Department of
Environmental Protection

Jeb Bush
Governor

Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

David B. Struhs
Secretary

October 13, 2000

Mr. Alex H. Makled, P.E., DEE
Principal Engineer
Camp Dresser & McKee Inc.
Suite 211 South
1601 Belvedere Road
West Palm Beach, Florida 33406

Re: Solid Waste Authority of Palm Beach County
North County Resource Recovery Facility, Class I and III Landfills
Request for Higher Wellhead Operating Temperature

Dear Mr. Makled:

The Department received your October 2nd letter requesting, on behalf of the Solid Waste Authority of Palm Beach County, an increase in the operating gas temperature from 55°C to 75°C at all of the Solid Waste Authority's gas collection wellheads. As noted in your letter, the pertinent paragraph of the NSPS Subpart WWW, 40 CFR 60.753(c), allows for the owner or operator to establish a higher operating temperature provided certain factors are considered. Because the rule specifies that such a change is allowable, no modification of the Solid Waste Authority's permit is required to accommodate this request. As the rule is silent regarding to whom the "higher operating value demonstration" should be made, it is possible that the request could be reviewed by the Department's compliance office rather than the permitting office. In any case, the Department concurs with the Solid Waste Authority's establishing a higher operating temperature of 75°C at all of its landfill gas collection wellheads for both the Class I and III landfills.

Please contact me at 850-921-9519 if you have any questions about the above.

Sincerely,

Joseph Kahn, P.E.
New Source Review Section

/jk

cc: Isidore Goldman, P.E., DEP SE District
Terri Long, DEP SE District

CDM Camp Dresser & McKee Inc.

consulting
engineering
construction
operations

1601 Belvedere Road, Suite 211 South
West Palm Beach, Florida 33406
Tel: 561 689-3336 Fax: 561 689-9713

October 2, 2000

Mr. Joseph Kahn, P.E.
New Source Review Section
Florida Department of Environmental Protection
Twin Towers Office Building
2600 Blair Stone Road
Mail Stop 5505
Tallahassee, FL 32399-2400

Subject: Solid Waste Authority of Palm Beach County
North County Resource Recovery Facility (NCRRF)
Class I and III Landfills
DEP Facility No. 5050C00803
Request for Higher Wellhead Operating Temperature under 40 CFR 60.753 (c)

Dear Mr. Kahn:

Camp Dresser & McKee Inc. (CDM), on behalf of the Solid Waste Authority (SWA), is submitting this request to the Department of Environmental Protection (DEP) to increase the wellhead temperature operating limit for the NCRRF Class I and Class III landfill gas collection systems in the Prevention of Significant Deterioration (PSD) air permit [Permit No. PSD-FL-108 (D)]. As indicated in the PSD air permit, these landfills are currently subject to Section 60.753 (c) of the New Source Performance Standards for Municipal Solid Waste Landfills, 40 CFR 60 Subpart WWW that requires that the landfill gas collection system operate with each interior wellhead in the collection system having a landfill gas temperature of less than 55° C (131° F). This requirement is in New Specific Condition No. 11 of the PSD air permit. However, this section of the rule also states that:

> "The owner or operator may establish a higher operating temperature, nitrogen, or oxygen value at a particular well. A higher operating value demonstration shall show supporting data that the elevated parameter does not cause fires or significantly inhibit anaerobic decomposition by killing methanogens."

SWA's Class I and III Landfills, and likely other landfills in Florida, operate at relatively high landfill gas temperatures, safely, for the following reasons:

- Ambient air temperatures are higher than in other parts of the country;

- The warm moist climate favors active microbial decomposition of the waste, which produces heat;

- SWA's NCRRF Refuse Derived Fuel Incinerator's bypass material, which makes up a large portion of the degradable material landfilled, comes from the Incinerator as warm and size-reduced, and tends to degrade rapidly and produce heat.

SWA's Class I Landfill has average gas temperatures at the wellheads of about 51° C, and routine high-end temperatures of about 70° C. Gas temperatures of up to 75° C do not "cause" fires, and are not necessarily indications that a fire is occurring in the landfill. SWA operators evaluate a combination of parameters such as temperature, oxygen, methane, carbon dioxide, and balance gas (assumed to be Nitrogen).

SWA's Class III Landfill gas readings have a different characteristic than the Class I Landfill because of the nature of the waste. The Class III Landfill accepts mainly non-degradable C&D debris, thus rendering less decomposition and methane production. The waste also tends to be bulkier and less densely compacted, which contributes to short-circuiting and air intrusion. When air enters the landfill, oxygen and nitrogen readings will be higher. However, the potential for higher temperatures exists for this landfill, as well.
Two textbook references are attached that describe acceptable temperatures for anaerobic decomposition. Bitton states that, "Methane production has been documented under a wide range of temperatures ranging between 0° C to 97° C," and thermophillic strains operate at an optimum range of 50° C to 75° C. McBean, Rovers, and Farquhar state that, "Landfill refuse at 15 m depth or greater is relatively unaffected by ambient air temperature and has been observed with temperatures as high as 70° C." Although the effect of ambient air can be argued, the NCRRF Class I Landfill is currently at an elevation of about 21 meters. Additionally, methane readings at the Class I Landfill average about 65 percent, thus indicating a high rate of methane production and anaerobic decomposition.
The SWA would like to request a higher permitted gas temperature at all of its wellheads of 75° C (168° F), to allow more operating flexibility within realistic conditions at its landfills. As discussed above, this requested limit meets the criteria in the rule that this temperature does not cause fires, and does not significantly inhibit anaerobic decomposition.

We greatly appreciate your consideration and time, and if you have any questions regarding this request, please do not hesitate to contact me at (561) 689-3336.

Very truly yours,

CAMP DRESSER & McKEE INC.

Alex H. Makled, P.E., DEE
Principal Engineer

AHM/bes
Enclosures

cc: John Booth, P.E., DEE, SWA
Marc C. Bruner, Ph.D., SWA
Bob Worobel, SWA
Jack Mesojedec, P.E., SWA
Scott Sheplak, FDEP Tallahassee
Steve Palmer, FDEP Tallahassee
Isidore Goldman, P.E., FDEP SE District
Terri Long, FDEP SE District

File: 2678-070[1]
bs5871

WASTEWATER MICROBIOLOGY

GABRIEL BITTON

Department of Environmental Engineering Sciences
University of Florida, Gainesville

WILEY-LISS

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New York • Chichester • Brisbane • Toronto • Singapore

niques are not suitable for methanogenic bacteria. Methanogens are fastidious and occur as microbial consortia. They are difficult to culture in the laboratory. Immunological analysis, with polyclonal (Archer, 1984; Macario and Macario, 1988) or monoclonal (Kemp et al., 1988) antibodies, is now being used as a tool for determining the numbers and identity of methanogens in anaerobic digesters. Indirect immunofluorescence (IIF) and slide immunoenzymatic assays (SIA) have shown that the methanogenic microflora of anaerobic digesters is more diverse than previously thought. The predominant species detected were *Methanobacterium formicum* and *Methanobrevibacter arboriphilus* (Macario and Macario, 1988).

Microbial activity in anaerobic digesters is usually determined by measuring volatile fatty acids (VFA) or methane. Lipid analysis has been used to determine the biomass, community structure, and metabolic status in experimental digesters. Microbial biomass, community structure, and metabolic stress are indicated by determining the total lipid phosphate, phospholipid fatty acids, and poly-β-hydroxybutyric acid, respectively (Henson et al., 1989; Martz et al., 1983; White et al., 1979). Microbial activity in anaerobic sludge can also be determined by measuring ATP and INT-dehydrogenase activity. These parameters correlate well with traditional ones such as gas production rates (Chung and Neethling, 1989). ATP determination responds to pulse feeding of the digester and to addition of toxicants (Chung and Neethling, 1988). Tests are available for the estimation of the amount of acetotrophic bacteria in sludge (Valcke and Verstraete, 1983; van der Berg et al., 1974). One of these tests measures the capacity of the sludge to convert acetate into methane. The test gives information on the percentage of acetotrophic methanogens in anaerobically digested sludge.

Phosphatase activity has also been proposed as a biochemical tool to predict digester upset or failure. An increase in acid and alkaline phosphatases can predict instability of the digestion process well in advance of conventional tests (pH, VFA, gas production) (Ahley and Hurst, 1981).

13.5. FACTORS CONTROLLING ANAEROBIC DIGESTION

Anaerobic digestion is affected by temperature, retention time, pH, chemical composition of wastewater, competition of methanogens with sulfate-reducing bacteria, and the presence of toxicants.

13.5.1. Temperature

Methane production has been documented under a wide range of temperatures ranging between 0°C and 97°C. Although psychrophilic methanogenic bacteria have not been isolated, thermophilic strains operating at an optimum range of 50–75°C are found in hot springs. *Methanothermus fervidus* has been found in a hot spring in Iceland and grows at 63–97°C (Sahm, 1984).

In municipal wastewater treatment plants, anaerobic digestion is carried out in the mesophilic range at temperatures from 25°C to up to 40°C with an optimum at approximately 35°C. Thermophilic digestion operates at temperature ranges of 50–65°C. It allows higher loading rates and is also conducive to greater destruction of pathogens. One drawback is its higher sensitivity to toxicants (Koster, 1988).

Because of their slower growth as compared with acidogenic bacteria, methanogenic bacteria are very sensitive to small changes in temperature. As to utilization of volatile acids by methanogenic bacteria, a decrease in temperature leads to a decrease of the maximum specific growth rate while the half-saturation constant increases (Lawrence and McCarty, 1969). Thus, mesophilic digesters must be designed to operate at temperature between 30°C and 35°C for their optimal functioning.

