000%	0%	0	0.488551749	Yes	60.6%
Cadmium (Cd)		0.0006	1-yr		2.41E-01	0.011724	0.007818	99.5550%	0%	0	8.69615E-05	Yes	100.0%
Copper (Cu)	2		8-hr		1.24E+01	1.357532	0.47742	0.0000%	0%	0	1.834951603	Yes	85.2%
Calcium (Ca)	0.1		1-yr	4	4.02E+01	0	0	0.0000%	0%	0	0	Yes	100.0%
Chloride (Cl^-)	20		24-hr	5	2.87E+02	13.57532	5.187621	0.0000%	0%	0	18.7629386	Yes	93.5%
Chlorine (Cl_2)	15		8-hr		9.29E+01	0.61706	9.838929	0.0000%	0%	0	10.45598911	Yes	88.7%
Fluoride (F^-)	0.1		1-yr	4	4.02E+01	0	0	0.0000%	0%	0	0	Yes	100.0%
Iron (Fe)	0.1		1-yr	4	4.02E+01	0	0	0.0000%	0%	0	0	Yes	100.0%
Hydrogen chloride (HCl)	20		24-hr		2.87E+02	0	0	0.0000%	0%	0	0	Yes	100.0%
Lead (Pb)	1.5		3-mo		2.36E+02	0.345554	0.248603	99.8531%	0%	0	0.000872816	Yes	100.0%
Magnesium (Mg)	100		8-hr		6.19E+02	802.1779	2.234526	0.0000%	0%	0	804.412384	No	-29.9%
Manganese (Mn)	0.05		24-hr		7.17E-01	14.80944	0.986968	0.0000%	0%	0	15.79640553	No	-2103.0%
Mercury (Hg)	0.3		24-hr	3	4.30E+00	0.006171	0.002433	61.3000%	0%	0	0.003329661	Yes	99.9%
Nickel (Ni)	0.0042		1-yr		1.69E+00	1.666062	0.260613	99.9574%	0%	0	0.000820763	Yes	100.0%
Selenium (Se)	2		8-hr		1.24E+01	0.129583	0.11961	95.4002%	0%	0	0.011462339	Yes	99.9%
Silver (Ag)	0.1		8-hr		6.19E-01	0	0	99.8420%	0%	0	0	Yes	100.0%
Thallium (Tl)	0.1		1-yr	4	4.02E+01	0	0	90.1219%	0%	0	0	Yes	100.0%
Titanium (Ti)	0.1		1-yr	4	4.02E+01	0	0	0.0000%	0%	0	0	Yes	100.0%
Zinc (Zn)	0.1		1-yr	4	4.02E+01	1.604356	10.2993	99.7869%	0%	0	0.025366686	Yes	99.9%
Potassium (K)	0.1		1-yr	4	4.02E+01	0	0	0.0000%	0%	0	0	Yes	100.0%
Ammonia (NH_3)	100		24-hr		1.43E+03	0	0	0.0000%	0%	0	0	Yes	100.0%
Ammonium (NH_4^+)	200		24-hr		2.87E+03	0	0	0.0000%	0%	0	0	Yes	100.0%
Nitrate (NO_3^{2-})	0.1		1-yr	4	4.02E+01	0	0	0.0000%	0%	0	0	Yes	100.0%
Sodium (Na)	0.1		1-yr	4	4.02E+01	0	0	0.0000%	0%	0	0	Yes	100.0%
Sulfur trioxide (SO_3)	10		8-hr	2	6.19E+01	0	0	0.0000%	0%	0	0	Yes	100.0%
Sulfate (SO_4^{2-})	0.1		1-yr	4	4.02E+01	0	0	0.0000%	0%	0	0	Yes	100.0%
% Sulfur					error								
Total Halogen					error								

Notes:

1. Maximum emission rate corresponds to ambient impacts equal to the correspondingh ITSL/IRSL/SRSL

2. This chemical meets the definition of a carcinogen per Rule 336.1103(e), but risk management considerations indicate that no IRSL should be derived. The combined ambient impacts of sulfuric acid, sulfur trioxide and oleum must be below the initial threshold screening level (ITSL) of 10 ug/m3, 8 hour averaging.

3. The former ITSL of 0.3 ug/m3 (24 hour averaging time) only addressed exposure from direct inhalation. Due to the highly bioaccumulative nature of mercury, and potential exposure through other routes of exposure, emissions of mercury will be evaluated on a case-by-case basis. Because of the expected increased exposure via the indirect pathways, mercury emissions do not qualify for exemption from a permit to install under Rules 279 or 290.

4. ITSL is based on the default value of 0.1 μg/m³.

5. Chloride imapct is compared against hydrogen chloride ITSL.

HOLNAM - MAR 225 COMPLIANCE DEMONSTRATION
KILN STACK

Unit Emission Rate of 1 g/s; 554,377 acfm; 318 F:

Averaging Period	Predicted Concentration (μg/m3)
1-Hour	0.70116
8-Hour	0.16143
24-Hour	[illegible]

ATTACHMENT 7

ASR Source
Materials Not Accepted

[redacted]

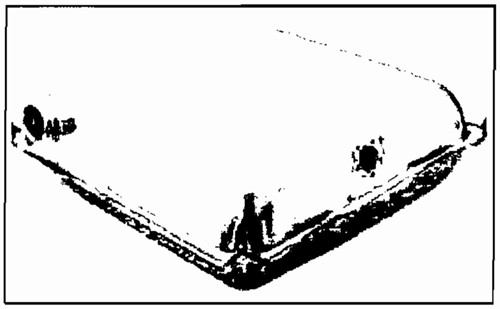
This section illustrates the materials that [redacted] mill locations will not accept from any of its suppliers. Please find below some examples and photos of materials that are not accepted. Certain [redacted] recycling yards may accept some of the following items. Please contact the appropriate yard for further information.

Materials Not Accepted

Sealed & Flammable Containers

Propane Tanks

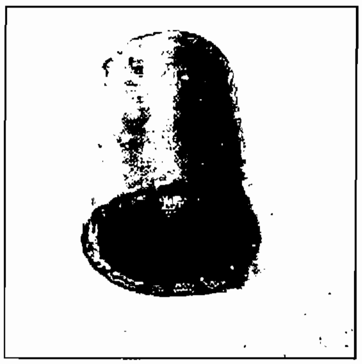
Gas Tanks



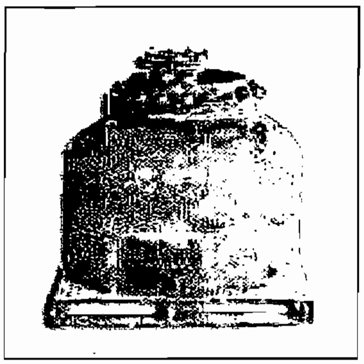
Aerosol Containers

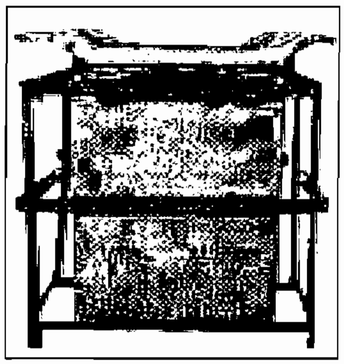
Scrap Bearing Lead

Pipes with lead



Chemical tanks with lead lining



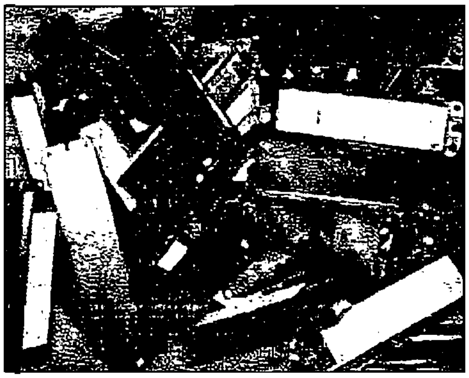


[redacted]

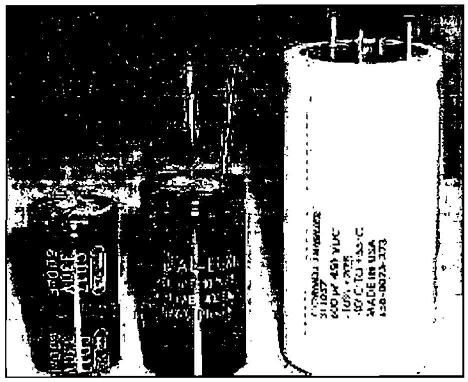
Materials Not Accepted

PCB Containing Devices (capacitors, ballasts, microwave ovens, etc)

Ballasts



Capacitors



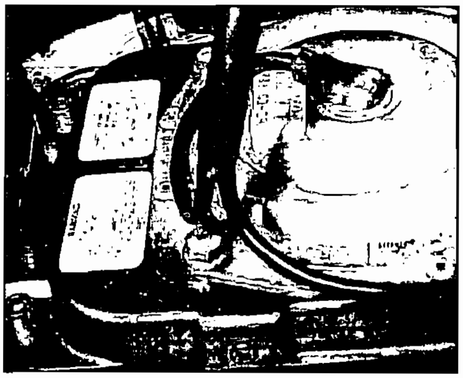
Batteries

[redacted]

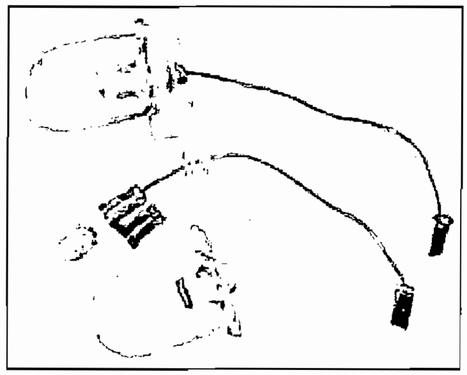
Materials Not Accepted

Miscellaneous items (material containing Freon, transformers, liquids or sludge, lead battery cable ends, heavy steel, mercury-containing devices, computers, electronics, etc.)

Air bag canisters

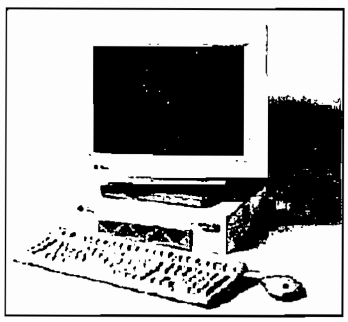


Mercury switches



Electronics

Computers



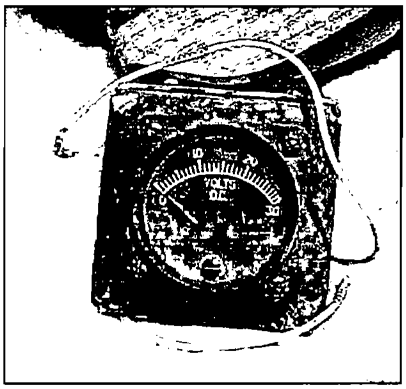
Heavy O/S Steel

[redacted]

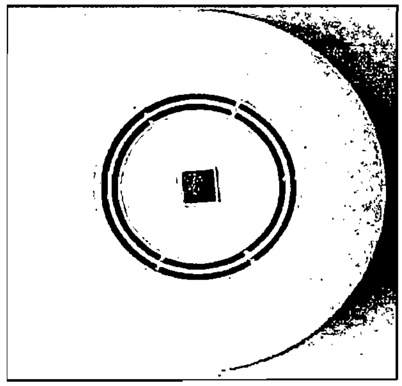
Materials Not Accepted

Radioactive material (military equipment, fertilizer related equipment, etc)

Radium dial

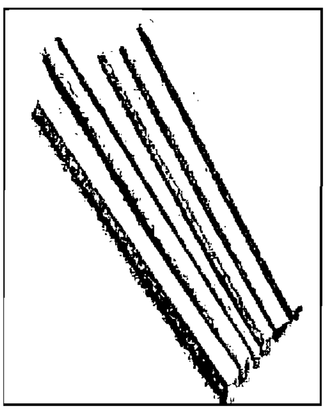


Smoke detectors

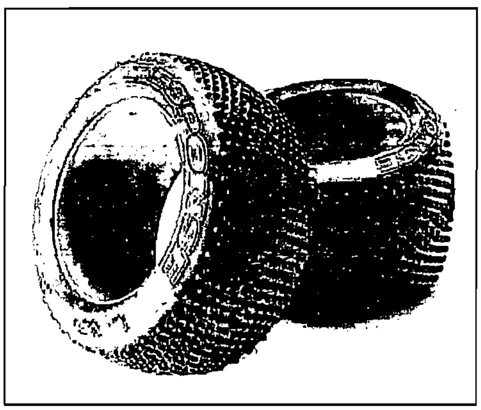


Contaminants (dirt, wood, plastic, water, cement, tires, etc)

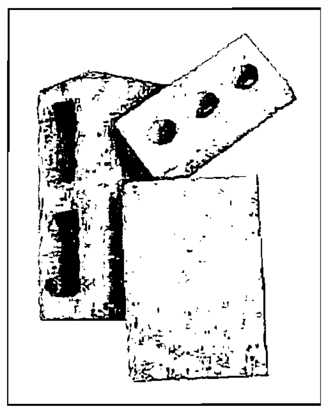
Wood



Tires



Cement



ATTACHMENT 8

Environmental Compliance Manual
For Automotive Recyclers

Florida Department of Environmental Protection

FLORIDA

Environmental Compliance Manual for Automotive Recyclers

Published by

Florida Department of Environmental Protection

and

Florida Auto Dismantlers and Recyclers Association

table of contents

Chapter Three

Appendix/ Reference

how to use this book

This book is designed as a reference guide to help Florida Automobile Recyclers comply with the environmental regulations that govern the automotive recycling industry.

Each chapter outlines a set of requirements and Best Management Practices (BMPs). In addition to the book, the accompanying self-audit checklist is designed to assist your facility in reducing waste, complying with important environmental regulations, and achieving an overall cleaner yard.

If you would like to take it a step further and "Go Green," you may request a set of six modules to work towards your official Green Yards certification. Submit your certification documents (one per month) to:

Florida Department of Environmental Protection
Green Yards Program Administrator
2600 Blair Stone Road MS #4560
Tallahassee, Florida 32399

After DEP has received your certification documents, a verification inspection will be performed. If your facility is in compliance with all applicable environmental regulations and has implemented Best Management Practices for managing waste, you may become a certified Green Yard. As a Green Yard, your facility will have the privilege of displaying the Green Yards logo and possibly benefit from the reduced likelihood of additional regulatory inspections. If corrective actions are required, a "Return to Compliance" plan will be developed.

The Green Yard certification is an award recognizing that the owner of a facility implements Best Management Practices (BMPs). Since BMPs concern ongoing operations and do not address the potential effect of past activities, this certification has no effect on obligations of the owner of a facilty to clean up contamination, whether known or as yet unidentified.

auto recyclers' golden rules

By following the 12 activities below, you will be using industry specific best management practices. Use this checklist to identify areas that need work and to track your progress.

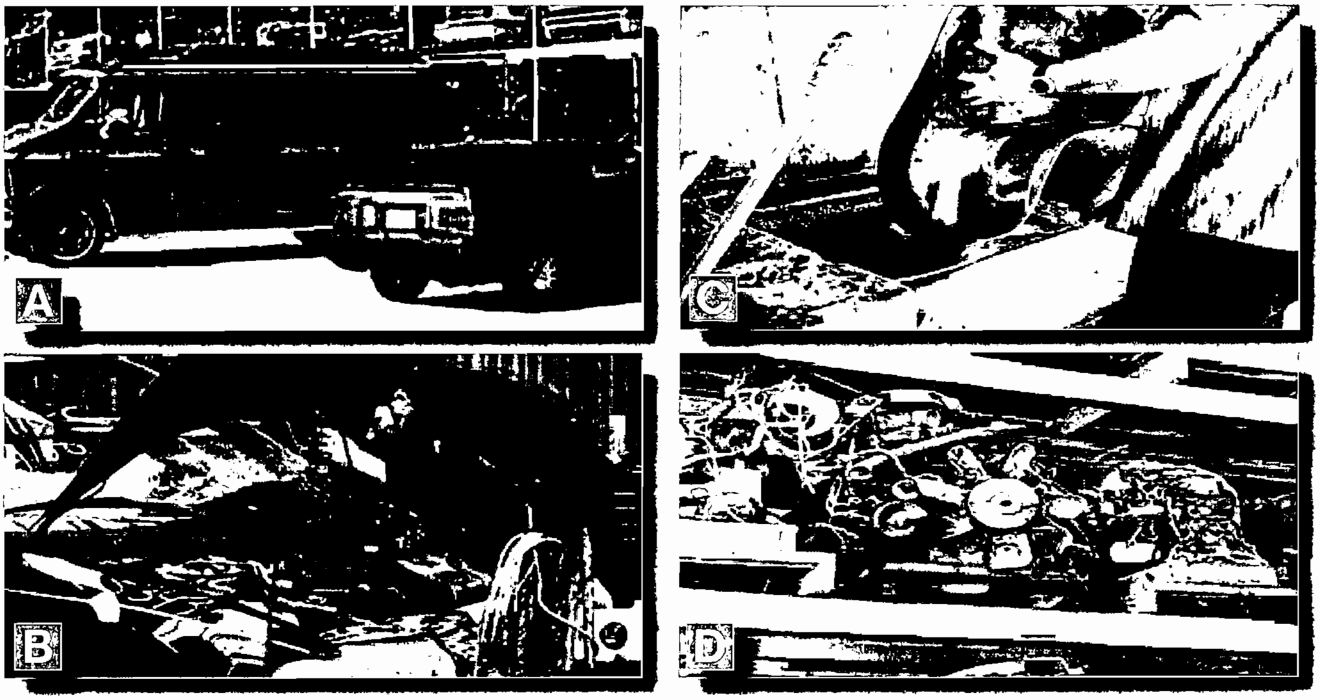
CHECK THAT:

1. **New arrivals are inspected for fluid leaks. Remove, recycle and store properly car batteries, mercury switches and air conditioning refrigerants.**
2. **Core parts storage areas are regularly inspected to make sure fluids are not leaking onto the ground or exposed to rainwater.**
3. **Used oil tanks/containers are labeled "Used Oil" and inspected regularly for good condition.**
4. **Anti freeze tanks/containers are labeled as "Good Antifreeze" or "Waste Antifreeze" and inspected regularly for good condition.**
5. **Gasoline tanks/containers are labeled "Good Gasoline" or "Waste Gasoline" and inspected regularly for good condition.**
6. **All drums and storage containers are marked with proper contents—No mystery drums.**
7. **A Stormwater Pollution Prevention Plan (SWPPP) has been developed and implemented, if required.**
8. **Batteries are stored inside on a pallet or outside in a leak-proof container away from traffic areas.**
9. **Refrigerant recovery machines (R12 and R134a) are in working condition and in good repair.**
10. **Disposal records for used oil, waste gasoline, batteries, refrigerant, etc. are maintained in order at a central location on site for a minimum of 3 years.**
11. **Spills are addressed immediately and any contaminated soils are removed quickly and stored in a separate, labeled container for proper disposal.**
12. **Waste tires are stored in a central location and never allowed to exceed 1500 without a permit.**

chapter one

overview and general waste management

where to start



A – Vehicles situated off ground in designated holding area over concrete B – Vehicle undergoing fluid removal inside

C – Draining fuel from a gas tank into above ground storage tank through screen filter with lid D – Stored engine blocks with plugs to prevent leakage

The following list offers some helpful best management practices for any size vehicle recycler.