13.5.2. Retention Time

The hydraulic retention time (HRT), which depends on wastewater characteristics and environmental conditions, must be long enough to allow metabolism by anaerobic bacteria in digesters. Digesters based on attached growth have a

Solid Waste Landfill

Engineering And Design

Edward A. McBean
Professor, Department of Civil Engineering, University of Waterloo

Frank A. Rovers
President, Conestoga-Rovers Associates, Waterloo, Ontario

Grahame J. Farquhar
Professor, Department of Civil Engineering, University of Waterloo

Prentice Hall PTR, Englewood Cliffs, New Jersey 07632

The pH of the leachate [k at 50∞∞°C is 5.07×10^{-7}] is

$$\frac{[H^+]\,[0.01]}{[0.00861]} = 5.07 \times 10^{-7}$$

$$[H^+] = 4.37 \times 10^{-7} \qquad pH = 6.36$$

Temperature Temperature conditions within a landfill influence the type of bacteria that are predominant and the level of gas production. As mentioned previously, the optimum temperature range for mesophilic bacteria is 30°C to 35°C, whereas the optimum for thermophilic bacteria is 45°C to 65°C. Thermophiles generally produce higher gas generation rates; however, most landfills exist in the mesophilic range. Landfill temperatures often reach a maximum within 45 days after placement of wastes as a result of the aerobic microbial activity. Landfill temperatures then decrease once anaerobic conditions develop. Greater temperature fluctuations are typical in the upper zones of a landfill as a result of changing ambient air temperature. Figure 4.11 illustrates temperature fluctuations at various depths with the refuse at a shallow, relatively dry landfill. Smaller temperature fluctuations occur in the central and deeper zones because of the insulating effects of the overlying refuse mass. Landfill refuse at 15 m depth or greater is relatively unaffected by ambient air temperatures and has been observed with temperatures as high as 70°C. Isolated zones of higher temperature may exist within a landfill of generally lower temperature. These higher temperatures tend to appear at deep landfills (greater than 40 m) where sludge is added and/or leachate is recirculated. At shallow landfills, ambient temperatures can affect the refuse temperature.

Elevated gas temperatures within a landfill are a result of biological activity. Landfill gas temperatures are reported to be typically in the range of 30°C to 60°C (Emcon, 1980 and 1981). Optimum temperatures range from 30°C to 40°C, whereas temperatures below 15°C severely limit methanogenic activity. The actual temperatures that can be expected in a full-scale landfill are questionable; most published data refer to expected landfill temperatures and not actual measured temperatures for varying conditions. One publication indicates that a maximum temperature of 24°C to 46°C can be expected as a result of aerobic decomposition soon after landfilling (Ham et al., 1979).

Temperature also affects chemical solubility, because solubility increases with increasing temperatures.

The role of temperature on rate production, k, has been characterized in

SWA
SOLID WASTE AUTHORITY
YOUR PARTNER FOR
SOLID WASTE SOLUTIONS

RECEIVED
AUG 14 2000
BUREAU OF AIR REGULATION

August 10, 2000

Mr. Tom Tittle
Florida Department of Environmental Protection
P.O. Box 15425
West Palm Beach, Fl 33416

Re: Status Overfire Air Fan Boiler #1 – North County Resource Recovery Facility

Dear Tom:

In follow-up to the March 14, 2000 correspondence, this letter is to inform you that the overfire air fan (OFA) for Boiler #1 which had experienced catastrophic failure on November 16, 1999 was replaced with a unit which met original specifications during a scheduled outage in April 2000. Attached for your review is a letter from the Plant's Environmental Engineer that further details the event.

If you have any questions or require any additional information you can contact me at 640-4000 ext. 4613.

Sincerely,

Mary Beth Mihalik
Environmental Compliance Coordinator

Enlcosure

cc: Joe Kahn, FDEP Tallahassee
Don Lockhart, SWA
Marc Hammond, SWA
John Booth, SWA
Marc Bruner, SWA
Mark McLean, SWA
Bob Worobel, SWA
John Ryberg, SWA
Bill Arvan, PBRRC
Chuck Jolliff, PBRRC
Naren Narendra, PBRRC

TO: David Broten, Environmental specialist, SWA.

FROM: Naren Narendra, Plant Environmental Engineer, PBRRC. 8/2/00

DATE: Aug 2, 2000.

SUBJECT: Replacement Over Fire Air (OFA) Fan for Boiler Unit 1.

Ref: PBRRC memo dated March 06, 2000

The switch over from the temporary bag house fan to the original specification fan was completed during the Unit 1 scheduled outage in April 2000.

Unit 1 was returned to service on April 11, 2000 with the original specification replacement fan. The fan performance and boiler performance was normal with out any major problems.

The compliance (stack) test was subsequently completed on April 26, 2000.

Should you have any further questions or concerns, please contact me at 616-6198.

cc: Bill Arvan -- PBRRC
Chuck Jolliff – PBRRC
Duff Rawlings -PBRRC
D. Burnham - PGG, PSO, Barberton, BVCB3C,
Bob Worobel - SWA,

Department of Environmental Protection

Jeb Bush
Governor

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

David B. Struhs
Secretary

November 22, 1999

Mr. Marc C. Bruner, Ph.D.
Director Planning & Environmental Programs
Palm Beach County Solid Waste Authority
7501 North Jog Road
West Palm Beach, Florida 33412

Re: Boiler #1 Over Fire Air Fan Failure

Dear Mr. Bruner:

We appreciate your notification to Tom Tittle that on November 16, 1999 at the Authority's North County Resource Recovery Facility the Boiler #1 over fire air fan experienced a catastrophic failure during the startup of the boiler. As you are aware, such notification is required under Rule 62-4.130, F.A.C. The plant operator has installed a temporary replacement fan of similar specifications to be used until a permanent replacement fan is available. We understand that operation of the temporary replacement fan is expected to be required for no more than 16 weeks to allow for fabrication, delivery, installation and testing of the permanent replacement fan. We also understand that the plant operator can comply with the emission limitations applicable to the facility while operating with the temporary replacement fan. Although pursuant to our initial advice you requested an emergency order, given these facts an emergency order is not required. The installation and operation of the temporary replacement fan falls within the scope of Rule 62-4.130, F.A.C., which requires the Authority advise the Department of its intention toward reconstruction. Please advise the Department when the permanent replacement fan is delivered and when it is installed.

Please contact me at 850-921-9519 if you have any questions about the above.

Sincerely,

Joseph Kahn, P.E.
New Source Review Section

/jk

cc: Tom Tittle, SED

SWA
SOLID WASTE AUTHORITY
YOUR PARTNER FOR
SOLID WASTE SOLUTIONS

November 19, 1999

Mr. Tom Tittle
Florida Department of Environmental Protection
P.O. Box 15425
West Palm Beach, Fl 33416

Re: Request for Emergency Order - North County Resource Recovery Facility

Dear Tom:

This letter is requesting an emergency order to allow modification of our approval to operate with a temporary substitution of the over fire air fan for Boiler # 1 at the North County Resource Recovery Facility (NCRRF). On November 16, 1999, Boiler #1 over fire air fan experienced a catastrophic failure during the startup of the boiler. This piece of equipment is necessary for boiler operation as it provides air flow over the combustion chamber and evenly distributes fuel, which is essential for the combustion process. An ambient air fan with similar specifications was removed from the waste processing B-line Baghouse, which is currently down for repairs, and was installed to an existing duct adjacent to the over fire air fan and tested on November 17, 1999. Enclosed for your review are the specifications of both fans, as well as a schematic depicting the location.

The over fire air fan is such a highly specialized piece of equipment, specifically built for each facility, that is not common practice for the Plant Operator to store a spare of this sort on site. According to the Plant Operator, it will take approximately 10 weeks for the manufacturing and delivery of the new over fire air replacement fan. Therefore, we are requesting that this emergency order be granted for a period of up to 16 weeks to allow sufficient time for manufacturing, delivery, installation, and testing. If you have any questions or require any additional information you can contact me at 640-4000 ext. 4607.

Very truly yours,

Marc C. Bruner, Ph.D.
Director Planning & Environmental Programs

cc:
Alvero Linero, FDEP Tallahassee
Joe Kahn, FDEP Tallahassee
Melissa Meeker, FDEP Southeast
Don Lockhart, SWA
Marc Hammond, SWA
John Booth, SWA
Richard Statom, SWA
Bob Worobel, SWA
John Ryberg, SWA
Bill Arvin, PBRRC
Chuck Jolliff, PBRRC
Naren Narendra, PBRRC

7501 North Jog Road, West Palm Beach, Florida 33412 (561) 640-4000 FAX (561) 640-3400

TO: Mary Beth Mihalik
Environmental Compliance Coordinator - SWA

FROM: Naren Narendra, Plant Environmental Engineer - PBRRC

DATE: November 19, 1999

RE: Replacement Over Fire Air (OFA) Fan for Boiler 1

PBRRC purchasing Department is in the process of obtaining quotes to purchase an OFA fan for Boiler 1 to replace the damage fan. The normal delivery time quoted by one vendor for an OFA fan with same specifications is 18 weeks.

The damaged fan manufacturer's representative was on site on 11/18/99 inspecting the damage. Any recommendations from the manufacturer will also be considered when ordering the new fan.

PBRRC is negotiating to expedite the delivery time. All indications are a replacement fan could be received on site by ten weeks. Once the fan is on site an outage will be scheduled on Boiler 1 within the next six weeks and the fan will be replaced during this outage.

If you have any questions on this please contact me at 616 6198.

Naren Narendra

Copy to: Bill Arvan - PBRRC
D. Burnham - PGG, PSO, Barberton BVCB3C
Bob Worobel - SWA

Equipment list (continued)

Induced Draft Fan (2ea)

Manufacturer:	TLT Babcock
Design speed:	880 RPM
Design vol flow:	219,091 ACFM
Total pressure in Wg:	15.52
Fan start HP:	593
Fan type:	1414B/1630/0
Design temp:	425° F
Wr^2 of Rotor lbs. Ft^2:	34,720
Rotor weight:	7,800 lbs.

- **Over Fire Air Fan** (2ea) ← ORIGINAL FAN SPEC.

Manufacturer:	TLT Babcock
Design speed:	1775 RPM
Design vol flow:	76,142 ACFM
Total pressure in Wg:	30.00
Fan start HP:	394
Fan type:	14/30 RUK 1120
Design temp:	425°
WR^2 of rotor lbs. $ft.^2$:	4,175
Rotor weight:	1,648 lbs.

- **Stokers**

Manufacturer:	Detroit Stoker Co.
Type:	Continuous forward traveling, ash discharge grates. Driven by hydraulic system.

SUBSTITUTE AMBIENT AIR FAN CURVE

BUFFALO FORGE CO. PERFORMANCE CURVES BUFFALO,NY

FOR: DUSTEX CORPORATION

SIZE & TYPE: 980 L-3S SWSI MSW FANS A32,B32,C32

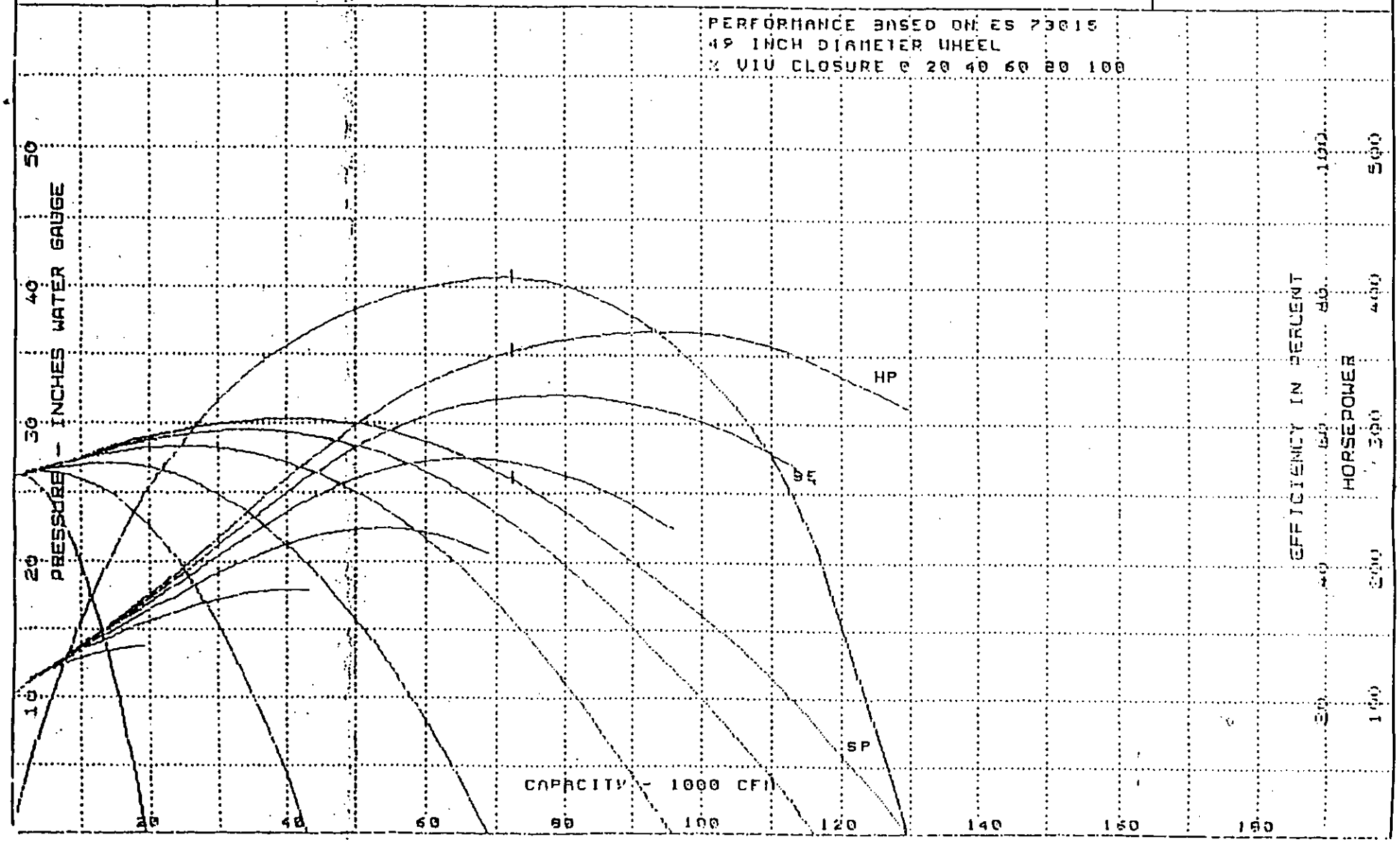
1785 RPM 110 °F 28.92 IN. HG .0652 LB/FT³

PO:

ORDER:

DATE: 01/15/1988

PERFORMANCE BASED ON ES 73015
49 INCH DIAMETER WHEEL
% VIU CLOSURE @ 20 40 60 80 100



SET ALL FOUNDATION BOLTS IN PIPES SO THEY ARE FREE TO MOVE UNTIL GROUTED IN PLACE.

1/4 TYP

8. REFERENCE NATIO
ORDER NO. 2043
9. BEFORE FIELD STAR
DOWEL TO SUB BAS
10. BUFFALO FORGE CO
MOUNTED MOTOR
FAN HALF B
MOTOR HALF

SUBSTITUTE AMBIENT AIR TEMP

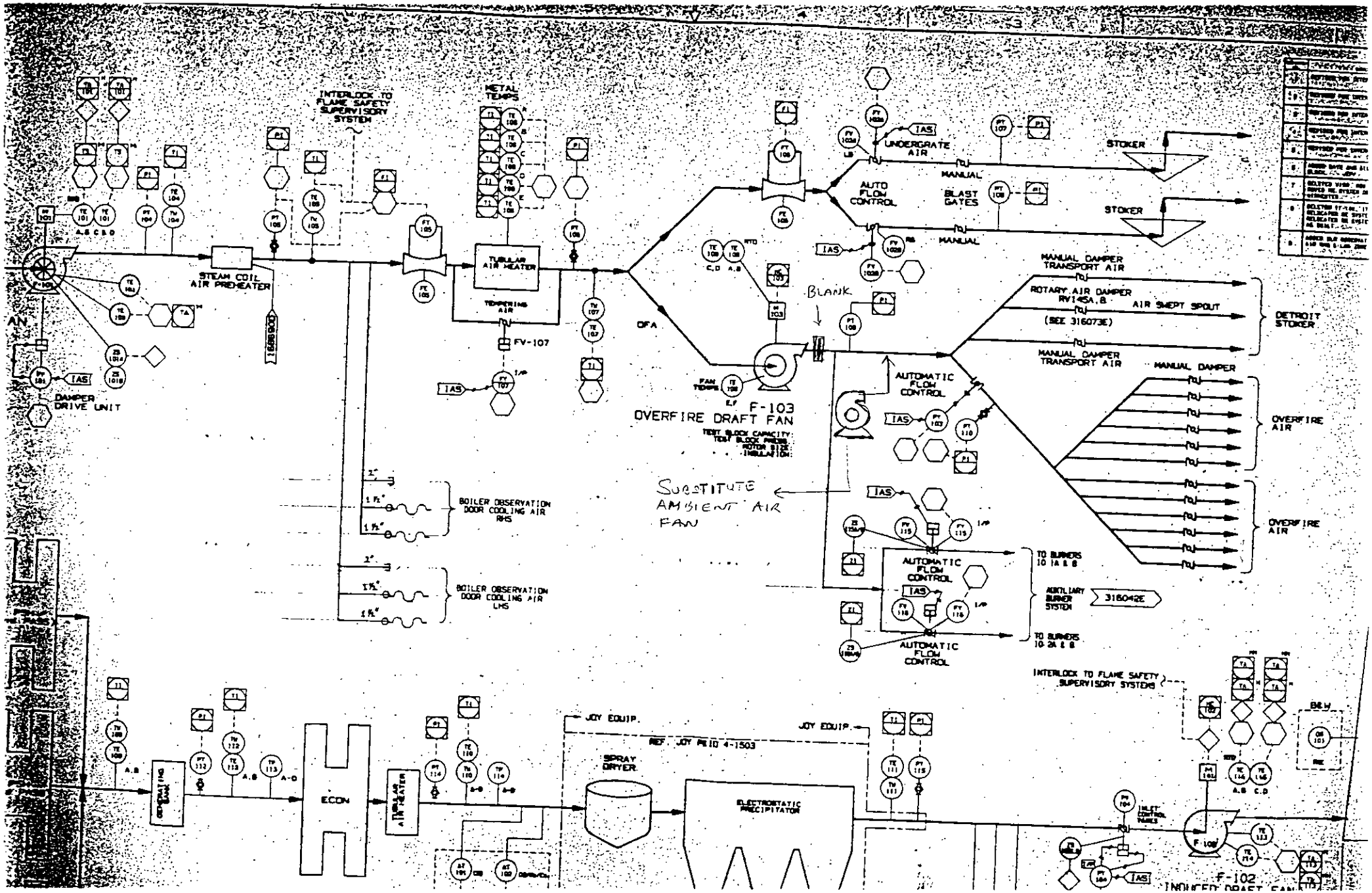
TING

72,147 CFM
350 BHP
WHEEL DIAMETER 49"
COMPLETE ROTOR WK² 1767 LBS FT²
N. E. I. TO CONE OUTLET TO 24 FT WITH A MAXIMUM AMB

25.99 SP
110°F TEMP

1765 RPM
0654 DENSITY AIR

13 12 11 10


INTERLOCK TO FLAME SAFETY SUPERVISORY SYSTEM
METAL TEMPS
STEAM COIL AIR PREHEATER
TUBULAR AIR HEATER
TEMPERING AIR
FV-107
DAMPER DRIVE UNIT
F-103
OVERFIRE DRAFT FAN
OFA
UNDERGRATE AIR
AUTO FLOW CONTROL
BLAST GATES
STOKER
MANUAL
MANUAL DAMPER TRANSPORT AIR
ROTARY AIR DAMPER RV145A,B
AIR SWEPT SPOUT
(SEE 316073E)
DETROIT STOKER
BLANK
AUTOMATIC FLOW CONTROL
MANUAL DAMPER
OVERFIRE AIR
SUBSTITUTE AMBIENT AIR FAN
BOILER OBSERVATION DOOR COOLING AIR RHS
BOILER OBSERVATION DOOR COOLING AIR LHS
TO BURNERS 10 1A & B
TO BURNERS 10-2A & B
AUXILIARY BURNER SYSTEM
316042E
INTERLOCK TO FLAME SAFETY SUPERVISORY SYSTEMS
ECON
JOY EQUIP.
REF. JOY REID 4-1503
SPRAY DRYER
ELECTROSTATIC PRECIPITATOR
F-102
INDUCED DRAFT FAN

November 19, 1999

SWA
SOLID WASTE AUTHORITY
YOUR PARTNER FOR
SOLID WASTE SOLUTIONS

Mr. Tom Tittle
Florida Department of Environmental Protection
P.O. Box 15425
West Palm Beach, Fl 33416

Re: Request for Emergency Order - North County Resource Recovery Facility

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Very truly yours,

Marc C. Bruner, Ph.D.
Director Planning & Environmental Programs

cc:
Alvero Linero, FDEP Tallahassee
Joe Kahn, FDEP Tallahassee
Melissa Meeker, FDEP Southeast
Don Lockhart, SWA
Marc Hammond, SWA
John Booth, SWA
Richard Statom, SWA
Bob Worobel, SWA
John Ryberg, SWA
Bill Arvin, PBRRC
Chuck Jolliff, PBRRC
Naren Narendra, PBRRC

TO: Mary Beth Mihalik
Environmental Compliance Coordinator - SWA

FROM: Naren Narendra, Plant Environmental Engineer - PBRRC

DATE: November 19, 1999

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Naren Narendra

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D. Burnham - PGG, PSO, Barberton BVCB3C
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Fan type:	14/30 RUK 1120
Design temp:	425° –
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Rotor weight:	1,648 lbs.