Incoming Vehicles

Inspect incoming vehicles for leaks in engines, radiators, transmissions, differentials, fuel tanks and damaged areas. Place drip pans under leaks to collect all fluids. Immediately stop the leaks.

Remove fuel, refrigerant, mercury switches, and the battery as soon as possible.

Processing Vehicles

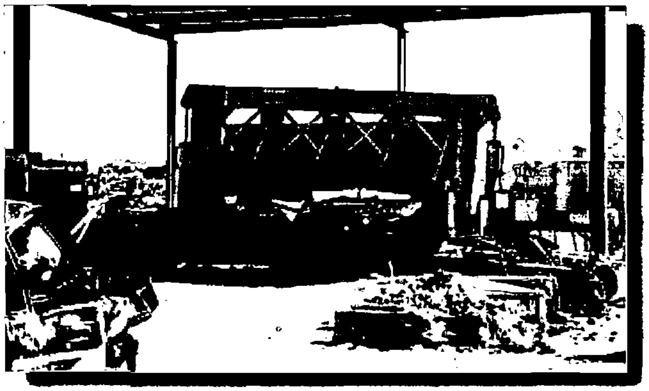
Drain all fluids from vehicles into appropriate containers over an impervious surface before crushing or storing on the ground. This includes fluids in: engines, radiators, transmissions, heater cores, brake lines, differentials, all lines and hoses, fuel tanks, air conditioning units and window washing fluid tanks. Remove and capture refrigerant.

Remove used engines without tipping vehicles on their sides to prevent fluids running out or spilling on the ground.

Situate vehicles off the ground.

Store vehicles in a manner so that they can be inspected for leaks.

Store fluid-containing parts that have been drained in covered secondary containment to minimize exposure of potential pollutants to stormwater.

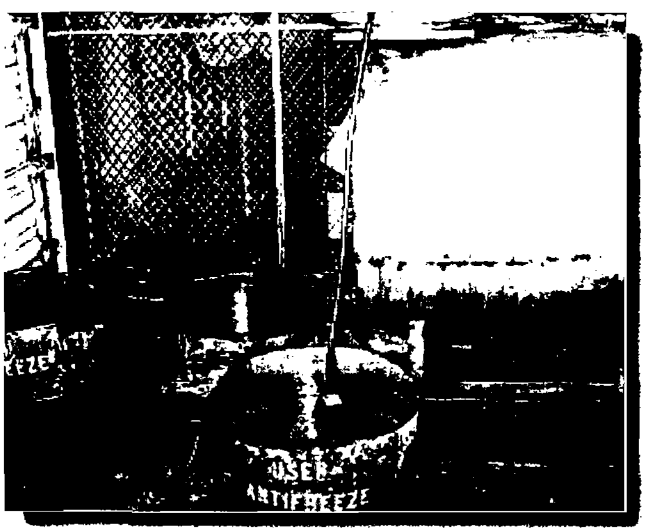


Crusher used to crush properly drained and stripped cars; crusher situated beneath a shed on an impervious surface.

Vehicle Crushers

Vehicle crushers and drain racks should be situated on a bermed or self-contained impervious surface, preferably under a roof and protected from the weather. The floor surface should be sloped to contain fluids. Position crushers and drain racks toward the center of the surface or concrete pad rather than along the edge.

- Mobile crushers should always be situated on an impervious surface. Containers designed to be fitted to the crusher can help capture fluids.
- Vehicles should be adequately drained prior to crushing in order to minimize the volume of waste fluids to manage.
- Maintain disposal receipts from mobile crusher operators for all wastes generated and transported off-site for disposal.



Antifreeze and fluids

Housekeeping

- Do not let liquids evaporate.
- Use drip racks, drip tables, screen tables and trays to capture fluids. Drained parts should be stored on an impervious surface inside secondary containment and protected from weather.
- LABEL everything with the contents of the container to avoid cross-contamination and to facilitate recycling.
- Keep all chemicals in closed, covered or sealed containers.
- Always use funnels or pumps when transferring or dispensing fluids.
- Place a platform or step next to storage drums so employees do not have to lift drain pans above their waists.
- Maintain equipment to prevent leaks/spills.
- Maintain trash dumpsters on-site and dispose of solid waste regularly.
- Do not burn or bury solid waste.
- Do not store empty open containers, drums or tanks on site. Recycle/dispose of material regularly.

Cores stored under cover, inside secondary containment to minimize exposure to stormwater.

spills and leaks
be prepared - spill control

Spill Prevention

Inspect, drain and dismantle vehicles in one area.

Drain vehicles, parts, and cores as soon as possible after vehicles come in.

Dismantle vehicles, parts and cores on a curbed, impervious surface with drip pans and absorbent materials available.

Do not crush vehicles on unprotected ground.

Plug engine and all hoses after draining.

Place all fluids in proper storage containers immediately after draining.

Store vehicles, parts and cores with proper spill containment.

Secondary containment must be adequate to contain 110% of the volume of fluid of the largest container in the area.

Clean up small spills right away. Use the smallest amount of absorbent possible or drain into a sump or oil/water separator.

Store all used absorbents in closed, covered, leak-proof containers, and dispose of properly.

Store all waste fluids in closed containers to prevent spills. Close tightly to prevent evaporation.

Inspect containers regularly for leaks.

Develop a maintenance plan for all facility equipment, such as crushers, forklifts and hydraulic lifts.

Clean crusher regularly by wiping off accumulated grease and oil; this helps prevent runoff.

Keep spill control equipment/absorbent materials in a central location, accessible to all employees.

Train all employees on spill response.

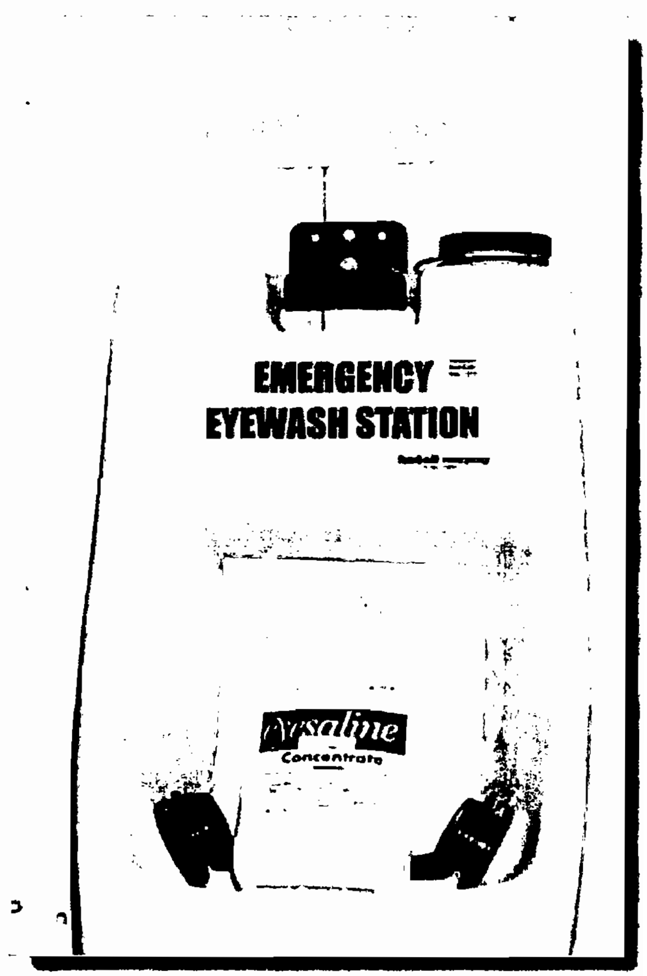
Spill Control Equipment

Fire extinguishers are required in all vehicle recycling areas. They should be kept where any cutting torches are used and in yard vehicles.

Safety equipment for employees should include rubber or latex gloves and safety glasses.

Use brooms, shovels and dust pans to pick up clean-up materials.

Containers to hold spill waste such as drip pans, pails, and drums should be available.



Make safety equipment accessible to all employees. Using signs will help employees locate safety equipment during emergencies.

spills and leaks reporting

When a spill occurs, follow these basic steps:

1. Observe the safety precautions associated with the material spilled.
2. Stop the source of the spill if possible and clean up the spill right away.
3. Call your local fire and/or police departments if fire or public safety hazards are created.
4. Contain the spilled material. Dirt, sand or any semi-impermeable material may be used to create a containment structure to prevent material from moving.
5. Report any spill of used oil or fuel that discharges to a water body, or any spill over 25 gallons, to the National Response Center at 1-800-424-8802 and the Florida State Warning Point at 1-800-320-0519.
6. Recover the spilled substance while observing safety precautions. Professional contractors may need to be hired if large quantities or dangerous substances are involved, or if long term cleanup and investigation are required.

Spill Prevention Control and Countermeasures (SPCC) Plan

SPCC Plans are designed to describe your facility's spill response plan in the event that you have a spill or release of oil, used oil, or fuel. The Plan should outline controls to prevent spills, define who will respond to spills, identify ways that oil could reach a water body, and describe equipment and materials to be used to respond.

Your facility needs a SPCC Plan if:

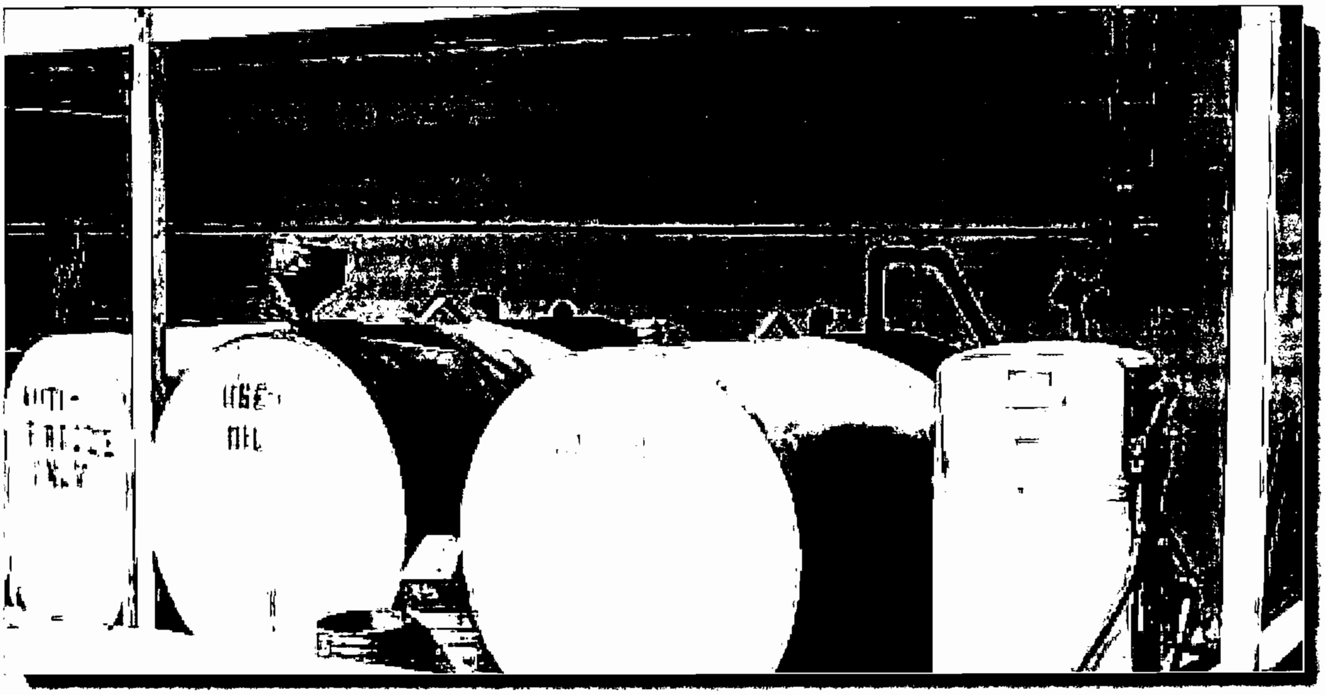
You have an above ground storage capacity of 1,320 gallons or

You have an underground storage capacity of 42,000 gallons, and

The spill has the potential to reach a water body.

For additional information on SPCC regulations:
www.epa.gov/oilspill/spcc.htm

container management and storage



Clearly labeled tanks are stored inside secondary containment.
The storage area has a roof to help minimize accumulation of stormwater.

Container Management

Maintain containers in good condition and routinely inspect for signs of rust, leaks or defects.

Prevent leaks, ruptures and the accumulation of rainwater on top of drums.

Keep containers **closed** when not actively adding or removing material.

Never place incompatible wastes, such as wastes that react with each other, in the same container (e.g. Do not store acids and bases in the same container).

Wastes must be compatible with the container in which they are being stored. For example, use plastic containers for corrosive wastes.

Label all containers properly.

Container leaks or spills must be **stopped, contained,** and **managed immediately** and the container repaired or replaced.

Labels

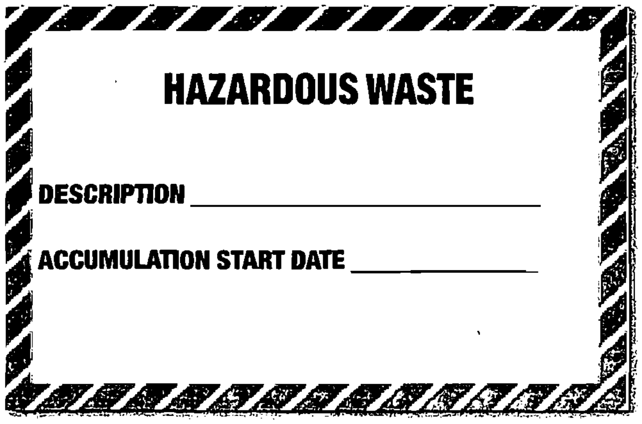
Label every container with the contents and type of waste.

Label every container as "Hazardous Waste" or "Non-hazardous Waste."

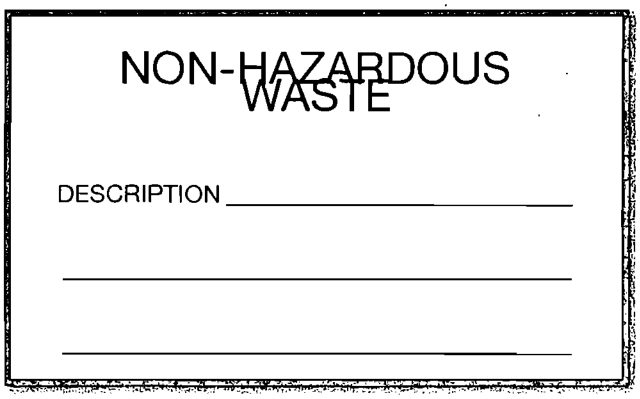
Include the **accumulation start date** for containers used to store hazardous waste (the date when hazardous waste was first stored in the container).

Labels (continued)

Use the following words on labels for hazardous wastes:



Use the following words on labels for non-hazardous wastes:



Storage

Store containers in an area protected from weather and on a curbed impervious surface.

Don't combine hazardous waste with non-hazardous waste.

Store ignitable and reactive wastes within property limits, at least 50 feet from property boundaries.

Store containers of incompatible wastes in separate areas.

Maintain aisle space between containers to allow for inspection for leaks and damage.

Be aware of allowable time limits for storage.

Hazardous Waste Inspections & Recordkeeping

Inspect containers at least once a week and keep a written log of container inspections.

Keep training and inspection records for 3 years.

Keep manifests and shipping receipts for 3 years.

Keep records of lab tests for 3 years.

Keep completed land disposal restriction forms for 3 years.

Get receipts to verify payment for disposal.

Training

Train all employees to identify, reduce and properly handle wastes.

Train new employees before they handle hazardous wastes.

Train new employees on the Stormwater Pollution Prevention Plan (SWPPP) and all employees annually (refer to Chapter 3).

Transport and Disposal

Make sure your transporter and disposal facility have EPA identification numbers.

Use manifests for all hazardous wastes shipped offsite.

Ensure used oil transporters have a current DEP registration. Check with your DEP District Office or Florida Auto Dismantlers and Recyclers Association (FADRA) for a list of approved transporters and processors.

container management and storage

Storage tank systems, with specified volumes and contents, are regulated and must be registered with the DEP or your county environmental protection agency.