- **Stokers**

Manufacturer:	Detroit Stoker Co.
Type:	Continuous forward traveling, ash discharge grates. Driven by hydraulic system.

SUBSTITUTE AMBIENT AIR FAN CURVE

BUFFALO FORGE CO. PERFORMANCE CURVES BUFFALO,NY

FOR: DUSTEX CORPORATION

SIZE & TYPE: 980 L-3P SWSI MSW FANS A32,B32,C32

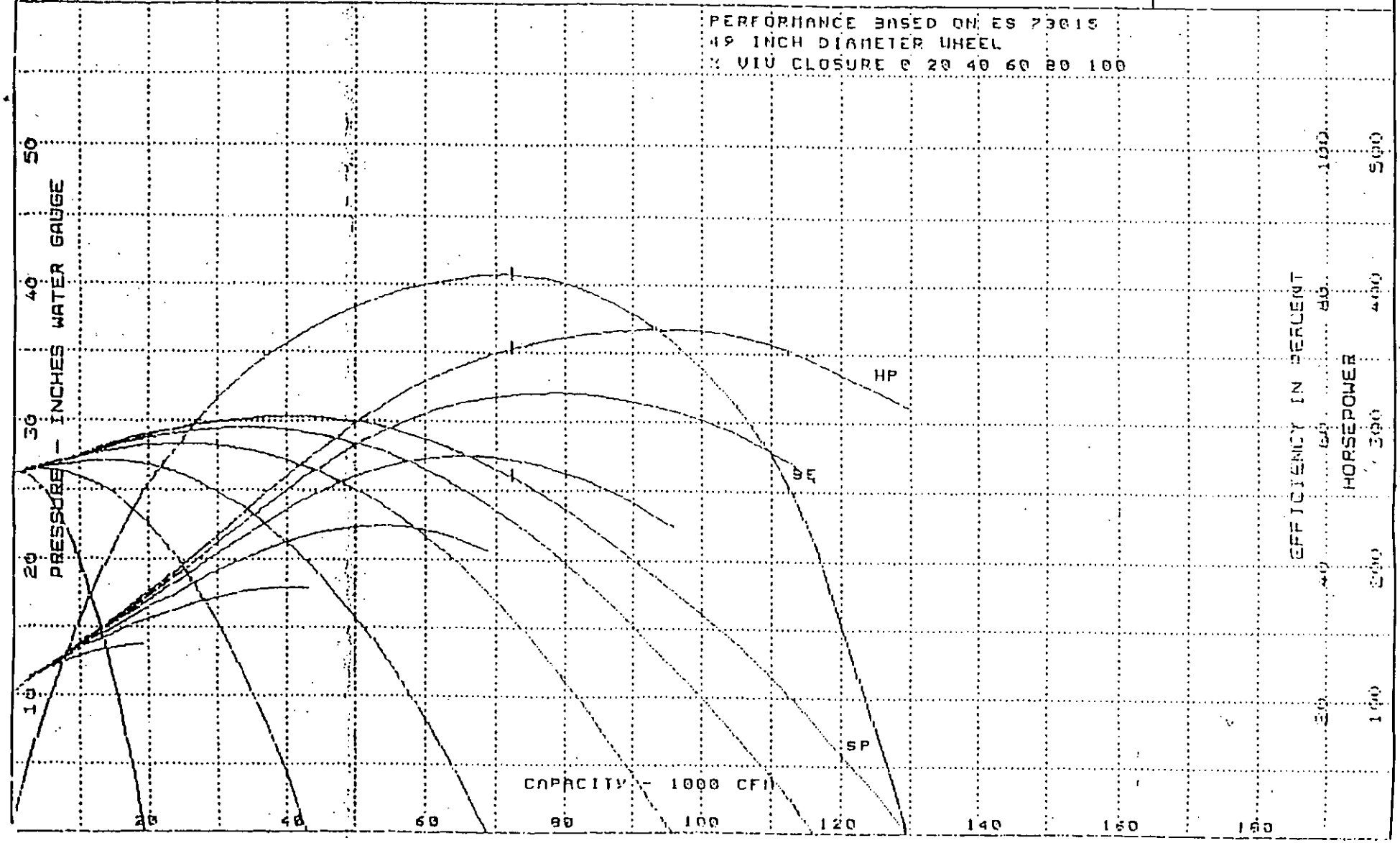
1785 RPM 110 °F 28.92 IN. HG .0652 LB/FT³

PO:

ORDER:

DATE: 01/15/1988

PERFORMANCE BASED ON ES 73015
49 INCH DIAMETER WHEEL
% VIV CLOSURE @ 20 40 60 80 100



SET ALL FOUNDATION BOLTS IN PIPES SO THEY ARE FREE TO MOVE UNTIL GROUTED IN PLACE.

8. REFERENCE NATIO
ORDER NO. 2048
9. BEFORE FIELD STAR
DOWEL TO SUB BAS
10. BUFFALO FORGE CO
MOUNTED MOTOR
FAN HALF
MOTOR HALF

SUBSTITUTE AMBIENT AIR

TING:
72,147 CFM
350 BHP
WHEEL DIAMETER
COMPLETE ROTOR WK²
N. E. I.
25.92 SP
110° F/ TEMP
TO CONE OUTLET TO 24 FT
1765 RPM
0.654 DENSITY
.1767 LBS FT²
WITH A MAXIMUM ANG

13 12 11 10

SWA
SOLID WASTE AUTHORITY

From: Donna Sayles ext. 4601
OBO: Donna Sayles ext. 4601

Date : 11/19/99
Time : 12:35 pm

7501 North Jog Road
West Palm Beach, Florida 33412
Telephone:(561)640-4000
Fax:(561)640-3400

To: Joe Kahn
Company:
Location:
Fax Number: 1-850-922-6979

Subject: FROM: MARC BRUNER
Total # of Pages: 7

Contents:

SWA
SOLID WASTE AUTHORITY
YOUR PARTNER FOR
SOLID WASTE SOLUTIONS

November 19, 1999

Mr. Tom Tittle
Florida Department of Environmental Protection
P.O. Box 15425
West Palm Beach, Fl 33416

Re: Request for Emergency Order - North County Resource Recovery Facility

Dear Tom:

This letter is requesting an emergency order to allow modification of our approval to operate with a temporary substitution of the over fire air fan for Boiler # 1 at the North County Resource Recovery Facility (NCRRF). On November 16, 1999, Boiler #1 over fire air fan experienced a catastrophic failure during the startup of the boiler. This piece of equipment is necessary for boiler operation as it provides air flow over the combustion chamber and evenly distributes fuel, which is essential for the combustion process. An ambient air fan with similar specifications was removed from the waste processing B-line Baghouse, which is currently down for repairs, and was installed to an existing duct adjacent to the over fire air fan and tested on November 17, 1999. Enclosed for your review are the specifications of both fans, as well as a schematic depicting the location.

The over fire air fan is such a highly specialized piece of equipment, specifically built for each facility, that is not common practice for the Plant Operator to store a spare of this sort on site. According to the Plant Operator, it will take approximately 10 weeks for the manufacturing and delivery of the new over fire air replacement fan. Therefore, we are requesting that this emergency order be granted for a period of up to 16 weeks to allow sufficient time for manufacturing, delivery, installation, and testing. If you have any questions or require any additional information you can contact me at 640-4000 ext. 4607.

Very truly yours,

Marc C. Bruner

Marc C. Bruner, Ph.D.
Director Planning & Environmental Programs

cc:
Alvero Linero, FDEP Tallahassee
Joe Kahn, FDEP Tallahassee
Melissa Meeker, FDEP Southeast
Don Lockhart, SWA
Marc Hammond, SWA
John Booth, SWA
Richard Statom, SWA
Bob Worobel, SWA
John Ryberg, SWA
Bill Arvin, PBRRC
Chuck Jolliff, PBRRC
Naren Narendra, PBRRC

7501 North Jog Road, West Palm Beach, Florida 33412 (561) 640-4000 FAX (561) 640-3400

TO: Mary Beth Mihalik
Environmental Compliance Coordinator - SWA

FROM: Naren Narendra, Plant Environmental Engineer - PBRRC

DATE: November 19, 1999

RE: Replacement Over Fire Air (OFA) Fan for Boiler 1

PBRRC purchasing Department is in the process of obtaining quotes to purchase an OFA fan for Boiler 1 to replace the damage fan. The normal delivery time quoted by one vendor for an OFA fan with same specifications is 18 weeks.

The damaged fan manufacturer's representative was on site on 11/18/99 inspecting the damage. Any recommendations from the manufacturer will also be considered when ordering the new fan.

PBRRC is negotiating to expedite the delivery time. All indications are a replacement fan could be received on site by ten weeks. Once the fan is on site an outage will be scheduled on Boiler 1 within the next six weeks and the fan will be replaced during this outage.

If you have any questions on this please contact me at 616 6198.