For more information,
contact the DEP Storage Tank Regulation Section at
(850) 245-8839
or visit their web site at
http://www.dep.state.fl.us/dwm/waste.

Storage Tank Requirements

Register underground storage tanks (USTs) larger than 110 gallons that contain petroleum such as motor fuel, new or used oils, new or used transmission fluids, and new or used hydraulic fluids.*

Register aboveground storage tanks (ASTs) larger than 550 gallons that contain petroleum such as motor fuel, new or used oils, new or used transmission fluids, and new or used hydraulic fluids, or hazardous substances.*

Label tanks and fill pipes with words identifying the contents.

Assure that the tanks are in compliance with leak detection requirements.

Assure that the storage tanks meet the appropriate secondary containment requirements.

Upgrade the tanks to meet spill, overfill and corrosion protection requirements.

Notify the State Warning Point immediately (within 24 hours or the close of the next business day) in the event of a discharge of 25 gallons or more. See page 5.

Do not remove, close, or upgrade any regulated storage tank without first notifying DEP or the contracted county.

** Storage capacities may require an SPCC plan.* *See page 5.*

Keep the secondary containment drain valve closed when not in use.

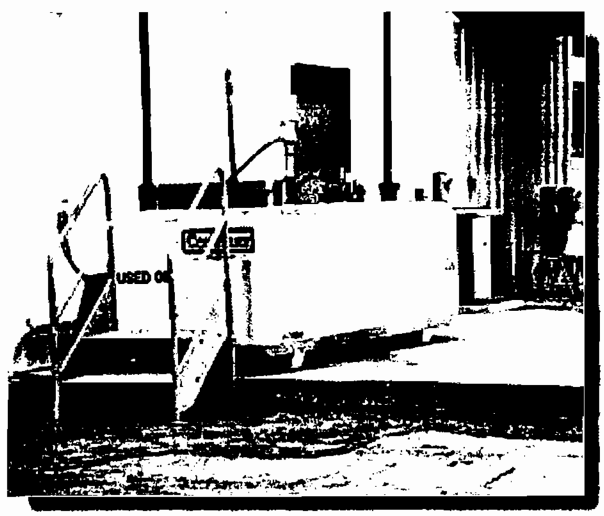
Maintain the secondary containment structures by keeping them free of debris.

Manage the liquids collected in the secondary containment structures appropriately.

Routinely inspect the integrity of the secondary containment structures by checking for cracks, holes, etc.

Maintain written documentation of secondary containment inspections.

Assure financial responsibility and/or provide third party liability insurance for tank cleanup activity.

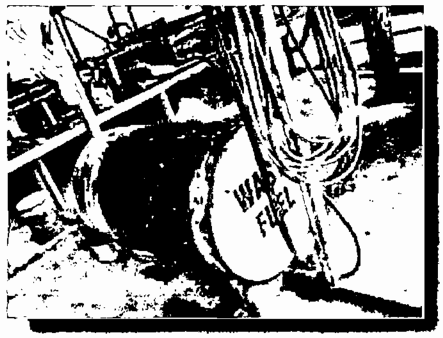


how do i determine if i am a generator?

The law says:

A Small Quantity Generator is one that generates less than 1,000 kilograms (kg) of hazardous waste in a calendar month. RCRA further refines this category into two separate groups:

- Small Quantity Generators (SQG)
  100-1,000 kg/month (220-2,200 pounds)
- Conditionally Exempt Small Quantity Generators (CESQG)
  100 kg/month (220 pounds) or less.



Which category do I belong to?

The amount of all hazardous waste generated and/or accumulated at your place of business within a calendar year will determine your category. Each category has its own requirements for waste management.

To determine the correct generator status, each generator is required to count any hazardous waste that is:

- Accumulated prior to recycling, transporting, storage, treatment, or disposal.
- Transported off-site for treatment, storage or disposal.
- Treated or disposed of on-site (unless exempt).

You don't have to count:

- Spent lead acid batteries that will be sent off-site for reclamation.
- Used oil that has not been mixed with hazardous waste and is recycled on or off-site.
- Petroleum Contact Water (PCW) managed in accordance with Chapter 62-740, Florida Administrative Code (F.A.C.)
- Waste antifreeze that is recycled in accordance with DEP guidelines.
- Hazardous waste batteries, pesticides and mercury lamps and devices managed in accordance with the EPA Universal Waste Rule (40 CFR Part 273) and Chapter 62-737, F.A.C.

hazardous waste generator categories

Conditionally Exempt Small Quantity Generator (CESQG) Hazardous Waste Limits

A **CESQG** may generate in any one month:

no more than 100 kilograms (220 pounds - about half a 55-gallon drum*) of hazardous waste

no more than 1 kilogram (2.2 pounds) of an acutely hazardous waste (e.g. some arsenic and cyanide compounds)

and

never accumulate more than 1,000 kilograms (2,200 pounds - about five 55-gallons drums) of hazardous waste at any time.

Small Quantity Generator (SQG) Hazardous Waste Limits

A **SQG** may generate in any one month:

between 100 kilograms (220 pounds - about half a 55-gallon drum) and 1,000 kilograms (2,200 pounds - about five 55-gallons drums) of hazardous waste

Large Quantity Generator (LQG) Limits

A **LQG** may generate in any one month:

1,000 kilograms of hazardous waste (2,200 pounds - about five 55-gallons drums) or more

or

1 kilogram (2.2 pounds) or more of an acutely hazardous waste

You are a CESQG if you generate no more than 100 kilograms of hazardous waste in any calendar month.

If you exceed the 100 kilograms per month or accumulate 1,000 kilograms at any one time, you are subject to the requirements of a Small Quantity Generator.

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 solid waste agency or DEP for more information (back cover).

• These volume limits are based on the weight of water (8 pounds/gallon) and are only provided for the purpose of estimating one's status. Heavier wastes like heavy metal sludges (20 pounds/gallon) and chlorinated solvents such as perchloroethylene, freon, and trichloroethylene (12-13.5 lb/gallon) need to be evaluated based on their actual weight per gallon.

generator status

The Hazardous Waste Regulations that apply to your facility are determined by the amount of hazardous waste that you generate in a calendar month or store on site.

If you generate less than 220lbs/100kg of hazardous waste in a calendar month (about half a drum), you are classified a **Conditionally Exempt Small Quantity Generator (CESQG)** of hazardous waste.

As a CESQG, you must:

1. Evaluate your hazardous wastes and ensure proper disposal of all wastes.
2. Maintain records of waste disposal for a minimum of 3 years.
3. Contact your DEP District Office or the DEP Small Quantity Generator Coordinator in Tallahassee at (850) 245-8773 to request a copy of the following documents:
   - *Fact Sheet: Requirements for Conditionally Exempt Small Quantity Generators of Hazardous Waste*

If you generate greater than 220 lbs/100 kg in a calendar month, you are considered a **Small Quantity Generator (SQG)** of hazardous waste.

As a SQG you must:

Apply for a US EPA Identification number, and meet additional requirements for waste storage, employee training, and emergency procedures.

Fact Sheet: Requirements for Small Quantity Generators of Hazardous Waste

Florida's Handbook for Small Quantity Generators of Hazardous Waste

If you generate more than 2,200 lbs/100 kg per month, contact DEP for more information.

identifying your wastes

Ways to Identify Hazardous Wastes.

When a material is destined for disposal, it is classified as a waste. You must determine whether the waste is hazardous or non-hazardous. There are several ways to identify hazardous wastes.

Obtain and read Material Safety Data Sheets (MSDSs) see p age 1.

Talk to product suppliers and manufacturers.

Read product labels.

Compare product to hazardous waste characteristics and to wastes listed in federal regulations.

A non-hazardous material may become hazardous if contaminated during use. In this case, lab testing may become necessary.

Testing/Analytical Waste Determinations

Sometimes sending a sample of waste to a laboratory for analysis is the only way to determine if the waste is hazardous. Important tests for vehicle recyclers may include pH, volatile organics, total petroleum hydrocarbons and heavy metals. If you test a waste once, and continue to use the same industrial process, you may apply those test results when designating future batches of the same waste.

identifying hazardous wastes

A hazardous waste is a solid, liquid, or gas with certain properties that could cause injury or death to a person, or could damage and pollute land, air, surface water or groundwater. Some wastes are specifically **listed** in "Identification and Listing of Hazardous Wastes," 40 CFR Part 261. Other wastes may be regulated because they exhibit certain **characteristics** (ignitability, corrosivity, reactivity, toxicity).

The Code of Federal Regulations is available online at *http://www.gpo.gov.*

Major Category	Hazardous Waste Type	Examples
Listed Wastes		
	F - Non-specific sources	Chlorinated solvents (methylene chloride), toluene
	K - Specific sources	Wood preservation chemicals
	U - Unused chemical product	Expired chemicals
	P - Acutely hazardous waste	Cyanide
	Ignitable wastes are easily combustible or flammable. If they have a flashpoint of less than 140 degrees Fahrenheit or an alcohol content of 24% or more, they are hazardous wastes.	Spent solvents Solvent still bottoms Mineral Spirits Waste oil-based paints Used gasoline
	Corrosive wastes corrode metals or other materials and can burn the skin. These liquids have a pH ≤ 2 or a pH ≥ 12.5.	Acid from lead acid batteries Acids/Bases
	Reactive wastes are unstable and may explode or react rapidly or violently with water or other materials.	Sodium azide in undeployed air bags
	Toxic wastes contain certain toxic organic chemicals or certain heavy metals, such as chromium, lead, mercury, or cadmium.	Sludges Heavy metals Used gasoline Spray cabinet wash water (possible)

other regulatory programs

Emergency Planning and Community Right-to-Know Act, Material Safety Data Sheets, OSHA Compliance

It is recommended that waste streams not be mixed. Mixing means fewer recycling opportunities or reuse options and more expensive management costs. Mixing wastes might even cause a chemical reaction that could produce an explosion or toxic gases.

Also, please remember - Label, Label, Label!

Material Safety Data Sheets (MSDSs)

A material safety data sheet should accompany each of the chemical products you purchase from a manufacturer or vendor. They are used to relay chemical hazard information. As a business, you are required to keep MSDSs for all products available to employees. The ability to scan through an MSDS and pick out the following information is important. MSDSs are valuable because they describe:

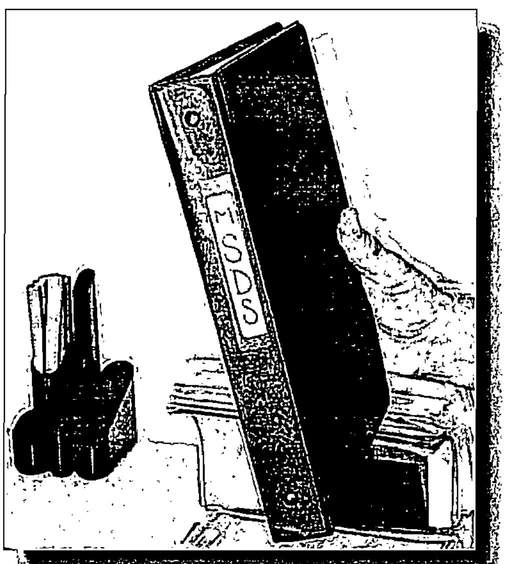
The physical and chemical properties of the hazardous substances contained in the product,

Spill cleanup instructions,

Health hazards and appropriate first aid,

Fire and explosion hazards, and

Proper management and disposal practices.



Notebook of MSDS maintained at facility with easy employee access.

An MSDS file should be maintained at the workplace. It should be located so that all employees have easy access. If you keep MSDSs on file in a computer, a hard copy should also be available in the event of a computer failure or loss of electrical power.

Indicate to your employees how and where your MSDSs are to be located and any access procedures necessary. Assign someone the responsibility to obtain, maintain and update MSDS information.

OSHA Compliance

Small business owners have a variety of problems in dealing with workplace safety and health hazards. It is important for business owners to establish their own safety and health programs in order to minimize worker injury and illness. For more information contact the Occupational Safety and Health Administration at: (800) 321-6742 or the Florida Agency for Workforce Innovation at (800) 342-3450. The "OSHA Handbook for Small Businesses" is available at: *http://www.osha.gov/.*

Emergency Planning and Community Right-to-Know Act (EPCRA)

Title III of the Superfund Amendments and Reauthorization Act (SARA) sets the procedures for government and industry emergency response planning. It also establishes the guidelines for notifying the community-at-large on the hazardous chemicals in their community. Many hazardous waste generators have requirements under EPCRA.

chapter one test

True or False

______ 1. As long as incoming vehicles are staged over an impervious surface they do not need to be checked for leaks.

______ 2. Batteries that are not damaged or leaking can be left in vehicles.

______ 3. Liquids may be allowed to evaporate to reduce waste volume.

______ 4. As long as all employees know what is in each storage tank or drum, labels are not required.

______ 5. Secondary containment is only required for fluid containers with a capacity of more than 110 gallons.

______ 6. Every person who has any substance or material under their control is required to report petroleum and fuel spills of 5 or more gallons, and any other chemical spill (including lead-acid batteries) to the State Warning Point.

______ 7. Hazardous waste containers should be inspected weekly and inspections documented in a written log.

______ 8. Any spill over 25 gallons should be reported to the National Response Center or State Warning Point.

______ 9. Every facility that generates a waste must conduct a waste determination before disposal.

______ 10. Disposal/recycling documents (manifests, receipts), lab results and land disposal restriction notices must be retained on site for a period of 1 year from the date on the document.

______ 11. A Material Safety Data Sheet (MSDS) file should be maintained at your facility so that all employees have easy access to it.

chapter two

specific wastes

a quick look at the waste streams

Waste	Best Handling Method
Air bag cartridges	Sell, dispose of properly.
Antifreeze	Reuse, recycle on-site or off-site
Batteries	Recycle; avoid storing for more than 6 months.
Brake fluid	Collect in a separate container, or with written permission from your waste hauler, manage with your used oil. Otherwise, conduct a waste determination, and if hazardous, dispose of brake fluid through a hazardous waste company.
Empty containers	Reuse on-site after all free product has been removed and the container cleaned. Recycle larger metal containers such as drums. Check with local solid waste landfill to see if they accept empty containers
Mercury switches	Remove and dispose of as hazardous waste.
Parts washer solvent	Recycle through service provider or conduct a waste determination. If parts washer solvent is determined to be hazardous, dispose of waste properly. Extend change-out time until solvent is unusable.
Refrigerants	Recover using certified recycling equipment and recycle on-site or send off-site. The technician must be certified to put refrigerant back into vehicles.
Shop towels	Use a commercial service that provides laundered cloth towels.
Solvents	Conduct a waste determination, and if hazardous, dispose of solvents as hazardous waste.
Sump sludge	Sump sludge should be tested to determine if it is a hazardous waste due to heavy metal or solvent content. If hazardous, manage as a hazardous waste until it is sent to a hazardous waste management facility.
Tires	Recycle, sell, dispose of appropriately.
Transmission filter	Drain fluid, recycle through scrap metal dealer.
Transmission fluid	Recycle.
Used oils	Recycle.
Used oil filters	Drain oil, recycle filter through scrap metal dealer.
Used fuel	Reuse in a vehicle, recycle or dispose of waste fuel through a hazardous waste company.
Windshield washer fluid	Reuse, sell.

vehicle fluids

Antifreeze, Brake Fluid, Gasoline/Diesel, Gear Oil, Power Steering Fluid, Transmission Fluid, Used Oil, Windshield Washing Fluid

Most problems at auto salvage yards result from the mishandling of vehicle fluids generated from dismantling, crushing or draining fluids from vehicles. Proper management of fluids may prevent spills and leaks, avoid potential clean-up costs, avoid disposal of contaminated soils, and will save money.

Vehicle undergoing fluid removal indoors on an impervious surface.

Antifreeze

Antifreeze is exempt from hazardous waste regulations if it is recycled. Antifreeze often becomes contaminated with traces of fuel, metal particles and grit. If antifreeze, antifreeze still bottoms, antifreeze filters, or antifreeze solids are not recycled, a waste determination must be conducted, **or** the antifreeze can be handled as a hazardous waste to avoid testing costs. Used antifreeze must be tested at a minimum for lead, benzene, tetrachloroethylene and trichloroethylene using the Toxicity Characteristic Leaching Procedure (TCLP). If determined **hazardous**, used antifreeze must be managed as a hazardous waste. Reusable or recycled antifreeze can be used in facility vehicles, sold or given away. If you use an off-site recycler, you **MUST ENSURE** that the antifreeze is being recycled!

Use separate equipment for the collection of used antifreeze (funnels, pads, storage containers).

Label used antifreeze collection equipment and containers "**Used Antifreeze.**"

Drain antifreeze from radiators and heater cores as soon as possible.

Keep used antifreeze free from cross-contamination with other wastes including used oil, fuels, degreasers or radiator flush chemicals.

Determine if the antifreeze is waste fluid or recyclable.

Consider keeping antifreeze in two separate, closed containers: one for antifreeze that cannot be reused marked "**Used Antifreeze**," and one marked "**Good Antifreeze.**"

Do not accumulate used antifreeze for longer than 180 days.

Recycle by reuse. Methods of processing waste antifreeze include distillation, filtration or ion exchange. Recycling can be done on-site or off-site by an antifreeze recycling service.

Conduct a waste determination on used antifreeze filters generated from recycling process equipment, or handle as a hazardous waste.

Maintain records of used antifreeze shipments and filter management for a minimum of 3 years.

Maintain a log documenting the volume of used antifreeze processed through on-site recycling equipment.

Maintain records of analytical waste determinations and disposal receipts for at least three years.

vehicle fluids

Brake Fluid

Brake fluid becomes hazardous when it is contaminated with chlorinated solvents. If brake fluid becomes hazardous, manage it as a sêparate waste stream, perform a waste determination and dispose of the waste accordingly. Check with your used oil transporter to see if non-hazardous brake fluid can be mixed with used oil.