Naren Narendra

Copy to: Bill Arvan - PBRRC
D. Burnham - PGG, PSG, Barberton BVCB3C
Bob Worobel - SWA

Equipment list (continued)

Induced Draft Fan (2ea)

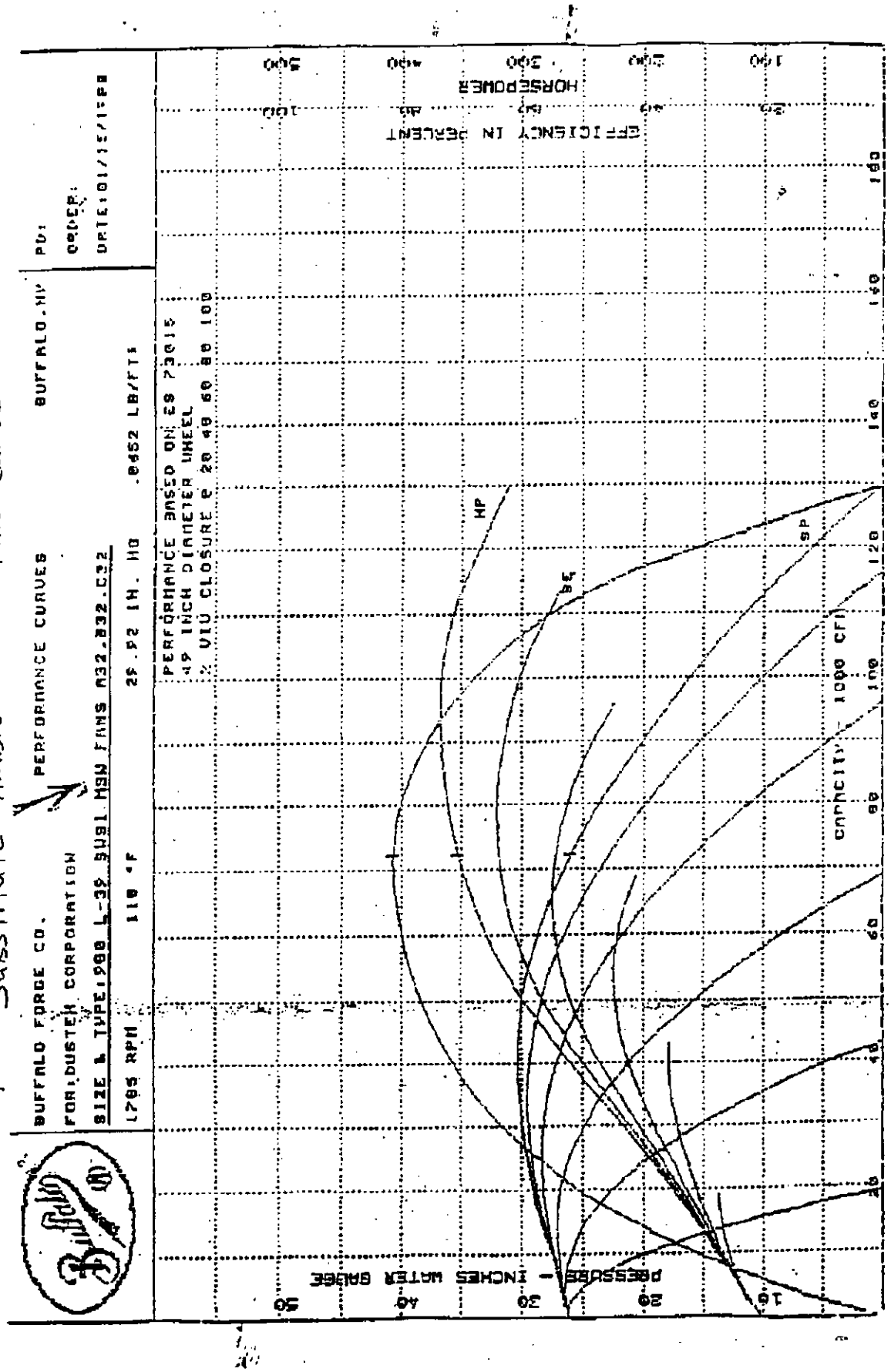
Manufacturer:	TLT Babcock
Design speed:	880 RPM
Design vol flow:	219,091 ACFM
Total pressure in Wg:	15.52
Fan start HP:	593
Fan type:	1414B/1630/0
Design temp:	425° F
Wr^2 of Rotor lbs. Ft^2:	34,720
Rotor weight:	7,800 lbs.

- **Over Fire Air Fan** (2ea) ← ORIGINAL FAN SPEC.

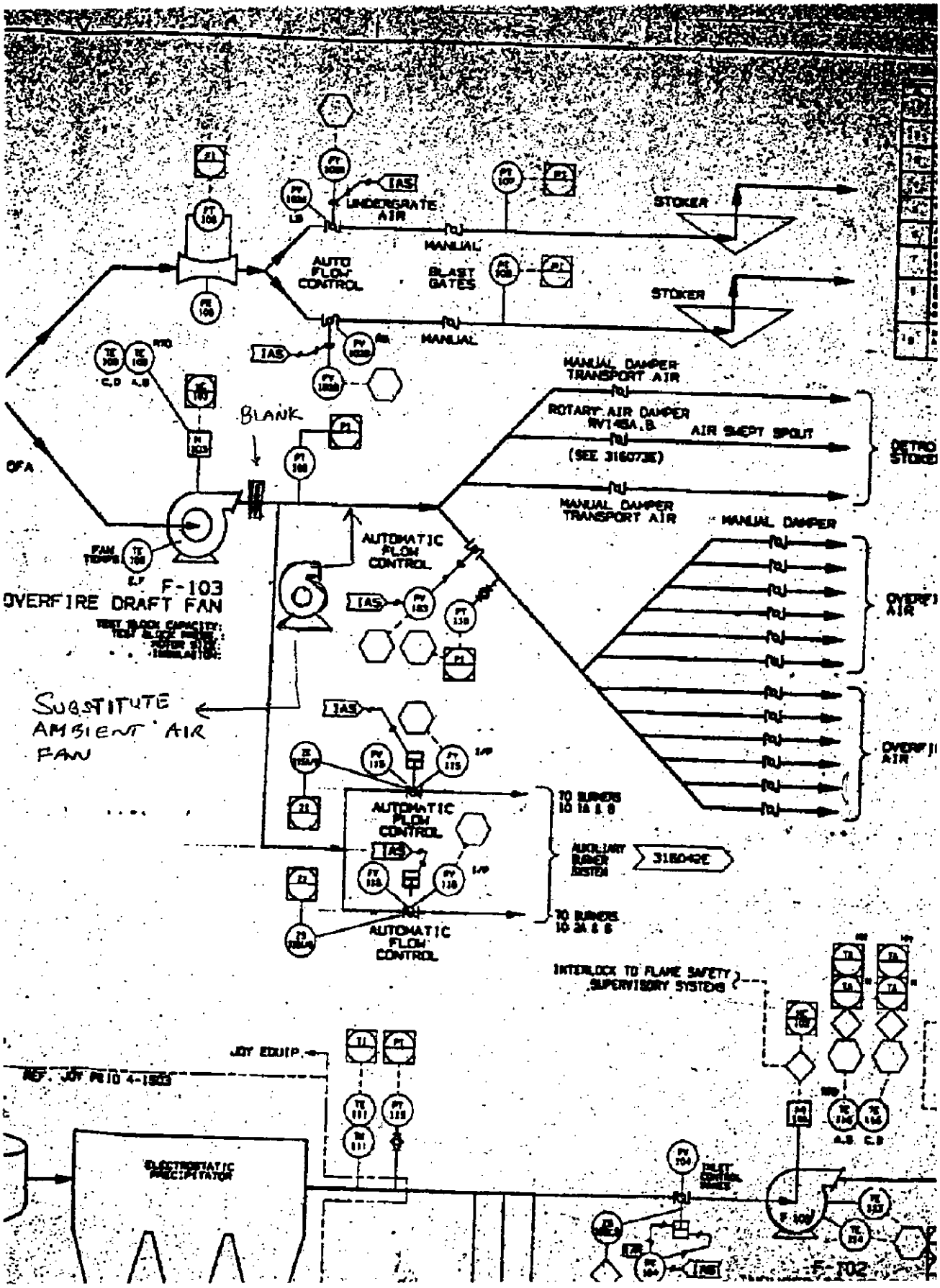
Manufacturer:	TLT Babcock
Design speed:	1775 RPM
Design vol flow:	76,142 ACFM
Total pressure in Wg:	30.00
Fan start HP:	394
Fan type:	14/30 RUK 1120
Design temp:	425°
WR^2 of rotor lbs. $ft.^2$:	4,175
Rotor weight:	1,648 lbs.

- Stokers

Manufacturer:	Detroit Stoker Co.
Type:	Continuous forward traveling, ash discharge grates. Driven by hydraulic system.


SUBSTITUTE AMBIENT AIR FAN CURVE
BUFFALO FORGE CO.
PERFORMANCE CURVES
BUFFALO, NY
FOR: DUSTER CORPORATION
SIZE & TYPE: 900 L-32 SWSI MSW FANS A32.832.C32
1705 RPM 110 °F 29.92 IN. HG .0452 LB/FT3
PERFORMANCE BASED ON ES 73015
49 INCH DIAMETER WHEEL
% VIU CLOSURE @ 20 40 60 80 100
PO:
ORDER:
DATE: 01/15/1999
PRESSURE - INCHES WATER GAUGE
CAPACITY - 1000 CFM
EFFICIENCY IN PERCENT
HORSEPOWER
HP
BHP
SP


SET ALL FOUNDATION BOLTS IN PIPES SO THEY ARE FREE TO MOVE UNTIL GROUTED IN PLACE
WHEEL DIAMETER
COMPLETE ROTOR


STOKER
UNDERGRATE AIR
MANUAL
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BLAST GATES
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MANUAL DAMPER TRANSPORT AIR
ROTARY AIR DAMPER RV145A,B
AIR SWEPT SPOUT
(SEE 315073E)
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MANUAL DAMPER
BLANK
AUTOMATIC FLOW CONTROL
F-103
OVERFIRE DRAFT FAN
SUBSTITUTE AMBIENT AIR FAN
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315042E
AUTOMATIC FLOW CONTROL
INTERLOCK TO FLAME SAFETY SUPERVISORY SYSTEMS
JOY EQUIP.
ELECTROSTATIC PRECIPITATOR
F-102