Do not spray brake cleaner around containers of brake fluid.

Do not dispose of brake fluid down any drain, into a septic system, on the ground, or in a dumpster.

Gasoline/Diesel

Facilities may add fuel to used oil as long as the mixture does not become hazardous for ignitability. Prior notification that fuel is added to used oil should be provided to your used oil hauler. Fuel may also be disposed of as a hazardous waste.

Remove fuel tanks as soon as possible after the vehicle enters the facility.

Determine if fuel is reusable or waste fuel.

Label containers of reusable fuel clearly: "**Good Gasoline**" or "**Good Diesel.**"

Manage contaminated fuel in designated containers and **label** containers of waste fuel clearly: "**Waste Fuel,**" and apply appropriate hazardous waste labels.

Reusable fuel may be used in facility or employee vehicles.

Do not mix fuel with any other waste streams.

Properly dispose of contaminated fuel and maintain the disposal receipts for at least three years.

Gear Oil, Power Steering Fluid, Transmission Fluid

Gear oil, power steering fluid and transmission fluid are not regulated as hazardous waste if they are recycled. Crude-based petroleum products can be managed like or with your used oil **ONLY IF** they have not been mixed/contaminated with hazardous wastes such as solvents, brake cleaner or carburetor cleaner. Do not dispose of crude-based petroleum products in a storm drain, septic tank, dry well, sewer system or dumpster. Refer to the USED OIL guidelines.

Used Oils

Used oil is exempt from hazardous waste regulations if it has not been mixed or contaminated with hazardous wastes, or it is sent for recycling or burned for energy recovery. Proper records must be maintained.

Used oils include but are not limited to the following:

Cutting oil*

Transmission fluid

Lubricating oil

Gear oil

Motor oil

Hydraulic oil

Differential oil

Power-steering fluid

Transaxle fluid

* Some cutting oils and metal working fluids contain chlorinated paraffins and must be managed and recycled separately. Do not mix these with other used oil.

Label containers clearly: "Used Oil."

Fill pipes used to transfer used oil into underground storage tanks (USTs) must be labeled "Used Oil."

Used oils can be mixed together and stored in the same container for collection by a state registered used oil transporter.

Used Oils (continued)

Do not pour, dump or dispose of used oil in vehicles or on automobile upholstery that is destined to be crushed or shredded.

Do not contaminate used oil with even small amounts of brake cleaner, carb cleaner, or solvents. Even small amounts of chlorinated solvents turn recyclable used oil into a hazardous waste.

Do not mix antifreeze, solvents, gasoline, degreasers, paint or anything else with used oil.

Do not pour used oil on the ground or use for weed control.

Do not mix used oil with other solid waste destined for a landfill.

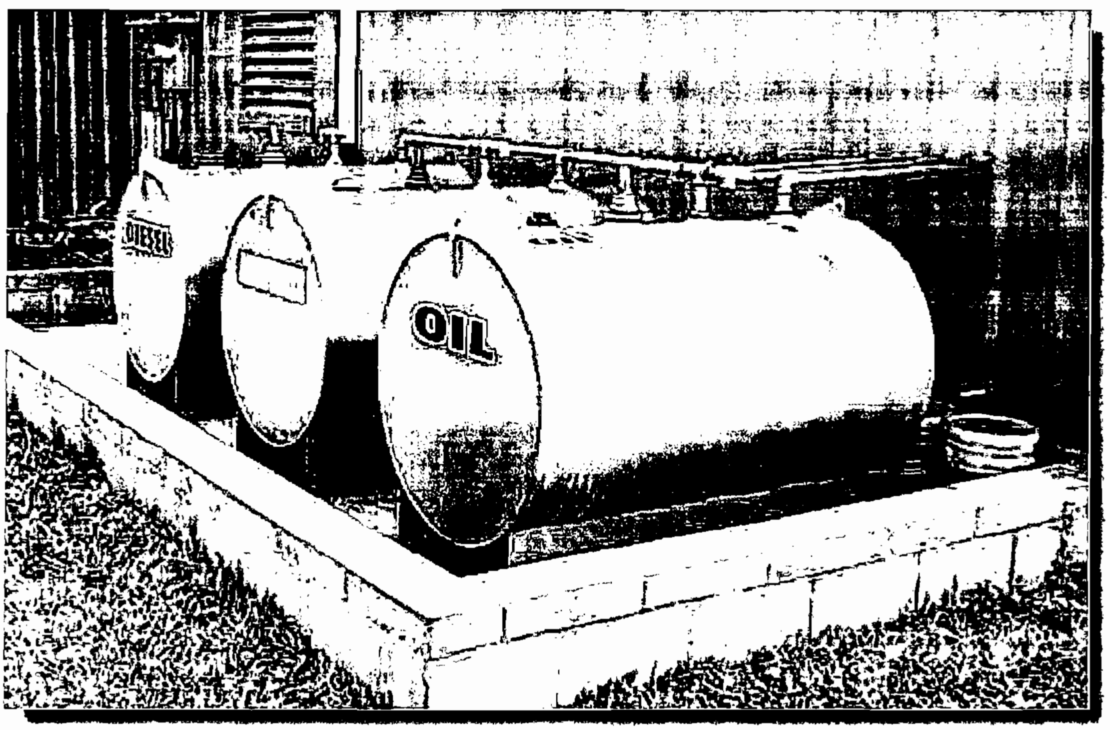
Used oil may be recycled by recovery and re-refining by a state permitted used oil processor. Approved used oil transporters must be registered with the state. Check with your DEP District Office or FADRA for a list of approved used oil/used oil filter transporters and processors.

Windshield Washing Fluid

Although window washing fluid is mainly alcohol, water and detergent, it may contain small amounts of antifreeze. Manage windshield washing fluid as a separate waste stream.

Reuse window washing fluid in facility or employee vehicles.

Sell or give away reclaimed window washing fluid to customers.



filters
(fuel filters, transmission filters used oil filters)

Used Oil Filters

Florida law prohibits disposal of used oil/transmission filters in a landfill or in any trash destined for a landfill. Used oil filters can be recycled through a state registered used oil filter processor. Check with your DEP District Office or FADRA for a list of approved used oil/used oil filter transporters and processors.

If your local disposal company sends its collected refuse to a waste-to-energy plant (an incinerator used to burn municipal solid waste and make electricity), you may be able to obtain written permission to dispose of your drained, used oil/transmission filters in the trash.

- Used oil filters should be punctured and drained for 24 hours prior to disposal.
- Consider crushing drained filters to reduce costs.
- Keep drained filters in a separate container labeled "Used Oil Filters".
- Maintain storage containers in good condition, indoors, protected from weather or sealed/closed, on an impervious surface.
- Maintain disposal/recycling receipts for at least three years.

Transmission Filters

Transmission filters should be handled with used oil filters.

Fuel Filters

Most fuel filters should be handled as hazardous waste and disposed of accordingly.

- Drain excess fuel from filters into a proper fuel container.
- Metal fuel filters can be handled with used oil filters if the filters are drained and dry.
- Glass filters should be managed separately and require a waste determination.
- Glass filters that are determined to be non-hazardous can be disposed of in a dumpster or recycled with other glass.

refrigerants

r-134a and cfcs (refrigerant/r-12, r-22)

Refrigerants (chlorofluorocarbons, or CFCs, and R-134a) are the chemicals used in automotive air conditioning and appliances.

CFCs refer to the R-12 (Refrigerant) and R-22 used in air conditioning units.
They are a family of chemicals that are stable, non- flammable and non-corrosive.
CFCs cannot be released to the atmosphere.

How Refrigerants are Processed

Refrigerants are processed by using one of these methods:

Recovery — removing refrigerant from air conditioning units and storing it in a container without testing or processing it.

Recycling — filtering refrigerants to remove impurities such as oil, air and moisture.

Reclaiming — processing refrigerant, usually by distillation, until all impurities are removed and it meets resale specifications.

*It is illegal to knowingly vent refrigerants into the environment during repair, service, maintenance, reclamation, recycling, or disposal of refrigeration and air conditioning equipment. Spent refrigerants that are not reclaimed or recycled and refrigerants used as solvents **are** regulated wastes.*

For additional information on refrigerants contact the

U.S. EPA's Ozone Protection Hotline at
(800) 296-1996

OR

http://www.epa.gov/ozone/

Refrigerants must be recovered prior to crushing vehicles or appliances (white goods).

Remove refrigerants from all vehicles using EPA-approved recycling/recovery equipment.

Do not evaporate or vent refrigerants to the atmosphere.

Maintain records that the refrigerants were recovered on site, or

Maintain records that the vehicle/appliance was brought into the facility free of refrigerants and that the refrigerants were removed using the proper methods prior to entering the facility.

Store refrigerant in tanks that meet U.S. Department of Transportation (DOT) or Underwriters Laboratory (UL) standards. Label tanks according to their contents: "**Refrigerant/Freon**."

Sell refrigerant only to U.S. EPA certified technicians or U.S. EPA authorized reclaiming facilities who will reclaim it to its original purity specifications. Keep records of refrigerant sales.

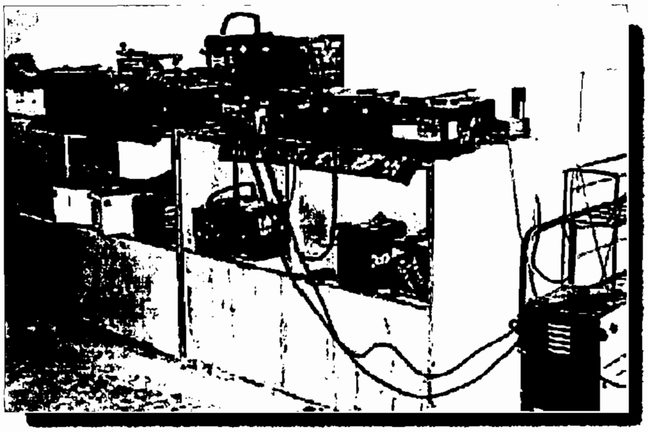
Do not recharge a vehicle's system with recovered refrigerants unless a U.S. EPA certified technician is recharging the vehicles on site.

Conduct a waste determination on filters from recovery equipment and dispose of properly.

Maintain records documenting the volume and final destination of recovered refrigerants.

lead

lead acid batteries, lead parts



Indoor used battery recharge area—batteries stored or recharged on wood shelving over an impervious surface, recharge areas should be well ventilated (*wood shelving does not corrode)*

Lead Acid Batteries

Batteries pose a potential threat to human health and the environment if improperly discarded. Spent lead acid batteries contain lead and corrosive acids which are considered hazardous waste. Lead acid batteries are exempt from hazardous waste regulations if recycled or returned to a battery manufacturer and documentation is maintained. Otherwise, lead acid batteries must be managed as a hazardous waste.

Remove batteries before crushing any vehicles.

Test batteries to determine usability or resale quality.

If lead acid batteries are recharged for resale, remove lead cable ends from batteries. Store lead parts in a covered container that is strong enough to hold the weight of the lead. Recycle the lead with a reputable recycler.

If spent lead acid batteries are going to be recycled as scrap batteries, leave lead battery cable ends attached to the scrap batteries.

Check batteries for leaks, cracks, etc. prior to storing.

Place cracked or leaking batteries in a closed, watertight, acid resistant storage container.

Store batteries upright, on wooden pallets, in a secure, covered location, on a bermed impervious surface or in watertight, acid resistant containers.

Do not stack batteries higher than four batteries high.

Keep spill control equipment near batteries to neutralize any acid release (e.g. baking soda, lime).

Do not place lead acid batteries in the garbage or incinerate batteries.

Do not pour battery acid on the ground or into a drain, septic system, or storm drain.

Ensure that battery cores are disposed of through a battery wholesaler/retailer, a permitted secondary lead smelter, a collection center or a reputable recycler.

Maintain recycling or disposal receipts for at least three years.

Lead Parts

Remove lead tire weights and battery cable ends before crushing vehicles. Battery cable ends may be left on usable batteries and recycled along with the batteries.

Store lead parts in a covered container that is strong enough to hold the weight of the lead.

Recycle lead parts

Plastic wrapped lead acid batteries stacked < than 4-high on a pallet, on an indoor impervious surface—notice the use of cardboard between layers of batteries.

mercury

fluorescent lamps, high intensity discharge lamps, and mercury switches

(A list of mercury recyclers can be obtained by request from the DEP or FADRA.)

Fluorescent and High Intensity Discharge Lamps

Spent lamps have been banned from solid waste incineration since 1994. Florida law limits spent lamp disposal in a landfill.

To recycle lamps, store them in a manner that prevents them from breaking, and label each container with "Spent Mercury-Containing Lamps."

Conduct a waste determination on spent lamps if you choose not to recycle your lamps.

Lamps destined for recycling do not count towards your facility's hazardous waste generator status, if properly managed.

Be able to demonstrate that you have not stored the lamps for more than one year. This can be done by keeping a log, shipping papers, or by labeling storage containers with the accumulation start date.

Do not break or crush lamps.

Maintain records of analytical waste determinations, shipping papers, disposal or recycling receipts for at least three years.

Automotive Applications of Mercury

Mercury tilt switches used on underhood and trunk lighting

Four Wheel Drive Anti-Lock Braking Systems, usually 3 per vehicle

Active Ride Control or Ride Leveling Sensor, 2 to 4 mercury switches used to adjust suspension on cornering events

High Intensity Discharge Systems, headlights and tail lamps

Virtual Image Instrument Panel

Mercury Switches

Mercury is a highly toxic metal often found in several automotive applications. Once released into the environment, mercury cannot be eliminated.

Remove all mercury switches from the vehicle as soon as possible.

Be careful not to break or puncture the mercury container during removal.

Store mercury switches in a leak-proof, labeled, closed container. Store in a way that will prevent the capsules from breaking.

Manage mercury switches as hazardous waste. Containers should be labeled "Hazardous Waste–Spent Mercury Switches" and dated with an accumulation start date. For more information, refer to pages 6 and 7.

Maintain disposal records for a minimum of three years.

Contact DEP or FADRA for a list of recyclers.

For more information on automotive applications of mercury or for a list of automobile makes and models that contain mercury switches, a copy of the "Draft Wisconsin Mercury Sourcebook: Automotive" is available at :

http://www.epa.gov/epaoswer/hazwaste/mercury

Additional information can be obtained at:
http://www.epa.gov.region5/air/mercury

scrap metal

Catalytic converters may be removed prior to crushing and recycled for their platinum content.

Maintain receipts for all scrap metal shipped off-site (including vehicles for shredding) for at least three years.

aluminum sweat furnaces

On March 23, 2000, a new Federal air emission standard came into effect. It states that:

"Dioxin/furan (D/F) emissions from each sweat furnace must be controlled to 0.80 nanograms of D/F toxic equivalent per dry standard cubic meter at eleven percent oxygen."

What does this mean to you?

If you operate a sweat furnace at your facility, you are subject to this standard, regardless of size or location of the sweat furnace.

You must either retrofit your existing sweat furnace with an afterburner (estimated cost according to EPA: $8,000 to $58,000),

or

Purchase a new sweat furnace that already meets the new standard,

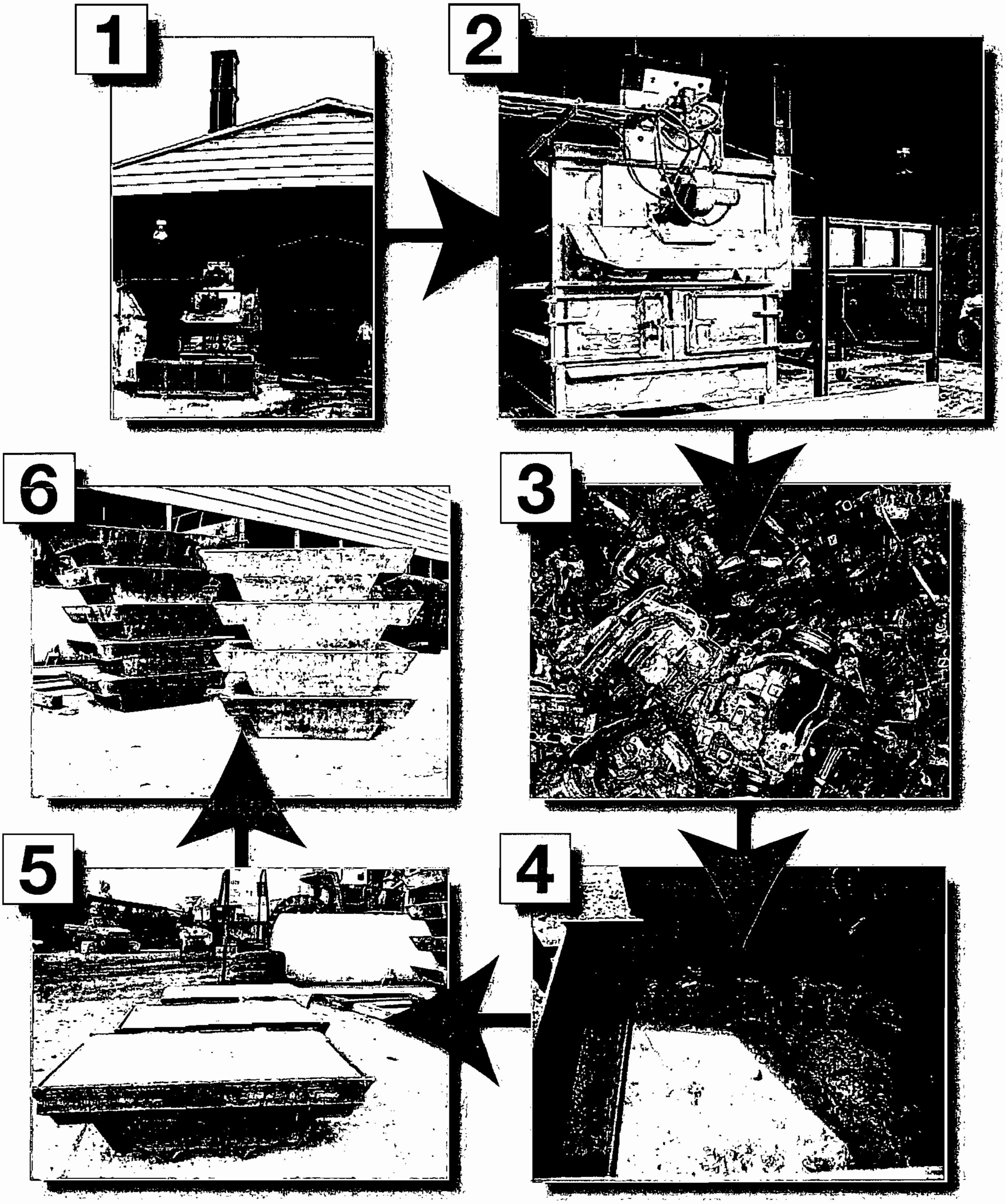
or

Discontinue the use of the sweat furnace.