SWA
SOLID WASTE AUTHORITY

From: Donna Sayles ext. 4601
OBO: Donna Sayles ext. 4601

Date : 11/19/99
Time : 11:48 am

7501 North Jog Road
West Palm Beach, Florida 33412
Telephone:(561)640-4000
Fax:(561)640-3400

To: Alvaro Linero
Company:
Location:
Fax Number: 1-850-922-6979

Subject: FROM: MARC BRUNER
Total # of Pages: 7

Contents:

November 19, 1999

YOUR PARTNER FOR
SOLID WASTE SOLUTIONS

Mr. Tom Tittle
Florida Department of Environmental Protection
P.O. Box 15425
West Palm Beach, Fl 33416

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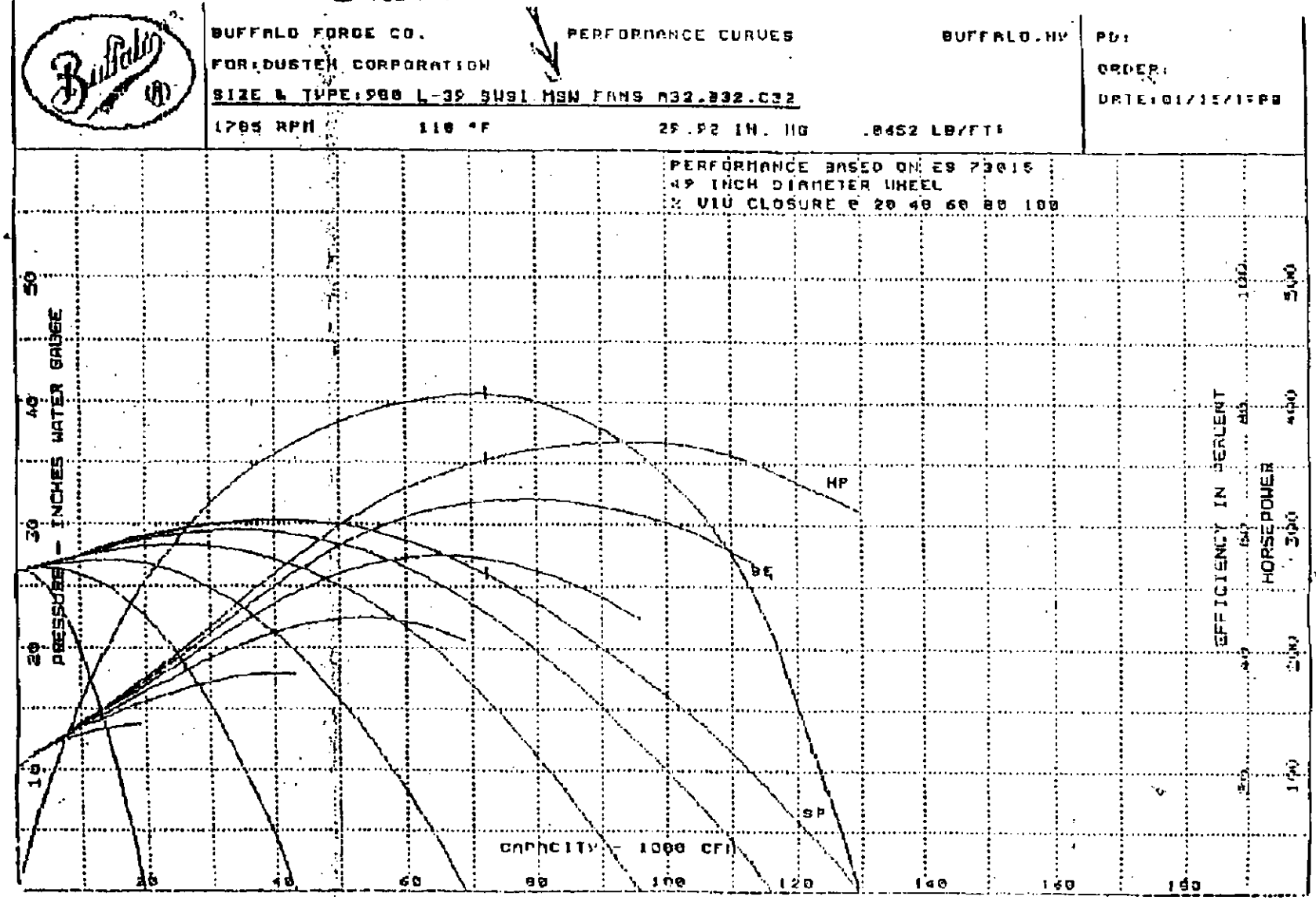
SUBSTITUTE AMBIENT AIR FAN CURVE



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ORDER NO. [illegible]
9. [illegible]
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10. BUFFALO FORGE [illegible]
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[illegible]
MOTOR [illegible]

24 7/8

SET ALL FOUNDATION BOLTS
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TO MOVE UNTIL GROUTED
IN PLACE

SUBSTITUTE [illegible]

TING

72,147 CFM [illegible] SP [illegible] RPM
350 BHP [illegible] TEMP [illegible]
WHEEL DIAMETER [illegible]
COMPLETE ROTOR [illegible] LBS FT [illegible]
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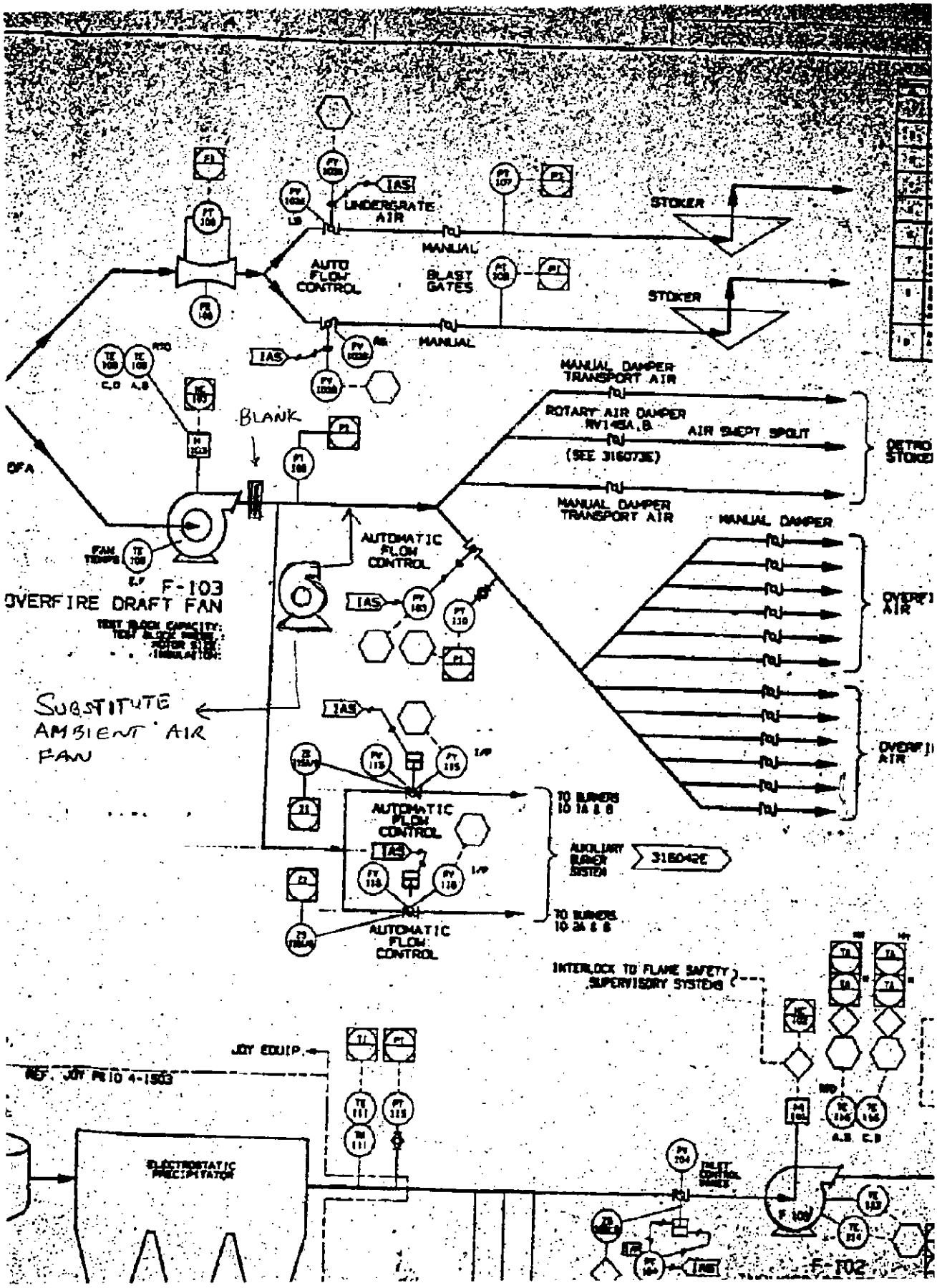
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3160426
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INTERLOCK TO FLAME SAFETY SUPERVISORY SYSTEMS
JOY EQUIP.
REF. JOY PRID 4-1503
ELECTROSTATIC PRECIPITATOR
F-102

ATTACHMENT A

1998 LANDFILL DEPLETION MODEL

1998 LANDFILL DEPLETION MODEL

Solid Waste Authority of Palm Beach County
North County Landfills
Landfill Depletion Model

November 15, 1997

Solid Waste Authority of Palm Beach County

7501 North Jog Road
West Palm Beach, FL 33412
561-640-4000

1998 Landfill Depletion Model

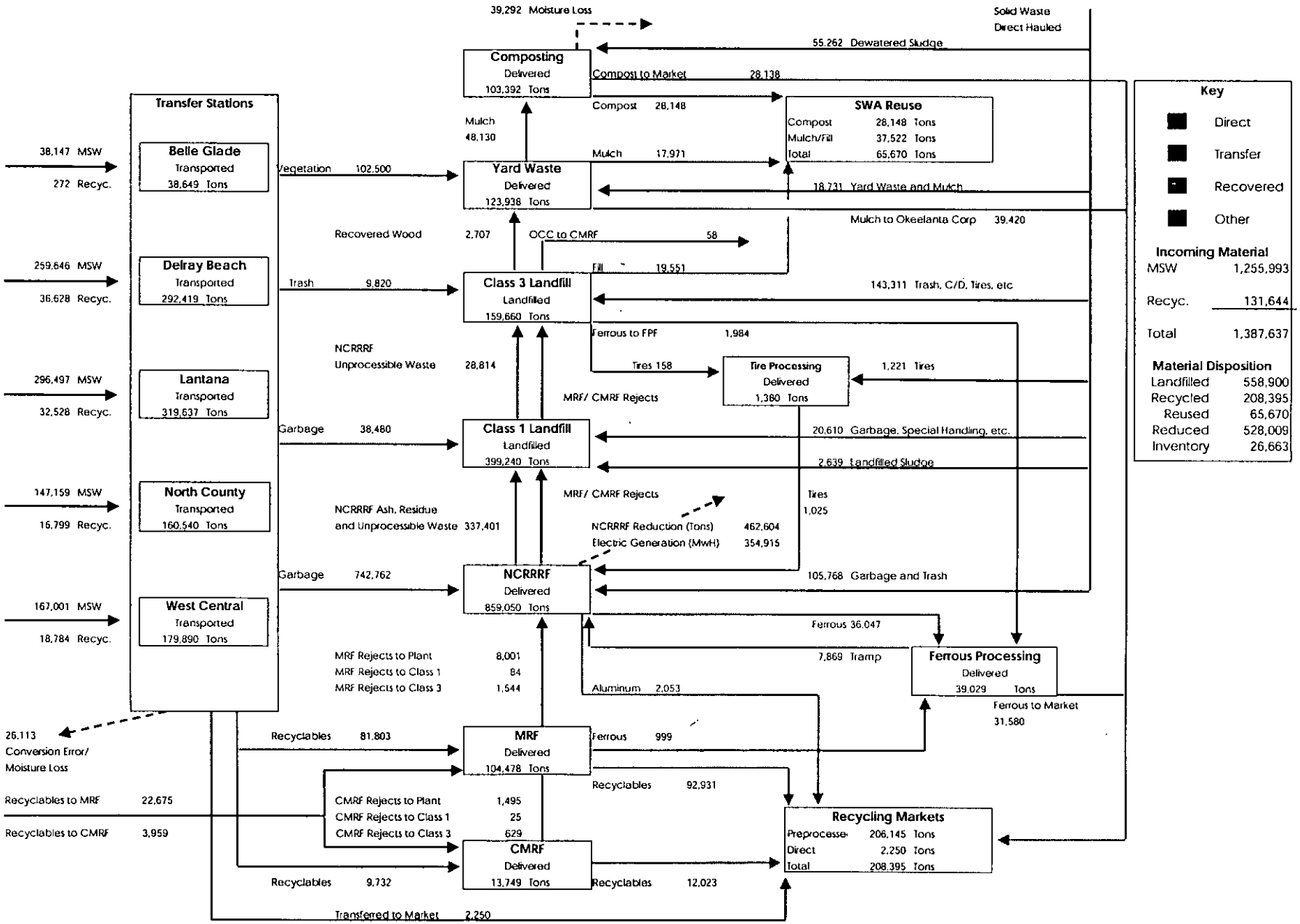
November 15, 1997

Table of Contents

Produced By:
Daniel Pellowitz, Business Analyst
Department of the Managing Director
Solid Waste Authority of Palm Beach County
561-640-4000

Solid Waste Authority of Palm Beach County

Waste Flow Diagram - FY 1996/1997



1998 Landfill Depletion Model
November 15, 1998

1.0 Introduction

1.1 Purpose

The principles of integrated solid waste management as put forth in the Environmental Protection Agency's hierarchy of integrated solid waste management are designed to minimize the quantity of waste disposed in landfills. The recycling, composting, and resource recovery programs that make up a part of the Authority's solid waste management system divert materials from landfill disposal and decrease the volume of landfill space required to serve the Palm Beach County population.

Despite the existence of these programs, the Authority recognizes the unique characteristics of landfilling as a waste disposal option, not the least of which is the reality that landfill space, unlike other forms of infrastructure, is a depletable resource. Recycling, composting, and resource recovery are all factors in increasing the life of a given landfill volume, however given existing technology, there will always be a need to landfill some portion of the waste stream. It is reasonable to assume that although the need to provide replacement capacity can be delayed through recycling, composting, and resource recovery programs, it cannot be prevented. The availability of landfill capacity is a driving force behind the solid waste management system decision making process.

Prudent planning requires identifying the time at which the need for replacement capacity becomes critical and taking the required steps to ensure that replacement capacity is available. Although replacement landfill capacity can be secured in several ways, including siting a new landfill and contracting with a private landfill operator, the long lead time in siting, permitting, and constructing a landfill site, often greater than ten years, necessitates effective long range planning in order to ensure viability of available options. The Authority's primary long range planning tool is the Landfill Depletion Model.

The Landfill Depletion Model is intended to forecast the estimated life of the Authority's North County landfills in order to facilitate facilities planning decisions and to assess the impact of alternatives and alternative states of nature on landfill life. As a planning tool, the model is useful in identifying the point or points in time at which a decision is required in order to ensure the availability of disposal capacity.

The Landfill Depletion Model considers the dynamic interrelationships between the available processing and disposal options, population projections and population growth rates, per capita generation rates, recycling rates, diversion rates, incineration capacity and reduction effectiveness, landfill compacted densities, and cover material requirements and produces a projected date of landfill depletion. With this date established and the anticipated lead time known, the latest date at which a decision must be made can be determined.

Because of the many factors impacting the rate of landfill depletion and in order to minimize the possibility of falling behind on the critical path, the Landfill Depletion Model is run on an annual basis when the latest population projections become available.

The model was last updated in February 1997 and was based on FY 1995-1996 operating data and existing assumptions.

1.2 Model Description

Population projections and per capita waste generation rates are used to forecast annual waste generation for the next 30 years. The annual waste tonnages are adjusted downward to account for recycling, incineration, and waste reduction activities. The net landfill tonnage is converted to cubic yards and the landfill depletion determined using estimated compacted densities. In every period, the cubic yards depleted in the period are deducted from the remaining volume at the end of the prior period to determine the volume remaining. A negative number in the "Landfill Volume Remaining" column indicates that the landfill is at capacity. The main schedules are as follows:

Table 1	Estimated Population and Solid Waste Generation
Table 2	Class 1 Landfill Depletion
Table 2A	Class 1 Landfill Depletion - Third Boiler at NCRRRF
Table 3	Class 3 Landfill Depletion
Table 3A	Class 3 Landfill Depletion - Third Boiler at NCRRRF
Table 4	North County Landfill Depletion Under Balanced Life Scenario
Table 4A	North County Landfill Depletion Under Balanced Life Scenario- Third Boiler at NCRRRF

1.3 Prior Results

The landfill depletion model was last updated in January 1997 and was based on operating data through 1996. The model predicted final depletion would occur in 2022 assuming the Class 1 and Class 3 landfills reach capacity at the same time. The model further indicated that adding a third boiler to the Resource Recovery Facility in the year 2001 would extend the life of the landfill to 2026.

Although the model is a long range planning tool, an evaluation of short term performance versus actual results is an important aspect of the annual review in order to identify any short term changes which may impact long term results. The following table presents projected, actual, and percent variance data for the previous year:

	Projected	Actual	Variance
Total Solid Waste Generation	1,189,389	1,173,368	1.3%
Class 1 Generation	878,318	921,219	-4.9%
Class 3 Generation	311,071	252,149	18.9%
Total Generation Rate (ppd)	6.50	6.31	2.9%
Class 1 Generation Rate	4.80	4.93	-2.7%
Class 3 Generation Rate	1.70	1.37	19.4%
Total Landfilled Tonnage	571,736	558,900	2.2%
Class 1 Landfilled Tonnage	357,993	399,240	-11.5%
Class 3 Landfilled Tonnage	213,743	159,660	25.3%

Note:

(1) Total generation is net of out-of-county recyclables but includes 17,753 tons of material removed from two closed landfills.

(2) Total landfill quantity includes 17,753 tons of material removed from two closed landfills.

(3) Per capita generation rates expressed net of out-of-county recyclables and net of material from other landfillsto provide an equal basis for comparison.

(4) Vegetation and sludge not included in any of the above figures.

Total solid waste generation and disposal were both in line with projections with a variance of 1.3% and 2.2%, respectively. Total Class 1 generation exceeded projections by 4.9% and the Class 1 landfill quantity exceeded projections by 11.5%. The primary reasons for this include the landfilling of 17,329 tons of material excavated from

two closed landfills and redisposed in the Class 1 landfill, in the absence of which the variances would have been 2.9% generated and 6.7% landfilled, and an increase in the delivery of garbage and recyclables of 40,304 tons and 8,437 tons, respectively. The strong increase in garbage deliveries was experienced primarily at the West Central Transfer Station (up 11,791 tons or 8%), most likely related to the rapid development in the Acreage, and at the Delray Beach Transfer Station (up 15,185 tons or 10%), possibly due to the recapture of commercial MSW from out-of-county disposal following the decrease in the tipping fee from $40 to $23 per ton. Additionally, the County experienced a significant increase in rainfall, which increases the moisture content and the weight of incoming waste.

The generation and disposal of Class 3 material was overestimated in the model for the second year in a row despite a decrease in the assumed per capita generation rate from 1.80 to 1.70 ppd. The Class 3 generation estimate exceeded actual by 58,922 tons (18.9%). This error was the result of decreased trash and construction and demolition debris deliveries of 18,452 and 23,192 tons, respectively. Trash and construction and demolition debris quantities disposed at the Authority have shown a steady decline for the past six years, both in total and on a per capita basis, and this decline continues. The ability to predict construction and demolition debris deliveries is made difficult by the competitive marketplace that exists for the processing and disposal of this type of material and the tipping fee economics involved. The decrease in the trash quantity may be the result of a substitution effect resulting from household bulk trash being collected with garbage by more communities.