For more information:

Consult the EPA brochure titled "New Regulations Controlling Emissions from Secondary Aluminum Production (Sweat Furnace Operations)" located in the Appendix of this workbook.

aluminum sweat furnaces

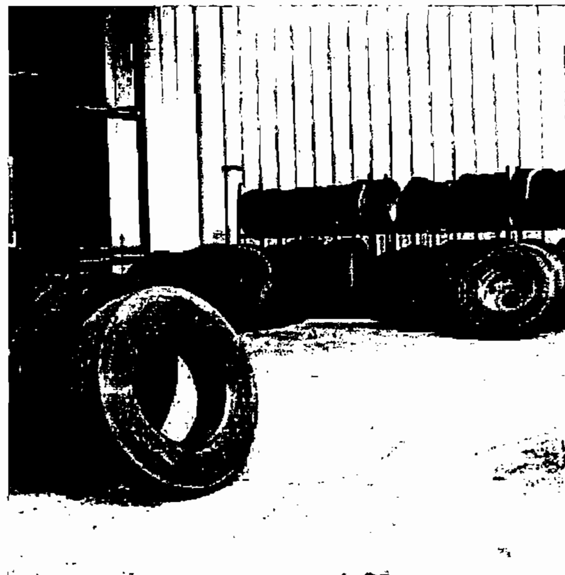


waste tires

More than 50% of the nation's rubber supply is used to make tires.
About 242 million tires are scrapped in the United States each year.
Up to 80% of tires are now retreaded, recycled, or used as fuel.

Bad Management

Good Management



Tires should be stored to prevent mosquito infestation.

In landfills, tires take up a large amount of space, harbor rodents, and collect gases. Illegally dumped tires or tire piles can pose health hazards by providing a breeding ground for mosquitoes and the potential for fires. Citrus oil or baking soda can be used to kill larvae in water collecting in tires.

Store waste tires indoors or outdoors with a cover to prevent the collection of standing water, and to prevent mosquito larvae from thriving.

If waste tires cannot be processed in a timely manner, leave waste tires on the rims to avoid problems with mosquitoes until the waste tires can be managed properly.

Do not accumulate more than 1,500 waste tires on site.

Do not burn or bury waste tires.

Transport stored waste tires regularly to prevent large accumulations.

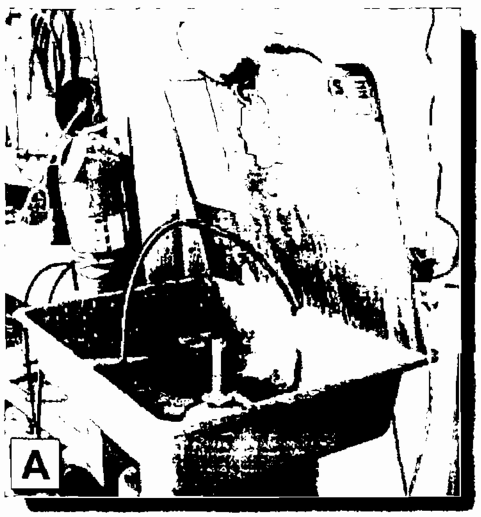
All haulers of over 25 tires must register with the DEP; use only vendors registered with the DEP.

Dispose of tires at a permitted or DEP approved facility. Check with your DEP District Office or FADRA for a list of facilities.

Maintain disposal/recycling receipts for at least three years.

cleaning solutions

Aqueous Parts Washers/Wastewater Management, Hot Tank Solutions, Parts Washers, Pressure Washing, and Sump Sludge



A – Solvent Parts Washer

B – Aqueous Parts Washer

Aqueous Parts Washers/ Wastewater Management

Aqueous parts washers provide environmental benefits because they do not use solvents that contain volatile hydrocarbons. However, some precautions must be taken concerning disposal of wastewater, sludge (see section on sump sludge on page 29), and filters. Wastewater is water that has been used for a purpose such as engine cleaning, and is destined for disposal. All process wastewater should go to a sanitary sewer. No wastewater should ever be discharged to the ground or septic system. Check with your local sewage plant for information on discharge limits and to obtain a discharge permit if required. **Find out where the drains in your shop lead.**

Use either an on-site capture and reuse system for wastewater, or have a connection to a city sewer and wastewater treatment facility with the proper permitting.

Notify and get written approval from the sanitary sewer system prior to discharging any wastewater.

Floor cleaning wastewater may be contaminated with heavy metals and grease that need to be treated before discharging to the sewer. If not contaminated, the water may go to an oil/water separator (or another appropriate system) and then the sanitary sewer.

Keep floors clean to begin with. Catch leaks before they hit the floor.

Recycle floor mop water into spray cabinet washers.

Steam cleaning, pressure washing and spray cabinet wastewater should go to an oil/water separator (or another appropriate system) before discharging to the sanitary sewer.

Recirculate and reuse water until unusable.

Do not dispose of spent parts washer fluids on the ground, down a drain, or in a dumpster or septic system.

Conduct a waste determination on spent parts washer fluid and filters and dispose of properly.

Maintain records of analytical waste determinations and disposal receipts for three years.

cleaning solutions

Hot Tank Solutions

A solution of caustic (alkaline) cleaners and water is commonly used in tanks for cleaning engines and parts. Spent solution and sludge may be hazardous due to corrosivity (pH $\geq$ 12.5) or high metal content.

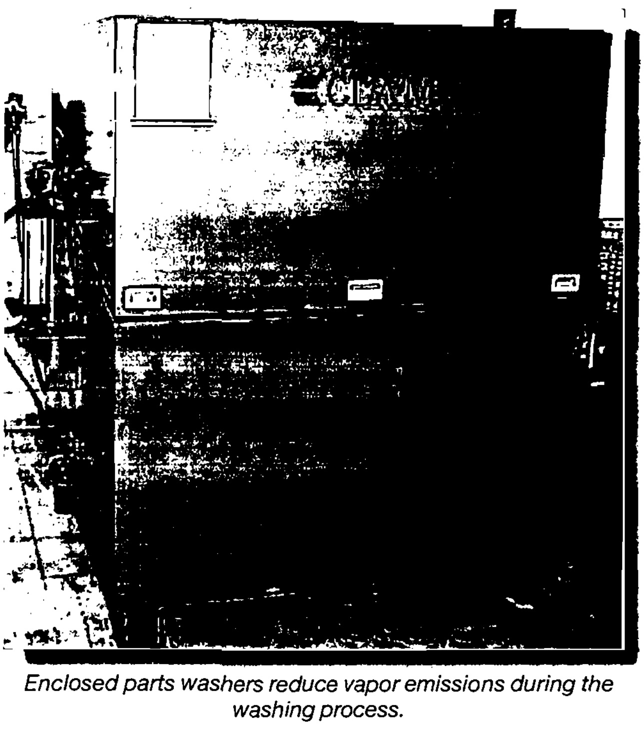
Accumulate spent cleaning solution and sludge removed from hot tanks in closed, labeled containers that are compatible with the waste placed in them.

Conduct a waste determination on spent solution and sludge and dispose of properly.

Maintain records of analytical waste determinations and disposal receipts for three years.

Notify and get written approval from the sanitary sewer system prior to discharging any wastewater.

Engine parts situated on a drain rack within a parts washer.



Enclosed parts washers reduce vapor emissions during the washing process.

Parts Washers

Mineral spirits, Stoddard solution, petroleum naphtha, gasoline, kerosene, or diesel fuel may be hazardous due to ignitability. Other solvents may be toxic if they contain toluene, methyl ethyl ketone (MEK) or 1,1,1-trichloroethane. Spent parts washer fluids may also be hazardous due to elevated metal content from oils and greases.

Do not dispose of spent parts washer fluids on the ground, into drains, into a septic system, or by evaporating.

Do not use aerosol spray cans near your parts washers.

Conduct a waste determination on spent parts washer fluid, sludge and filters and dispose of properly.

Maintain records of analytical waste determinations and disposal receipts for three years.

Pressure Washing

Pressure washing should be performed on a curbed concrete pad. Wastewater may contain heavy metals and greases, which if improperly managed, could contaminate soil and/or groundwater.

- Pressure wash parts and engines over a contained, impervious surface such as a wash table that drains to an oil/water separator.
- Do not allow wastewater, oils or greases on the ground.
- Do not allow wastes to flow into a septic tank or a drain leading to a ditch, stream, lake or dry well.
- Check with your local sewer utility to verify that drains in your pressure washing containment area are connected to a sanitary sewer system.
- Notify and receive written authorization prior to discharging wastewater to a sanitary sewer system.
- Maintain an oil/water separation system or sump regularly.
- Equip the oil/water separator with an emergency shut-off to prevent spills from entering the sewer, or discharging directly to surface waters.
- Conduct a waste determination on spent liquids and sludge and dispose of properly.
- Maintain records of analytical waste determinations and disposal receipts for three years.

Sump Sludges

Sludges from your sump or oil/water separator may be hazardous waste. You will need to conduct a waste determination on sludge at a certified laboratory to determine if it is hazardous.

- If sludge tests as a hazardous waste, manage as a hazardous waste and dispose of the sludge through a hazardous waste management facility.
- Do not put hazardous sludge in the dumpster, on the ground, down a drain, or into a septic system.
- Do not use a septic tank pumping service to dispose of sludge.
- Maintain records of analytical waste determinations for three years.

An enclosed pressure washing area, over concrete, with wash water drained through an oil/water separator.

process auto salvage wastes

Absorbents, Aerosol Spray Cans, Shop Towels

Absorbents: Granular Clay, Pads, Booms (Pigs)

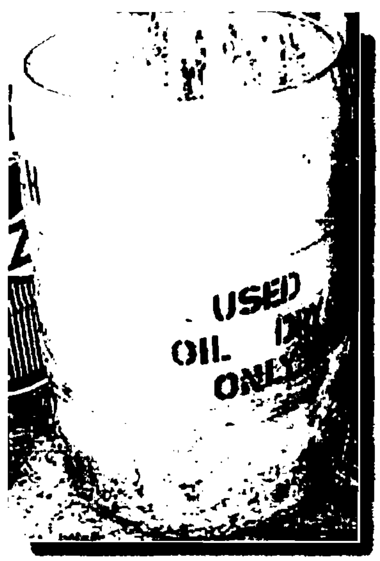
Check with your solid waste authority whether you may dispose of your oily wastes in the trash dumpster.

Do not put spent absorbent in vehicles to be crushed or shredded, in drains, or on the ground.

Maintain absorbent material in areas where fluids are generated, managed or stored.

Soak up leaks and spills as soon as they occur and remove them in a timely manner.

Manage absorbent that comes in contact with hazardous waste as a hazardous waste.



Do not mix spent non-hazardous absorbent with spent hazardous absorbent.

Maintain records of analytical waste determinations and also disposal receipts for at least three years.

Aerosol Spray Cans

Partially empty spray cans may be regulated as hazardous waste if discarded because they contain ignitable propellants or chlorinated solvents. Empty spray cans are exempt from hazardous waste regulations and can be recycled as scrap metal.

Use the entire spray can before starting another, and empty cans completely before discarding.

If a spray can malfunctions, handle as a hazardous waste or consider returning it to your supplier.

Do not spray around other solvents, waste or open containers to prevent contamination.

Never spray a product in the air in lieu of proper disposal.

Collect and conduct waste determinations on spray cans which are not empty.

Maintain records of analytical waste determinations and disposal receipts for at least three years.

Contaminated Soil

At some facilities, soil has become contaminated by past or ongoing vehicle handling practices. Improving daily work practices can alleviate the cost to remediate and dispose of contaminated soils.

Prevent spills before they happen. Clean up spills as soon as they happen or are discovered.

Excavate contaminated soil as spills and leaks occur to prevent migration of the contamination.

Collect the soil in appropriate, labeled containers and store the containers on a covered, impervious containment area until the soil can be treated or transported to a waste treatment facility.

Do not dispose of contaminated soil in vehicles to be crushed or shredded.

Do not store contaminated soils for an indefinite amount of time. Dispose of contaminated soil promptly to avoid additional contamination.

Contact DEP for information on disposing of contaminated soil.

Maintain records of analytical waste determinations and disposal receipts for at least three years.

Dust

Dust from your facility can pollute the air and cause complaints from your neighbors. Listed below are some techniques to prevent and suppress dust.

- Surface- apply chemical suppressants to non-traveled areas. **Used oil cannot be used for this purpose.**
- Apply gravel or rock, sod, seed or mulch.
- Do not clear more vegetation than is necessary to provide ample work areas.
- Construct natural or artificial wind breaks or wind screens.
- Lower speed limits on roads.

Shop Towels

Dirty rags can become hazardous if used to soak up hazardous substances. However, dirty rags are exempt from regulation if managed correctly and picked up for laundering by an industrial rag/laundry service which is connected to a sanitary sewer. If a rag service is not used, then you must determine that your rags are not hazardous before putting them in the trash.

- Do not dispose of dirty shop towels in vehicles to be crushed or shredded.
- Avoid use of disposable towels.
- Do not throw dirty wipes, paper towels or rags into the dumpster if they have come into contact with hazardous solvents or waste.
- Keep waste shop towels in a closed, fireproof container labeled "**Used Shop Towels.**"
- Maintain records of analytical waste determinations and disposal receipts for at least three years.

chapter two test

True or False

_______ 1. It is legal to vent refrigerants to the environment as a means of disposal.

_______ 2. Reusable or recycled antifreeze can be used in facility vehicles, sold, or given away.

_______ 3. Brake fluid is allowed to be poured down any drain, on the ground, or placed in a dumpster.

_______ 4. Pouring used oil on the ground as weed control or dust suppressant is allowed.

_______ 5. Antifreeze, solvents, degreasers, and paint can be mixed with used oil for disposal.

_______ 6. Spent lead acid batteries contain lead and corrosive acids that are considered hazardous waste.

_______ 7. Do not store more than 1,500 waste tires at your facility; you must have a permit from the DEP.

_______ 8. All wastewater from aqueous parts washing and pressure washing should go to a sanitary sewer (with written authorization) that goes to a publicly owned treatment works (POTW) and not to any other type of drain, such as a stormwater drain or septic system.

_______ 9. A septic tank pumping service can be used to dispose of oil/water separator sludge.

_______ 10. An acceptable way to dispose of used absorbent materials is to place them in the trunks of vehicles to be crushed..

_______ 11. Used oil filters should be punctured and drained for 24 hours before disposal.

chapter three

npdes

stormwater permit, pollution prevention plan, and guidance pages

npdes stormwater permit

The following guidance pages include a step-by-step procedure, including forms, for developing and maintaining your facility-specific Stormwater Pollution Prevention Plan.

You need an NPDES (National Pollutant Discharge Elimination System) permit if ...

- you dismantle automotive vehicles to recover, use, or sell used parts
- you have a primary or secondary Standard Industrial Classification Code 5015 or 5093 (example, your primary source of income is the sale of used vehicles [SIC Code 5521], but your second most important source of income is the sale of used parts [SIC Code 5015]), or if
- rainwater (stormwater) runs off your business' property, or could run off the property to any ditch, canal, stream, lake, or ocean or to a city storm sewer (different from sanitary sewer) through a curb, gutter, ditch, drain inlet, wetland or other surface water body.

How Do I Get a Permit?

Under the Multi-Sector Generic Permit for Industrial Activity (MSGP) you must fill out and mail in a document called a Notice of Intent (NOI). A sample is included in the Appendix. This can also be obtained from Florida DEP at:

www.dep.state.fl.us/water/stormwater/npdes/
(follow the links for industrial activity)

or

NPDES Stormwater Notices Center, MS #2510
Florida Department of Environmental Protection
2600 Blair Stone Road
Tallahassee, FL 32399-2400
(850) 245-7522

or

1-(866) 336-6312 (toll free) or (850) 297-1232
NPDES Stormwater Notices Center (operated by a contractor for basic assistance)

The permit provides a 5-year coverage period (permit-by-rule) at a cost of $500.00 to be submitted with the NOI. The application fee is subject to change. Please refer to the most current version of Rule 62-4.050 (4)(d), F.A.C. Make checks payable to the Florida Department of Environmental Protection.

What Is Required?

A Stormwater Pollution Prevention Plan must be prepared for the facility as required by the permit.

what is a stormwater pollution prevention plan?

A Stormwater Pollution Prevention Plan (SWPPP) is a document which:

- describes the facility and its operations,
- identifies potential sources of stormwater pollution at the facility,
- specifies appropriate Best Management Practices (BMPs) or pollution control measures to reduce the discharge of pollutants in stormwater runoff, and
- provides for periodic review of the SWPPP.

The SWPPP outlines your plans to continually ensure that "Potential Pollutants" are not exposed to rain or stormwater. The goal is to eliminate or minimize the chances of polluting stormwater that would leave your facility. You will be expected to review the success of your SWPPP and to make changes to the SWPPP as needed.

Examples of potential pollutants:

POLLUTANT	POLLUTANT
Used Oil	On Road Diesel
Used Transmission Fluid	Off Road Diesel
Used Brake Fluid	Metals (Aluminum, Lead)
Used Wiper Fluid	Solvents/Detergents
Used Antifreeze	Hydraulic Fluid
Gasoline	Lubricating Fluids
Batteries	Mercury
Oily Water	

What Can I Do?

Use the fill-in-the-blanks Stormwater Pollution Prevention Plan on the following pages,

or:

Contact Florida Auto Dismantlers & Recyclers Association (FADRA) at 407-647-8839 for referral to a consultant to help you with permitting, preparation of the SWPPP, and setting up a sampling program.

A Professional Engineer's seal is NOT required on your SWPPP.

What if I Don't?

Pursuant to Section 403.121 of the Florida Statutes, penalties can be assessed up to $10,000.00 per day per offense.

stormwater pollution prevention plan

Name of Facility ______________________________

Filled out by ______________________ Title ______________________

Permit Number ______________________________

Identified Potential Pollutants					
Yes	No	Pollutant	Yes	No	Pollutant
		Used Oil			On Road Diesel
		Used Transmission Fluid			Off Road Diesel
		Used Brake Fluid			Batteries
		Used Wiper Fluid			Solvents/Detergents
		Used Antifreeze			Hydraulic Fluid
		Gasoline			Oily Water
		Mercury			

Step #1 Pollution Prevention Team

Use the following form to assign employees specific tasks involved with pollution prevention at your facility. Be sure to select employees that are available to perform the required tasks during the time frame you need them accomplished.

Responsibility	Name & Title
Chairperson of Team	
Implementation of BMPs	
Housekeeping	
Incoming Vehicle Inspections	
Routine and Quarterly Inspections	
Visual Wet Weather Observations	
Collection of Stormwater Samples	
Spill Response	
Employee Training and Record Keeping	
Annual Comprehensive Site Compliance Review	

Step #2 Assessment of Site Activities

Use the following checklist to identify processes and areas of concern at your facility that may allow pollutants to come in contact with stormwater. Any item checked "yes" must be included in the Site Plan Drawing of your facility in Step #3.

Yes	No	Activity	Possible Pollutants
		Vehicle Holding Area	Oil and grease, assorted fluids, metals, suspended solids
		Dismantling Inside	Oil and grease, assorted fluids, metals
		Dismantling Outside	Oil and grease, assorted fluids, metals
		Fuel Removal Area (if separate from fluid removal area)	Good gasoline, waste gasoline, diesel
		Fluid Removal Area (if separate from Dismantling Area)	Used oil, transmission fluid, brake fluid, wiper fluid, antifreeze, gasoline, diesel
		Outside Fluid Storage Area	Used oil, transmission fluid, brake fluid, wiper fluid, antifreeze, gasoline, diesel, oily water, solvent, hydraulic fluid,lubricating oils
		Inside Motor & Transmission Storage	Oil and grease, metals
		Outside Motor & Transmission Storage	Oil and grease, metals, suspended solids
		Battery Storage Area	Metals, battery acid
		Tire Storage Area	Suspended solids
		Vehicle Storage Area	Oil and grease, assorted fluids, metals, suspended solids
		Outside Core Storage Area	Oil and grease, metals, suspended solids
		Scrap Storage Area	Oil and grease, metals, suspended solids
		Pressure Washing Area	Oil and grease, metals, suspended solids
		Parts Cleaning Area	Oil and grease, assorted fluids, metals, suspended solids, solvents
		Crushing Area	Oil and grease, metals, suspended solids
		Soil Contamination Areas	Used oil, transmission fluid, brake fluid, wiper fluid, antifreeze, gasoline, diesel, oily water, solvent, hydraulic fluid, lubricating oils
		Spill Areas	
		Areas of Soil Erosion	Suspended solids

Step #3 Site Plan Drawing

Use the following page to complete the Site Plan Drawing of your facility. Any item checked "yes" in the Assessment of Site Activities must be included. Also include:

- Property lines and total acreage at this site
- Adjacent streets, roads, entrances and exits
- Drainage areas and associated ground cover
- Indicate direction of stormwater flow and any storm drains
- Identify locations of major spills and leaks within the past three years.
- "North" direction
- Existing and planned buildings and structures and floor drains
- Retention ponds, swales, berms, wetlands
- Where stormwater leaves the property and where it goes (ditch, canal, creek, lake, river, ocean)

Step #4 Best Management Practices

Use the following checklist to select the BMPs that are appropriate to your facility.

BMP	Implemented Yes, No, or N/A
Vehicles are inspected as they come in and are checked for cracked batteries and fluid leaks	
All fluids are removed from vehicles before they are stored in the main storage area.	
Used oil is kept in clearly labeled containers (labeled "Used Oil") separate from parts cleaning solvents, antifreeze, and fuel.	
Engine oil is drained and stored in clearly labeled tanks or containers. Tanks and containers are kept in good condition, free of any visible spills or leaks, structural damage, or deterioration.	
Antifreeze is drained and reused or disposed of properly and stored in clearly labeled containers, with waste antifreeze and usable antifreeze stored separately.	
Windshield washer fluid is drained for reuse or disposal with antifreeze.	
Batteries are removed as soon as feasible after vehicle enters the facility. Batteries are stored inside on a pallet or outside in a leak-proof covered container, away from traffic areas.	
All pressure washing operations are performed indoors or in covered and bermed outside cleaning areas.	
Parts washing water is captured and recycled or disposed of by a licensed disposal company and NEVER allowed to run on the ground, down a drain, or into a septic system.	
Substances used to wash/clean parts are replaced by less volatile/less harmful products whenever possible (i.e., non-phosphate soaps for detergents, naphtha for harsher solvents).	
Cleaning fluids are recycled and reused where practical.	
Crusher fluids are captured to prevent spillage. This mixture of fluids is collected in a spill-proof covered container and disposed of properly. It is not allowed to run on the ground, down a drain, or into a septic system. The drain within the crusher is kept clean so that the fluids do not collect and overflow from the crusher onto the ground, down a drain, or into a septic system.	
A preventive maintenance program that involves timely inspections and/or maintenance of all facility equipment has been developed.	
The crusher and other equipment is kept clean.	
Periodic inspections of equipment for leaks, spills and malfunctioning, worn or corroded parts are conducted. Tanks, valves, hoses, and containers are regularly inspected and checked for signs of wear or weakness.	
Valves on secondary containment are kept in the "off" position and locked at all times, except when collected water is being removed.	

Step #4 Best Management Practices (continued)

Use the following checklist to select the BMPs that are appropriate to your facility.

BMP	Implemented Yes, No, or N/A
Labeled spill clean up equipment is provided at locations where spills are most likely to occur.	
Clean-up procedures are in place, including the use of dry absorbent materials or other clean-up methods to collect, dispose of, or recycle spilled or leaked fluids. An adequate supply of dry absorbent material is kept on-site and disposed of properly. Used absorbent is never disposed of in vehicles to be crushed.	
Oil or other fluids spilled during parts removal are immediately contained, cleaned up, and the cleaning materials disposed of properly.	
When parts are removed, they are drained. Drip pans are not left unattended.	
When refueling, vehicles and equipment are parked as close to the pump as possible. The fuel nozzle is kept upright when not in use, and replaced securely in the pump.	
Any spills that may occur around fueling areas are immediately controlled, cleaned up, and the cleaning materials disposed of properly.	
All fluid, waste, and core containers are labeled, kept closed and stored away from traffic areas, preferably under cover.	
All tanks, drums, and containers are inspected regularly as required for leaks, spills, and labeling.	
Vehicle fluids, oil, or fuels are not used for dust control or weed control.	
Parts are removed on a concrete pad, under cover.	
Training on pollution prevention is provided annually to all employees.	
The SWPPP is reviewed annually and modified as needed.	
No solvents, detergents, wash water, or other fluids are poured down a drain, into a septic system, or allowed to run on the ground.	
Hoods are kept down where any vehicles are stored.	

Step #5 Annual Stormwater Pollution Prevention Training

Topics to be covered during the annual training include:

- the purpose and requirements of the Stormwater Pollution Prevention Plan;
- spill prevention and response procedures;
- reporting procedures;
- automotive fluids, used oil and spent solvent management;
- good housekeeping practices;
- lead-acid battery management;
- current and proposed Best Management Practices;
- parts handling and storage.

Have each employee at the training sign a sheet (sample below) and give the date and instructor of the training.

Annual Stormwater Pollution Prevention Training

Facility Name: ______________________________

Location: ______________________________

Print Name	Sign Name

Comments: ______________________________

____

____

____

Instructor: ____________________ Date: ____________

Step #6 Quarterly Inspection Checklist

Use the following checklist to inspect the facility and document the results once during each calendar quarter, as required by the MSGP.

Date ________________ Inspected by ____________________________ Title ____________________________

Area/Action	What did you see?	What did you do about it?
HOLDING AREA		
Look at each vehicle for leaks, clutter, hoods down		
DISMANTLING AREA		
Check for stains, spills, leaks of fluids		
Is dismantling being done in the designated area?		
Drain gasoline when vehicles come in so it can be reused or recycled		
FLUID STORAGE AREA		
Check all fluid containers for leaks, levels, labeling, and housekeeping		
INSIDE PARTS STORAGE AREA		
Ensure drip pans are in place if necessary		
Inspect for leaks and spills		
Ensure parts are stored on racks or pallets		
OUTSIDE PARTS STORAGE AREA		
Ensure parts are completely drained before storage		
Ensure parts are stored off the ground		
Inspect for leaks and spills		
VEHICLE STORAGE AREA		
Ensure all fluids have been removed from vehicles		
Ensure all batteries have been removed from vehicles		
Ensure hoods are kept down		
Ensure vehicles are stored in rows or in an appropriately organized manner		

Quarterly Inspection Checklist (continued)

Area/Action	What did you see?	What did you do about it?
PARTS WASHING/PRESSURE WASHING AREA		
Ensure no wash water runs to the ground, down a drain, or into a septic system		
Ensure all equipment is in good working order		
If solvent sink is used, ensure regular servicing and proper disposal of spent solvent		
CORE AND SCRAP STORAGE AREAS		
Ensure cores are completely drained before storage		
Ensure cores are stored under cover over an impervious surface or out of the rain		
CRUSHING AREA		
Ensure all fluids and batteries have been removed from vehicles before crushing		
Inspect crusher for leaks and spills		
STORMWATER SAMPLING LOCATION		
Ensure sample point is accessible and clean		
Ensure nothing is stored around the sample point		
Look at the vegetation for signs of oil		
EQUIPMENT MAINTENANCE		
Evaluate each piece of equipment for leaks		
Repair any hydraulic lines, hoses, cylinders, etc. promptly		

Step #7 Quarterly Stormwater Visual Monitoring

1st Quarter Inspected by________________ Title________________ Date________

2nd Quarter Inspected by________________ Title________________ Date________

3rd Quarter Inspected by________________ Title________________ Date________

4th Quarter Inspected by________________ Title________________ Date________

Use the following checklist to visually examine a sample of your stormwater runoff once each calendar quarter, when and if you have a discharge, and verify that no noticeable pollutants are present in the stormwater discharge. Make copies of this page to use for each quarter. N/D = no discharge. The results are to be kept with the SWPPP.

DO YOU SEE?	DESCRIBE WHAT YOU SEE (suds, oil sheen, water is cloudy, smell of gasoline)	POTENTIAL SOURCE (Anything seem to be different or out of place?)	CORRECTIVE ACTION (What did you do to fix the problem?)
Material floating on the surface of the water?			
Solids settling to bottom of container?			
Solids suspended in water?			
Oil or grease?			
Discoloration of the water?			
Turbidity (is the water cloudy or clear)?			
Foam or suds?			
Odor (gasoline, antifreeze)?			
Other unusual conditions about the water?			

Temporary Suspension of Permit Requirements

The permit requirements to sample stormwater discharge can be temporarily suspended when there are adverse weather conditions. Adverse weather conditions are defined as those that:

- make sampling dangerous to personnel (e.g. high wind, excessive lightning)
- make access to the discharge impossible (e.g. flooding, freezing conditions, extended periods of drought)

You must document when adverse weather conditions result in the temporary suspension of a permit requirement to sample stormwater discharges. The documentation must be included as part of the SWPPP.

Documentation will include:

- the date of the suspension
- time
- names of personnel that witnessed the adverse weather condition
- the nature of the adverse condition

In the event of adverse weather conditions you should reschedule sampling during the next safe rain event.

Step #8 Analytical Stormwater Sampling

Collection of stormwater samples for laboratory analysis is to be conducted once each calendar quarter during the 2nd year of the permit coverage. Five-year permit coverage begins two days after the facility's complete NOI is received by Florida DEP. The analytical data from each quarter is to be entered on a Discharge Monitoring Report (DMR). Then the data from all four quarters is to be averaged and summarized on a fifth and separate DMR. Samples of DMRs are included in the Appendix.

This process is to be repeated in the 4th year of permit coverage unless the average values for the samples in year 2 were beneath the cut-off concentrations (benchmarks). The five DMRs are to be submitted by March 31 of the next year. Copies of all DMRs are to be maintained with the SWPPP.

Information about monitoring requirements is contained in the confirmation letter sent by Florida DEP upon receipt of your facility's NOI.

Information about when to sample,
how to obtain a Discharge Monitoring Report (DMR),
and when to send it in is available from Florida DEP at:

www.dep.state.fl.us/water/stormwater/npdes/index.htm

(follow the links for industrial activity)

or contact the

NPDES Stormwater Notices Center, MS #2510

Florida Department of Environmental Protection

2600 Blair Stone Road

Tallahassee, FL 32399-2400

or

1-(866) 336-6312 or (850) 297-1232

Rain Gauge

Accurate stormwater sampling information requires a rain gauge (from any hardware store) mounted in a place such as a door rack or a front-end rack so it is not shielded or blocked from rain or mounted to receive runoff from a roof or shed.

Qualifying Rain Event

Stormwater monitoring requires a qualifying rain event in order to provide accurate results. Specifically, samples should be collected when the following conditions exist:

- There must have been no rain in the previous 3 days (72 hours) of the sampling event;
- Sampling should not begin until the storm has produced a minimum of 0.1 inches rainfall;
- Samples should be collected in the first 30 minutes of the storm or as soon as there is adequate flow at the sampling location.

The sequence of events required to collect qualified samples is as follows:

1. Confirm designated sample point (shown on Site Plan Drawing).
2. Inventory materials for sampling kit. Materials include as a minimum:

Latex gloves	Plastic scoop	Freezer pack
Chain-of-Custody forms	Sample bottles	Plastic bags (for forms)
Wrapping material for sample bottles	Pre-addressed mailing label	Cooler

3. Prior to projected rain event, ensure rain gauge is empty.
4. Wearing latex gloves, collect sample with scoop and pour into sample bottles. Fill all sample bottles to the top. Do not scrape the bottom of the sampling location when collecting samples.

> ***Caution*: Some sample bottles contain acid preservatives. Do not remove preservatives from bottles. Exercise all safety precautions to prevent acid from getting on your body. Should you get acid on you, immediately flush with water for a minimum of 15 minutes and seek first aid assistance.**

5. Record date, time, and amount of rainfall from rain gauge.
6. Wrap sample bottles in bubble pack or equivalent for protection and pack with freezer pack, in cooler, immediately. Do not allow samples to sit uncooled.
7. Complete Chain-of-Custody form provided by the laboratory, enclose in plastic bag, and place inside cooler.
8. Ship cooler to laboratory via overnight service or two-day delivery service.

Step #9 Annual Comprehensive Site Compliance Assessment

Date ________________ Inspected by ______________________ Title______________________

Every year, you must check your SWPPP and make changes to improve it if necessary. Use the following checklist to review, document, and make the appropriate changes to your SWPPP and the facility. Keep the Annual Reports with your SWPPP.

Items to Check	Yes	No	Observation	Suggested Modifications if Appropriate
Is Pollution Prevention Team current?				
Is the Site Plan Drawing accurate?				
Are BMPs being implemented according to schedule?				
Are the BMPs working?				
Do BMPs need to be changed or added?				
Do the Discharge Monitoring Reports show improvement?				
Were there any spills during the past year?				
Is your inventory of Potential Pollutants still accurate?				
Are your structural BMPs (retention ponds, swales, berms) being maintained?				
Does the facility maintain good housekeeping?				
Have you signed the certification for your SWPPP and for this Annual Report?				
Has your Annual Pollution Prevention Training been performed and documented?				

Each Annual Comprehensive Site Compliance Assessment requires a signature by an authorized representative.

Management Review and Certification

"I certify, under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Authorized Signature ______________________________ Date_________________________

Step #10 Non-Stormwater Discharge Certification

This facility does/does not have non-stormwater discharges. Non-stormwater discharges are illicit discharges connected to the storm sewer, i.e., floor drains, sinks, closed loop wash water recycling systems. If so, list below.

Non-Stormwater Discharge	Yes or No
Parts washing water containing detergents or solvents	
Air compressor condensate contaminated with compressor oil	
Other	

Each facility is required to have a Non-Stormwater Discharge Certification signed by an authorized representative of the facility.

Non-Stormwater Discharge Certification

"I certify, under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Authorized Signature ______________________________ Date__________________

Although a Professional Engineer's seal is not required to authorize the Stormwater Pollution Prevention Plan, it requires a signature by an authorized representative of the facility.

Management Review and Certification

"I certify, under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Authorized Signature ______________________________ Date__________________

chapter three test

True or False

__________ 1. If your facility has a primary or secondary Standard Industrial Classification Code of 5015 or 5093, and stormwater potentially discharges from the site, you are required to have a NPDES permit and Stormwater Pollution Prevention Plan (SWPPP).

__________ 2. The goal of a SWPPP is to eliminate or minimize the chances of polluting stormwater that might leave your facility.

__________ 3. You are required to have your SWPPP stamped by a Professional Engineer.

__________ 4. Pursuant to Section 403.121 of the Florida Statutes, penalties of up to $10,000.00 per day per offense can be assessed for failure to obtain and comply with NPDES permit conditions.

__________ 5. Proposed Best Management Practices identified in the SWPPP for your facility should have identified target dates for completion.

__________ 6. Visual wet weather monitoring is required quarterly for the life of the permit.

__________ 7. The life of the permit (five years) begins two days after the facility's complete Notice of Intent is received by Florida DEP.

__________ 8. Collection of stormwater samples for laboratory analysis is to be conducted once each calendar quarter every year of the permit coverage.

__________ 9. Samples should be collected in the first 30 minutes of the storm or as soon as there is adequate flow at the sampling location.

__________ 10. Each facility is required to have a Non-Stormwater Discharge Certification signed by the authorized representative of the facility.

appendix

reference

facility emergency contact list

worksheet 1 **Fill in and post this information next to your telephone.**

Emergency Response Information

Emergency Coordinator

Name: ______________________________

____

Telephone(s): ______________________________

____

____

____

Fire Extinguisher

Location(s): ______________________________

____

____

____

Spill Control Materials

Location(s): ______________________________

____

____

____

Fire Alarm (if present)

Location(s): ______________________________

____

____

Fire Department

Telephone: ______________________________

worksheet 2 **Fill in and post this information next to your telephone.**

Make sure all employees read and are familiar with its contents.

Emergency Response Procedures

In the event of a spill:
Contain the flow of hazardous waste to the extent possible, and as soon as possible, clean up the hazardous waste and any contaminated materials or soil.

In the event of a fire:
Call the fire department and, if safe, attempt to extinguish the fire using a fire extinguisher.

In the event of a fire, explosion, or other release that could threaten human health outside the facility—or if you know that the spill has reached surface water:
Call the **National Response Center** at its 24-hour number (800-424-8802).
Provide the following information:

Our Company name: ______________________________

Our Address: ______________________________

____

Our U.S. EPA identification number:

____

Date of accident: ______________________________

Time of accident: ______________________________

Type of accident (e.g., spill or fire): ______________________________

Quantity of hazardous waste involved: ______________________________

Extent of injuries, if any: ______________________________

Estimated quantity and disposition of recovered materials, if any ______________________________

recycling and disposal companies

Contact your DEP District Office for a list of registered recycling and disposal companies:

• Northwest District	(850) 695-8300
• Northeast District	(904) 807-3371
• Southwest District	(813) 744-6100
• Southeast District	(561) 681-6600
• Central District	(407) 894-7555
• South District	(239) 332-6975

other sources of information

Chemical Manufacturer's Association
Chemical Transportation Emergencies
(800) 424-9300

Environmental Protection Agency (EPA)
Emergency Planning and Right-to-Know
http://www.epa/gov
(800) 424-9346

The Environmental Yellowpages, Inc.
P.O. Box 1375
Coral Springs, Florida 33077
http://www.enviroyellowpages.com/

DEP Pollution Prevention Program
(850) 245-8707

Environmental Compliance for Automotive Recyclers
http://www.ecarcenter.org

Global Recycling Network
EPA Region 10 Public Information Center
http://grn.com

Greenlink
http://www.ccar-greenlink.org/

Minnesota Pollution Control Agency
http:///www.pca.state.mn.us/netscape4.html

SAGE: Solvent Alternatives Guide
http://clean.rti.org

Southern Waste Information Exchange, Inc.
(800) 441-7949

Wisconsin Department of Natural Resources
http://dnr.wi./gov

important phone numbers and hotline

Florida State Warning Point (24 hour)
(800) 320-0519
or (800) 413-9911

SPILL REPORTING (24 hour)
National Response Center
(800) 424-8802

Federal Information Center
(800) 688-9889

DEP Bureau of Emergency Response
http://www.dep.state.fl.us/law/

Tallahassee	(850) 245-2010
Pensacola	(850) 595-8300
Jacksonville	(850) 807-3246
Orlando	(407) 893-3337
Tampa	(813) 744-6462
Ft. Myers	(239) 332-6975
Ft. Lauderdale	(954) 958-5575

DEP Waste Management Issues
(800) 741-4337
Automated Information Line

Florida Waste Exchange for Profit
(954) 967-0011

Hazardous Substances
(800) 633-7585

NIOSH – Occupational Safety and Health
(800) 356-4674

Recycle Florida Today, Inc.
http://enviroworld.com

Waste Treatment Technology and Vendors
(800) 245-4505

reporting requirements guidance

State of Florida Multi-Sector Generic Permit **(MSGP)**
for Stormwater Discharge Associated with Industrial Activity

The following are step-by-step instructions for completing Discharge Monitoring Reports **(DMRs)**, as required under the Multi-Sector Generic Permit **(MSGP)**. The words and phrases in italics refer to specific locations or headings on the DMR. If more than one storm event was sampled for a given quarter, the additional monitoring data must be submitted on a separate quarterly DMR for each outfall and for each storm event sampled.

general instructions

Name/Address

Enter the Permittee Name and Mailing Address. Enter the Facility Name and Location only if different from the permittee name and mailing address.

Permit Number

Enter the Facility Identification Number.

Discharge Number

Enter the facility's Discharge Number. If the facility is submitting monitoring results for more than one outfall, each outfall's results must be recorded on a separate DMR page and must display the outfall's Discharge Number. A unique discharge number (e.g., 001, 002, etc.) must be assigned to each outfall.

No Discharge

Check the box labeled "Check Here if No Discharge," if no storm water discharge occurred from the outfall during the monitoring period.

Recording of Sample Results

Enter the monitoring results for each parameter in the specified units.

Sample Type

Enter "Grab" for the sample type, as required by the MSGP.

Identification/Certification

Enter Name/Title of the Principal Executive Officer, Signature of the Principal Executive Officer or Authorized Agent, Telephone Number, and Date at the bottom of the DMR after reading the Certification Statement.

Comments and Explanation of Any Violations

The facility's applicable sector, subsector, and SIC code will be preprinted on the DMR in the Comments section. Any corrections, comments, or references to attachments should be recorded here by the permittee.

Additional Instructions for Completing the Per Storm Event DMR

Monitoring Period

Enter the quarter period covered by the DMR (e.g., for the first quarter of 2005, enter 01/01/05 - 12/31/05).

Date of Storm Event

Enter the date the sample was taken.

Storm Event Characteristics

Record the duration of the storm, as well as the time elapsed (in days) since the last measurable storm greater than 0.1 inch.

Recording Estimated Rainfall

Enter the estimated rainfall for the given storm event in inches.

Recording Estimated Storm Discharge Volume

Enter the estimated total volume of stormwater discharge in gallons.

Frequency of Analysis

Enter the sampling frequency (frequency should correspond to the preprinted permit requirement). Required sampling frequency, at a minimum, is once per quarter for a storm event greater than 0.1 inch of rainfall.

Additional Instructions for Completing the Annual DMR

Monitoring Period

Enter the annual period covered by the DMR (e.g., for year 2005, enter 01/01/05 - 12/31/05).

Recording of Sample Results—Average

Enter the annual average monitoring results for each parameter.

Frequency of Analysis

Enter the sampling frequency (i.e., the actual total number of sampling events per year).

Send Completed DMRs to:

Florida Department of Environmental Protection
NPDES Stormwater MSGP DMR
Mail Station #2511
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

** REMEMBER **

Before Submitting Your DMR, Please Check

- If there is no discharge for the monitoring period, the "Check Here if No Discharge" box must be marked accordingly.
- If there is a discharge for the monitoring period, all blanks on the DMR must be completed.
- If the DMR is signed and dated by the Principal Executive Officer or Authorized Agent.

epa's new regulation controlling emissions from sweat furnace operations

The U.S. Environmental Protection Agency (EPA) has issued national regulations to control air emissions from secondary aluminum production facilities. These facilities include aluminum scrap shredders, thermal chip dryers, scrap dryers/delacquering kilns/decoating kilns, group 2 furnaces (processing clean charge only and no reactive fluxing), sweat furnaces, dross-only furnaces, and rotary dross coolers.

This brochure presents a summary of the standard for owners and operators of sweat furnaces only (i.e., emission limits, performance testing, and operating and monitoring requirements). The full regulation appeared in the March 23, 2000, edition of the Federal Register [Vol. 65, No. 57, beginning on page 15690].

GENERAL INFORMATION

- **What is a sweat furnace?**

A sweat furnace is a unit designed and used exclusively to reclaim aluminum from scrap that contains substantial quantities of iron by using heat to separate the low melting point aluminum from the scrap while the higher melting point iron remains in solid form. These units are also commonly known as dry hearth furnaces.

- **Where are sweat furnaces located?**

Due to their small size and portability, sweat furnaces are common in many industries. They are used to process scrap that cannot be processed in other furnaces. For example, scrap yards use sweat furnaces to reclaim aluminum from many forms of scrap (sheet and cast aluminum), and automotive salvage yards use them to reclaim aluminum from unusable auto parts (such as, transmissions).

- **Why are sweat furnaces included in the regulation?**

The Clean Air Act directs EPA to regulate emissions of 188 toxic chemicals, which include organic hazardous air pollutants (HAPs), inorganic gaseous HAPs (hydrogen chloride, hydrogen fluoride and chlorine), and particulate HAP metals. Some of these pollutants, including dioxins are known to, or suspected of, causing cancer, and all are harmful to humans.

The secondary aluminum regulation helps protect public health by requiring that you reduce air emissions from your sweat furnace to comply with the national limits.

EPA estimates that with full compliance with this rule, nationwide toxic emissions would be reduced by about 12,400 tons per year (11,300 megagrams/year). Emissions of other pollutants, such as particulate matter and volatile organic compounds, would also be reduced.

- **When must I meet these standards?**

If your operation is an existing source (a sweat furnace that began construction or reconstruction prior to February 11, 1999), then you must be in compliance no later than March 24, 2003. On the other hand, if you operate a new source (constructed or reconstructed after February 11, 1999), then you must have complied by March 23, 2000, or upon startup, whichever is later.

- **How much will it cost?**

Estimates of the average cost for adding an afterburner to a sweat furnace to control dioxin/furan (D/F) emissions range from $8,000 to $58,000, depending on the size of the furnace.

- **What happens if I don't comply?**

If you fail to comply with the requirements of the rule, you could face legal action under the Clean Air Act. You may be assessed civil penalties of $25,000 per day for non-compliance.

SWEAT FURNACE REQUIREMENTS

- **Does this regulation apply to me?**

The secondary aluminum production regulation applies to ALL sweat furnace operations regardless of their location and size.

- **What emission limits must sweat furnaces meet?**

If you are an owner/operator of a sweat furnace, you must control the dioxin /furan (D/F) emissions from each sweat furnace to 0.80 nanogram of D/F toxic equivalent per dry standard cubic meter (3.5 x 10-10 grain per dry standard cubic foot) at 11 percent oxygen.

As an alternative, you may operate and maintain an afterburner with a design residence time of 0.8* seconds or greater and an operating temperature of 1600 °F or greater. If you elect to comply with these afterburner requirements, you would not be required to conduct emissions testing to show compliance with the emission limit.

- **What operating standards must I meet?**

If you choose to install and operate an afterburner with a design residence time of 0.8* seconds or greater and an operating temperature of 1600 °F or greater, then you must maintain the average afterburner temperature at no less than 1600 °F. The afterburner must operate in accordance with your operation maintenance and monitoring plan.

However, even if you are using an afterburner, you can choose to comply with the emission limits by conducting an initial compliance test. In this case, you must then maintain the afterburner average operating temperature at the level established during the performance test.

- **When must I conduct performance tests?**

If you choose to demonstrate compliance with the requirements of the regulation by conducting an initial compliance test, then the test must be conducted prior to the compliance deadline.

If you choose to comply with the alternative equipment standard, you are not required to conduct emission testing.

epa's new regulation controlling emissions continued

** The rule is being amended to reflect this time.*

• What test methods must I use in conducting performance tests?

The test method required to determine dioxin/furan (D/F) emissions is EPA Reference Method 23. This method and other test methods can be found in the Code of Federal Regulations (CFR), Appendix A, 40 CFR Part 60, or the Emissions Measurement Center (EMC) website at: ***www.epa.gov/ttn/emc***

• What are the monitoring requirements for afterburners?

You must operate a device that continuously monitors and records the afterburner operating temperature. This device must be installed at the exit of the afterburner's combustion zone, and it must record the temperature in 15 minute block averages and also determine and record the average temperature for each three-hour block period. You must prepare and implement for each emission unit, a written Operation Maintenance and Monitoring (OM&M) plan, approved by your permitting authority, that shows how you are complying with the national standards. You must also inspect each afterburner at least once a year and record the results of the inspection. Repairs must be completed in accordance with the OM&M plan. You must maintain files of all information (including all reports and notifications) for at least five years for each affected source with emissions controlled by an afterburner.

STATE OR LOCAL REQUIREMENTS

• How does the new EPA regulation relate to state or local requirements?

Some state or local agencies have existing control requirements that you must continue to meet. Check with your state or local agency for the specific requirements that apply to your sweat furnace operation. Most state and local permit authorities also have operating permit programs (a Clean Air Act requirement under Part 70) that you must comply with. However, under this new regulation for sweat furnaces, EPA has specified that the state or local permit authority has discretion to defer operating permits until December 9, 2004 for sweat furnace operations at area sources of HAPs (i.e., facilities that emit, or have the potential to emit considering controls, less than 10 tons per year of any individual HAP or less than 25 tons per year of any combination of HAPs). This deferral is not automatic, so you should check with your state or local agency to see if your operation has a deferral.

FOR MORE INFORMATION

Whom can you contact?

For more information, contact your state or local air pollution control agency, state Small Business Assistance Program (SBAP), or state Small Business Ombudsman (SBO). Remember, states and local agencies may have additional requirements.

The State and Territorial Air Pollution Program Administrators and Association of Local Air Pollution Control Officials (STAPPA/ALAPCO) website is: www.4cleanair.org/ A list of the state SBAP and SBO contacts can be found at: www.epa.gov/ttn/sbap/offices.html

You may also contact the EPA Regional Office in your state or territory.

EPA Regional Offices and Telephone Numbers		
1	CT, ME, MA, NH, RI, VT	(617) 918-1314
2	NJ, NY, Puerto Rico, Virgin Islands	(212) 637-4023
3	DE, MD, PA, VA, WV, DC	(800) 438-2474
4	AL, FL, GA, KY, MS, NC, SC, TN	(404) 562-9131
5	IL, IN MI, WI MN, OH	(312) 353-6684 (312) 886-6794 (312) 353-9228

EPA Regional Offices and Telephone Numbers		
6	AR, LA, NM, OK, TX	(214) 665-7296
7	IA, KS, MO, NE	(913) 551-7566
8	CO, MT, ND, SD, UT, WY	(303) 312-6581
9	AZ, CA, HI, NV, American Samoa, Guam	(415) 744-1219
10	AK, ID, WA, OR	(206) 553-4273

This pamphlet is intended for general reference only; it is not a full and complete statement of the technical or legal requirements associated with the regulation. A copy of the rule can be obtained from the Federal Register or the EPA's Air Toxics Website (ATW) rule and implementation page for secondary aluminum at: ***www.epa.gov/ttn/uatw/alum2nd/alum2pg.html***

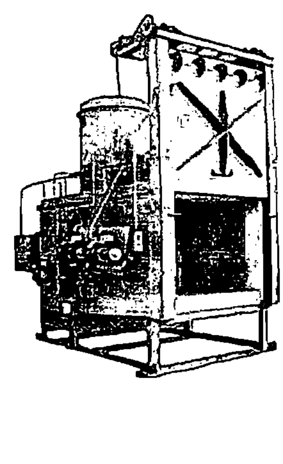
If you need TTN assistance, call (919) 541-5384.

United States EPA-456-/F-00-004

Environmental Protection Agency November 2000

Office of Air Quality Planning & Standards (MD-12)

EPA New Regulation Controlling Emissions from Secondary Aluminum Production (Sweat Furnace Operations)



permit application

NOTICE OF INTENT

TO USE

MULTI-SECTOR GENERIC PERMIT FOR

STORMWATER DISCHARGE

ASSOCIATED WITH INDUSTRIAL ACTIVITY

(RULE 62-621.300(5), F.A.C.)

This form is to be completed and submitted to the Department before use of the **Multi-Sector Generic Permit for Stormwater Discharge Associated with Industrial Activity** (**MSGP**) provided in Rule 62-621.300(5), F.A.C. The type of facility or activity that qualifies for use of this generic permit, the conditions of the permit, and additional requirements to request coverage are specified in Rule 62-621.300(5)(a), F.A.C. Note that additional requirements for requesting coverage include submittal of the applicable generic permit fee pursuant to Rule 62-4.050, F.A.C. Familiarize yourself with the generic permit and the attached instructions before completing this form. Please print or type information in the appropriate areas below.

I. IDENTIFICATION NUMBER: Facility ID ______________________

II. APPLICANT INFORMATION:

A. Operator Name:		
B. Address:		
C. City:	D. State:	E. Zip Code:
F. Operator Status	G. Responsible Authority:	
	H. Phone No.:	

III. FACILITY LOCATION INFORMATION:

A. Operator Name:		
B. Address:		
C. City:	D. State:	E. Zip Code:
F. County:	G. Latitude: ° ' " Longitude: ° '	
H. Is the facility located on Indian lands? ☐ Yes ☐ No	I. Water Management District:	
J. Facility Contact:	K. Phone No.:	

Page 1 of 5 DEP Form 62-621.300(5)(b)
Effective October 22, 2000

IV. FACILITY ACTIVITY INFORMATION

A. SIC or Designated Activity Code(s)	Primary:		Secondary:	
B. Monitoring code (1, 2, 3, or 4):	C. Will construction be conducted for stormwater controls? ☐ Yes ☐ No			
D. Other Existing Permits	ERP No.:	Wastewater Permit No.:	Other (specify):	

A. MS4 Operator Name:							
Outfall No.	Latitude			Longitude			Receiving Water Name
	Deg.	Min.	Sec.	Deg	Min	Sec	

V. DISCHARGE INFORMATION

VI. CERTIFICATION[1]

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true,

Name and Official Title (Type or Print):
B. Monitoring code (1, 2, 3, or 4):

accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

[1]Signatory requirements are contained in Rule 62-620.305, F.A.C.

Page 2 of 5 DEP Form 62-621.300(5)(b)
Effective October 22, 2000

Signature: ______________________________ Date Signed: ______________________________

INSTRUCTIONS – DEP FORM 62-621.300(5)(b)
NOTICE OF INTENT (NOI)
TO USE MULTI-SECTOR GENERIC PERMIT FOR STORMWATER
DISCHARGE ASSOCIATED WITH INDUSTRIAL ACTIVITY (MSGP)

Who Must File an NOI

Federal law at 40 CFR Part 122 prohibits point source discharges of stormwater associated with industrial activity to waters of the United States without a National Pollutant Discharge Elimination System (NPDES) permit. Under the State of Florida's delegated authority to administer the NPDES program, operators that have stormwater discharge associated with industrial activity to surface waters of the State must file for and obtain either coverage under an appropriate generic permit contained in Chapter 62-621, Florida Administrative Code (F.A.C.), or an individual permit issued pursuant to Chapter 62-620, F.A.C.

Where to File NOI

NOIs for coverage under this generic permit must be sent to the following address:

NPDES Stormwater Notices Center, MS #2510
Florida Department of Environmental Protection
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Part I – Identification Number

Enter the facility's DEP identification number (generic permit coverage number) if known. If an ID number has not yet been assigned to this facility, leave this item blank.

Part II – Applicant Information

Item A: Provide the legal name of the person, firm, public organization, or any other entity that operates the facility described in this application. The operator of the facility is the legal entity which controls the facility's operation rather than the plant or site manager. The name of the operator may or may not be the same as the name of the facility.

Items B – E: Provide the complete mailing address of the facility operator, including city, state, and zip code.

Item F: Enter the appropriate one letter code from the list below to indicate the legal status of the operator of the facility:

F = Federal; **S** = State; **P** = Private; **M** = Public (other than federal or state); **O** = Other

Items G – H: Provide the name and telephone number (including area code) of the person authorized to submit this application on behalf of the facility operator. This should be the same person as indicated in the certification in Part VI.

Part III – Facility Location Information

Items A – E: Enter the facility's official or legal name and complete street address, including city, state, and zip code. Do not provide a P. O. Box number as the street address.

Item F: Enter the county in which the facility is located.

Item G: Enter the latitude and longitude of the approximate center of the facility.

Item H: Indicate whether the facility is located on Indian lands.

Item I: Enter the appropriate five or six letter code from the list below to indicate the Water Management District the facility is located within:

NWFWMD	=	Northwest Florida Water Management District
SRWMD	=	Suwannee River Water Management District
SFWMD	=	South Florida Water Management District
SWFWMD	=	Southwest Florida Water Management District
SJRWMD	=	St. John's River Water Management District

Items J– K: Give the name, title, and telephone number (including area code) of the person who is thoroughly familiar with the operation of the facility, with the facts reported in this application, and who can be contacted by the Department if necessary.

Part IV – Facility Activity Information

Item A: List, in descending order of significance, up to two 4-digit Standard Industrial Classification (SIC) codes that best describe the principal products or services provided at the facility identified in Part III. For industrial activities defined in 40 CFR 122.26(b)(14)(i)-(xi) that do not have SIC codes that accurately describe the principal products produced or services provided, use the appropriate two letter code from the list below:

HZ = Hazardous waste treatment, storage, or disposal facilities, including those that are operating under interim status or a permit under subtitle C of RCRA [40 CFR 122.26(b)(14)(iv)].

LF = Landfills, land application sites, and open dumps that receive or have received any industrial wastes, including those that are subject to regulation under subtitle D of RCRA [40 CFR 122.26(b)(14)(v)].

SE = Steam electric power generating facilities, including coal handling sites [40 CFR 122.26(b)(14)(vii)].

TW = Treatment works treating domestic sewage or any other sewage sludge or wastewater treatment device or system used in the storage, treatment, recycling, and reclamation of municipal or domestic sewage [40 CFR 122.26(b)(14)(ix)].

Page 4 of 5 DEP Form 62-621.300(5)(b)
Effective October 22, 2000

Part IV – Facility Activity Information (continued)

Item B: Enter the appropriate 1-digit monitoring code for the facility from the list below. The monitoring requirements for the facility are contained in the MSGP.

- **1** = Not subject to monitoring requirements under the conditions of the permit.
- **2** = Subject to monitoring requirements and required to submit data.
- **3** = Subject to monitoring requirements but not required to submit data.
- **4** = Subject to monitoring requirements but submitting certification for monitoring exclusion.

Item C: Indicate whether any construction will be conducted to install or develop stormwater controls.

Item D: Provide the permit number for any existing state, federal, or local environmental permit(s) issued to the facility, including any environmental resource permit (ERP) issued by DEP or the Water Management District; any DEP wastewater facility permit; and, any EPA-issued NPDES permit.

Part V – Discharge Information

Item A: If the facility discharges stormwater associated with industrial activity to a municipal separate storm sewer system (MS4), enter the name of the operator of the MS4 (e.g., municipality name, county name), and in Item B of this Part enter "MS4" as the outfall number and indicate the receiving water of the discharge from the MS4. (See Chapter 62-624, F.A.C., for the definition of an MS4.)

Item B: If the facility discharges stormwater associated with industrial activity directly to receiving water(s), list each outfall, the receiving water of each outfall, and the latitude and longitude of each outfall if available.

Part VI – Certification

Type or print the name and official title of the person signing the certification. Sign and date the certification.

Section 403.161, F.S., provides severe penalties for submitting false information on this application (NOI) or any reports or records required by a permit. There are both civil and criminal penalties, in addition to the revocation of permit coverage for submitting false information.

Rule 62-620.305, F.A.C., requires that the application (NOI) and any reports required by the permit to be signed as follows:

- **A.** For a corporation, by a responsible corporate officer as described in Rule 62-620.305, F.A.C.;
- **B.** For a partnership or sole proprietorship, by a general partner or the proprietor, respectively; or,
- **C.** For a municipality, state, federal or other public facility, by a principal executive officer or elected official.

quarterly DMR for years 2 and 4

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)

DISCHARGE MONITORING REPORT (DMR)

PERMITTEE NAME/ADDRESS
(Include Facility Name/Location)

NAME

ADDRESS

FACILITY LOCATION

(2 - 16) FLRO5 — PERMIT NUMBER

(2 - 17) DISCHARGE NUMBER

MONITORING PERIOD

FROM YEAR (20-21) MO (22-23) DAY (24-25) TO YEAR (26-27) MO (28-29) DAY (30-31)

☐ Check here if No Discharge

NOTE: Read instructions before completing this form.

PARAMETER (32 -37)		(3 Card Only) QUANTITY OR LOADING (46 - 53) AVERAGE	(54 - 61) MAXIMUM	UNITS	(4 Card Only) QUANTITY OR CONCENTRATION (38 - 45) MINIMUM	(46 - 53) AVERAGE	(54 - 61) MAXIMUM	UNITS	NO EX (62-63)	FREQUENCY OF ANALYSIS (64 - 68)	SAMPLE TYPE (69 - 70)
DATE OF STORM EVENT	SAMPLE MEASUREMENT	*****	** **		*** **	*** **	****			*****	*** **
	PERMIT REQUIREMENTS	*****	** ***		*** **	*** **	****			*****	*** **
DURATION OF ______ HRS STORM ELAPSED SINCE ______ DAYS LAST STORM > 0.1 INS	SAMPLE MEASUREMENT	*****		INS	*** **	*** **		GALS	* *		*** **
	PERMIT REQUIREMENT	*****	ESTIMATE RAINFALL		*** **	*** **	ESTIMATE VOL DIS				
SOLIDS, TOTAL SUSPENDED 00530 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	*****	** ***		*** **	*** **		mg/1	* *		
	PERMIT REQUIREMENT	*****	** ***		*** **	*** **	REPORT DAILY MX				GRAB
ALUMINUM, TOTAL RECOVERABLE 01104 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	*****	** ***		*** **	*** **		mg/1	* *		
	PERMIT REQUIREMENT	*****	** ***		*** **	*** **	REPORT DAILY MX			QTRLY	GRAB
IRON, TOTAL RECOVERABLE 00980 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	*****	** ***		*** **	*** **		mg/1	* *		
	PERMIT REQUIREMENT	*****	** ***		*** **	*** **	REPORT DAILY MX				GRAB
LEAD, TOTAL RECOVERABLE 01114 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	*****	** ***		*** **	*** **		mg/1	* *		
	PERMIT REQUIREMENT	*****			*** **	*** **	REPORT DAILY MX			QTRLY	GRAB

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER

TYPED OR PRINTED

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBLITY OF FINE AND IMPRISONMENT SEE 18 U.S.C 1001 AND 33 U.S.C. 1319. *(PENALTIES UNDER THESE STATUES MAY INCLUDE FINES UP TO $10,000 AND OR MAXIMUM IMPRISONMENT OF BETWEEN 6 MONTHS AND 6 YEARS.)*

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE: AREA | NUMBER

DATE: YEAR | MO | DAY

COMMENTS AND EXPLANATIONS OF ANY VIOLATIONS (Reference all attachments here)

SECTOR M: AUTO SALVAGE YARDS
SIC CODE 5015

Send completed DMR to: Florida Department of Environmental Protection, NPDES Stormwater MSGP DMR, Mail Station #2511, 2600 Blair Stone Road, Tallahassee, Florida

PAGE 1 OF 1

Fill in Facility ID Number

Unless taking more than one sample, fill in 001.

Fill in beginning and ending dates of this quarter

Check here if no discharge for quarter

Fill in Permittee Name, Facility Name, and Facility Address

Fill in Date of Rainfall

Fill in # of inches of rain received

Fill in estimate of volume of stormwater leaving property

Fill in Duration of Rainfall

Number of Days since last rain

Results from lab of TSS

Results from lab of Al

Results from lab of Fe

Results from lab of Pb

Name and title of permittee typed or printed

Signature of permitee

Date of signature

Telephone number of facility

annual DMR for years 2 and 4

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)

DISCHARGE MONITORING REPORT (DMR)

PERMITTEE NAME/ADDRESS (Include Facility Name / Location)

Fill in Facility ID Number:

Fill in Permittee Name, Facility Name, and Facility Address

NAME

ADDRESS

FACILITY LOCATION

Fill in beginning and ending dates of this year.

Unless taking more than one sample, fill in 001

Check here if no discharge for quarter

(2 - 16)	(2 - 17)
FLROS	
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
FROM				TO			
	(20 - 21)	(22 - 23)	(24 - 25)		(26 - 27)	(28 - 29)	(30 - 31)

☐ Check here if No Discharge

NOTE: Read instructions before completing this form.

PARAMETER (32 - 37)		(3 Card Only) QUANTITY OR LOADING (46 - 53) AVERAGE	(54 - 61) MAXIMUM	UNITS	(4 Card Only) (38 - 45) MINIMUM	QUANTITY OR CONCENTRATION (46 - 53) AVERAGE	(54 - 61) MAXIMUM	UNITS	NO EX (62 - 63)	FREQUENCY OF ANALYSIS (64 - 68)	SAMPLE TITE (69 - 70)
SOLIDS, TOTAL SUSPENDED 00530 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	*****	** ** *	*** **	*** ** **Average of TSS**		*****	mg/l	* *		
	PERMIT REQUIREMENTS	*****	** ** *		*** **	100 ANNL AVG	*****			ONCE/ QTR	GRAB
ALUMINUM, TOTAL RECOVERABLE 01104 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	*****	** ** *	*** **	*** ** **Average of Al**			mg/l	* *		
	PERMIT REQUIREMENTS	*****	** ** *		*** **	0.75 ANNL AVG				ONCE/ QTR	GRAB
IRON, TOTAL RECOVERABLE 00980 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	*****	** ** *	*** **	*** ** **Average of Fe**			mg/l	* *		
	PERMIT REQUIREMENTS	*****	** ** *		*** **	1 ANNL AVG				ONCE/ QTR	GRAB
LEAD, TOTAL RECOVERABLE 01114 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	*****	** ** *	*** **	*** ** **Average of Pb**			mg/l	* *		
	PERMIT REQUIREMENTS	*****			*** **	0.0816 ANNL AVG				ONCE/ QTR	GRAB
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENTS										

Name and title of permittee typed or printed

Signature of permitee

Telephone number of facility

Date of Signature

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER

TYPED OR PRINTED

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SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE		DATE		
AREA	NUMBER	YEAR	MO	DAY

COMMENTS AND EXPLANATIONS OF ANY VIOLATIONS (Reference all attachments here)

SECTOR M: AUTO SALVAGE YARDS

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PAGE 1 OF 1

most common regulatory violations

The most common regulatory violations that the Florida Department of Environmental Protection field inspectors encounter while inspecting auto recycling yards are:

1) Not labeling drums or containers.
2) Not cleaning up spills.
3) Not keeping adequate records of waste and recycled materials management.
4) Not storing batteries off the ground and in a common area.
5) Storing oil and other automotive fluids in open containers.
6) Not ensuring that the area under the auto crusher has containment for fluids.
7) Throwing used oil filters in the trash.
8) Not having a stormwater permit or plan

best management practices

2

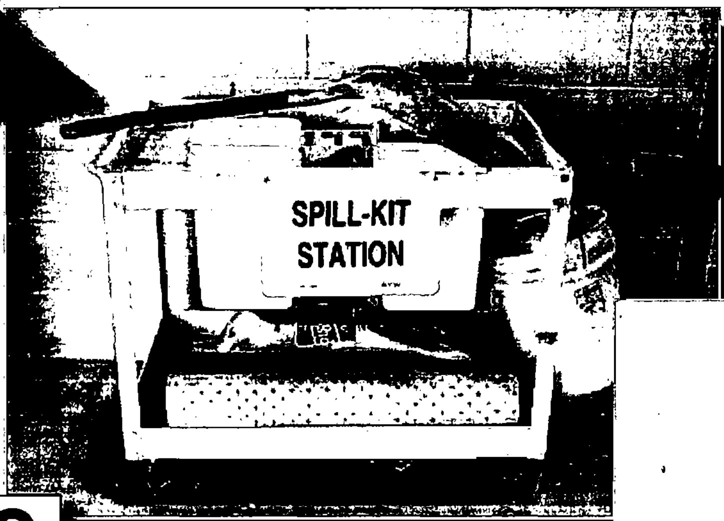
All drums are labeled and rotated outward for easy inspection

1

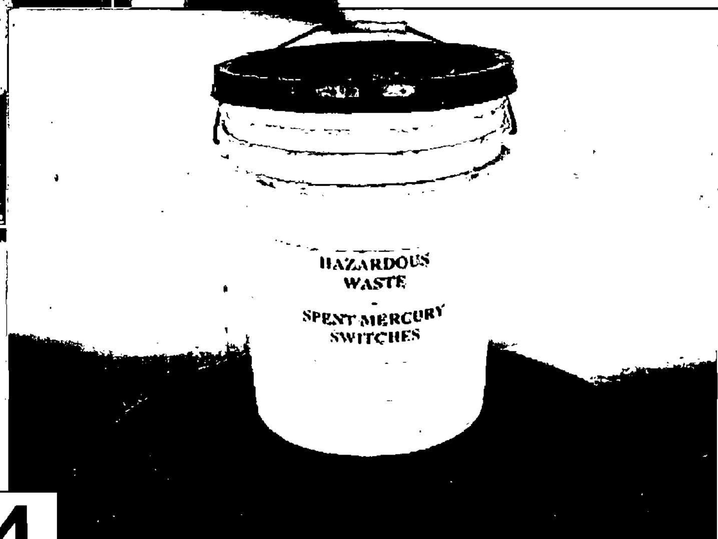
7

Batteries are palletized, wrapped and stored under cover

best management practices



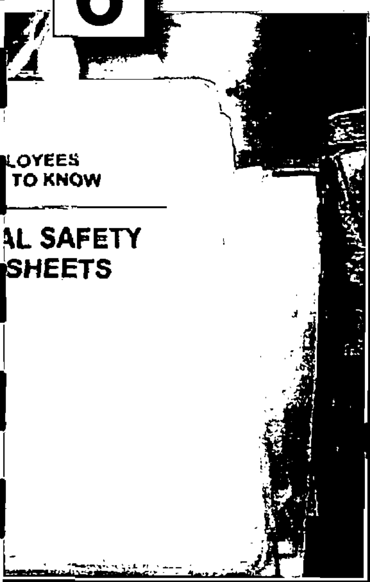
3 Well-labeled spill station



Mercury switches are closed and labeled **4**

Refrigerant recovery machine **5**

6 MSD Sheets kept in a central file



Photos by Leah Proffitt—FDEP

chapter test answers

Chapter 1	
1	FALSE
2	FALSE
3	FALSE
4	FALSE
5	FALSE
6	FALSE
7	TRUE
8	TRUE
9	TRUE
10	FALSE
11	TRUE

Chapter 2	
1	FALSE
2	TRUE
3	FALSE
4	FALSE
5	FALSE
6	TRUE
7	TRUE
8	TRUE
9	FALSE
10	FALSE
11	TRUE

Chapter 3	
1	TRUE
2	TRUE
3	FALSE
4	TRUE
5	TRUE
6	TRUE
7	FALSE
8	FALSE
9	TRUE
10	TRUE