An additional source of error may be the impact of the decrease in the Authority's tipping fee for garbage and trash along with the tipping fee for construction and demolition debris remaining at $37 per ton. This could have resulted in construction and demolition debris and/or trash entering the Authority's facilities commingled with garbage. Nonetheless, it must be noted that the ***Landfill Depletion Model*** is a long range planning tool and short term fluctuations may not be consistent with long term results.

2.0 Landfill Depletion Model Assumptions

2.1 Population

Palm Beach County is one of the most rapidly growing areas in the country. Recent projections indicate that the population of Palm Beach County is anticipated to increase from approximately 1,004,000 people in 1997 to 1,500,000 people in 2020. Both the population growth and the timing of population growth are critical to properly assessing future waste generation and landfill longevity.

The Authority uses the University of Florida Bureau of Economic and Business Research medium permanent population projections as published in ***Florida Population Studies***. Due to the need to provide capacity assurance to the municipalities in a timely manner, the population projections issued in February 1997 (***Florida Population Studies, Vol. 30 No.2, Bulletin No. 117***) are used in the model. The BEBR population projections are the same projections used by Palm Beach County Planning and Zoning for planning purposes. The average annual growth rate from 1997 through 2020 is approximately 1.7%. The BEBR projections are presented in 5 year intervals. The between interval population estimates are calculated through interpolation using the periodic growth factors. The between interval growth rates are as follows:

Average Annual Growth Rates		Average Annual Growth Rates	
1997-2000	1.95%	2000-2005	1.79%
2005-2010	1.62%	2010-2015	1.52%
2015-2020	1.42%		

Tourism being one of Palm Beach County's largest economic contributors, there is an annual surge in population between Thanksgiving and Easter. Due to the difficulty in predicting seasonal population, which fluctuates with general economic conditions and the weather, among other factors, the solid waste generation projections are made using only permanent population.

The Bureau of Economic and Business Research provides no estimate beyond 2020. The model assumes that the build-out population is the 2020 BEBR medium projection. This assumption is consistent with the approach used by Palm Beach County Planning. The model freezes population growth in 2020.

2.2 Waste Generation

Two per capita generation rates are utilized in the model, one for Class 1 material (garbage) and one for Class 3 material (trash), because these materials are generally processed separately. Class 1 material is delivered to the North County Resource Recovery Facility for incineration with material in excess of the plant's capacity landfilled directly in the Class 1 landfill. Class 3 material is delivered to the Class 3 landfill for processing and disposal. In order to calculate the per capita generation rates, Authority incoming waste tonnages for the preceding several years are reviewed in an effort to identify any trends. The data source is Authority scale reports. The per capita generation rates used in the model reflect only the material the Authority receives or reasonably expects to receive.

Currently, approximately 600,000 tons of primarily heavy construction and demolition debris and clean vegetation are delivered to private recyclers permitted by the Authority. Material that is currently diverted to private recyclers is assumed to continue to be delivered to private recyclers unless there is some compelling reason to believe that the situation will change. Socioeconomic, regulatory, and other factors that could affect the estimate are evaluated for their potential impact.

2.2.1 Per Capita Generation Rates - Discussion

The estimated per capita waste generation rates for the past five years and for FY 1985/1986 are presented on Page 5. Fiscal year 1985/1986 data was used in the Authority's original ***Comprehensive Solid Waste Management Plan.***

After a significant decrease in the per capita generation rate last year, the total per capita generation rate was almost unchanged for the most recent year at 7.39 p.p.d versus 7.38 p.p.d last year. The Authority experienced a marked increase in the garbage and vegetation components, offset primarily by strong decreases in the delivery of construction and demolition debris and trash. The increase in garbage deliveries directly impacts the Authority's disposal facilities, both the Resource Recovery Facility and the landfill. The increase in vegetation deliveries is not anticipated to affect the disposal facilities because the Authority has other uses for the material, including the SWA Compost Facility.

Clean vegetation deliveries increased from .62 p.p.d. to .76 p.p.d. in 1996/1997 after decreasing last year from .83 p.p.d. As in the previous year, tipping fee economics was the major cause. In 1995/1996, the Authority increased the tipping fee for vegetation from $18 to $25 per ton and restricted deliveries of compacted vegetation, which directed more vegetation to the private sector. In 1996/1997 the Authority was forced to reduce the tipping fee for vegetation from $25 per ton to $20 per ton as a part of a strategy to maintain competitiveness by decreasing the tipping fee for garbage and trash from $40 per ton to $23 per ton. The reduction in the vegetation tipping fee was necessary to maintain the incentive to separate the material. As expected, this action diverted vegetation away from the private sector and the quantity increased.

As in the previous ***Landfill Depletion Model,*** due to the sensitivity of vegetation deliveries to market factors and the fluctuations this causes in the per capita generation rates, this revision of the model eliminates the vegetation component from the per capita trash generation rate used in the model. The Class 3 reduction rate has been adjusted accordingly. As long as the Authority continues diverting vegetation from the landfill, this methodology will be used.

Solid Waste Authority of Palm Beach County
Historical Per Capita Generation Rates

	Fiscal Year						Base Year
	1996/1997	1995/1996	1994/1995	1993/1994	1992/1993	1991/1992	1985/1986
Population	1,003,684	981,793	962,802	937,190	918,119	905,928	752,115
Tonnage	1,353,466	1,321,858	1,347,872	1,290,203	1,254,329	1,217,910	1,222,930
Garbage	783,112	742,808	724,761	734,207	683,029	692,764	536,775
Trash	141,691	160,254	158,459	181,100	177,746	185,440	290,327
Vegetative	139,950	110,415	145,892	97,299	113,862	41,719	30,724
CD/Land Clearing	89,125	111,719	106,773	99,572	127,264	146,264	354,574
Sludge	57,901	59,536	59,346	44,068	48,734	60,645	119
Clean Fill	19,551	21,964	37,100	26,392	2,632	7,550	1,733
Tires	1,358	1,974	3,151	3,601	7,271	4,255	2,690
Miscellaneous	3,112	3,960	3,343	2,488	3,163	9,011	5,988
Subtotal MSW	1,235,800	1,212,629	1,238,825	1,188,727	1,163,701	1,147,648	1,222,930
Recyclables	117,666	109,229	109,047	101,475	90,628	70,262	0
Total MSW	1,353,466	1,321,858	1,347,872	1,290,202	1,254,329	1,217,910	1,222,930
Garbage	4.28	4.15	4.12	4.29	4.08	4.19	3.91
Trash	0.77	0.89	0.90	1.06	1.06	1.12	2.12
Vegetative	0.76	0.62	0.83	0.57	0.68	0.25	0.22
Land Clearing/CD	0.49	0.62	0.61	0.58	0.76	0.88	2.58
Sludge	0.32	0.33	0.34	0.26	0.29	0.37	0.00
Clean Fill	0.11	0.12	0.21	0.15	0.02	0.05	0.01
Tires	0.01	0.01	0.02	0.02	0.04	0.03	0.02
Miscellaneous	0.02	0.02	0.02	0.01	0.02	0.05	0.04
Subtotal MSW	6.75	6.77	7.05	6.95	6.95	6.94	8.91
Recyclables	0.64	0.61	0.62	0.59	0.54	0.42	0.00
Total MSW	7.39	7.38	7.67	7.54	7.49	7.37	8.91
Major Categories (pounds per person per day)							
Class 1	**4.93**	**4.78**	**4.76**	**4.90**	**4.64**	**4.67**	**3.95**
Class 3	**1.37**	**1.65**	**1.74**	**1.82**	**1.88**	**2.08**	**4.73**
Vegetation	**0.76**	**0.62**	**0.83**	**0.57**	**0.68**	**0.25**	**0.22**
Sludge	**0.32**	**0.33**	**0.34**	**0.26**	**0.29**	**0.37**	**0.00**
Garbage and Trash	**6.31**	**6.43**	**6.50**	**6.72**	**6.52**	**6.75**	**8.68**

Notes:

(1) Population projections are BEBR Medium Permanent projections.

(2) Tonnage based on SWA scale reports, except for 90/91 and prior, which are adjusted for density assumption variance, and for the addition of small quantities of unweighed waste.

(3) The increase in clean vegetation resulted from tipping fee economics following a decrease in the tipping fee for Fiscal Year 96/97 from $25 to $20 per ton.

(4) Solid waste tonnage reduced by 12,670 tons of material from Cross State Landfill and 5,083 tons of material from Jupiter Landfill redisposed at the NCRSWDF. This material was not generated in the year.

(5) Recycling tonnage reduced by 11,940 tons of Martin County and 2,038 tons of St. Lucie County recyclables.

Solid Waste Authority of Palm Beach County
Historical Garbage and Trash Quantities

Garbage

	90/91	91/92	92/93	93/94	94/95	95/96	96/97	91/92	92/93	93/94	94/95	95/96	96/97	Six Years	Three Years
October	60,219	59,195	52,221	57,951	57,409	62,568	63,685	-1.70%	-11.78%	10.97%	-0.94%	8.99%	1.78%	0.94%	5.32%
November	56,904	55,735	55,469	62,389	63,173	59,920	60,493	-2.05%	-0.48%	12.48%	1.26%	-5.15%	0.96%	1.02%	-2.14%
December	58,939	61,957	58,059	63,048	67,148	60,712	68,225	5.12%	-6.29%	8.59%	6.50%	-9.58%	12.37%	2.47%	0.80%
January	65,854	61,900	60,203	65,348	64,057	67,707	69,891	-6.00%	-2.74%	8.55%	-1.97%	5.70%	3.22%	1.00%	4.45%
February	57,627	57,715	54,270	62,028	57,401	60,712	64,005	0.15%	-5.97%	14.30%	-7.46%	5.77%	5.42%	1.76%	5.60%
March	61,304	62,951	66,711	67,724	64,832	64,178	69,172	2.69%	5.97%	1.52%	-4.27%	-1.01%	7.78%	2.03%	3.29%
April	63,033	59,248	60,680	62,891	57,668	64,890	67,968	-6.01%	2.42%	3.64%	-8.31%	12.52%	4.74%	1.26%	8.56%
May	59,584	53,687	54,409	60,920	61,356	64,876	66,075	-9.90%	1.34%	11.97%	0.72%	5.74%	1.85%	1.74%	3.77%
June	52,544	58,560	56,938	61,485	59,899	58,741	65,657	11.45%	-2.77%	7.99%	-2.58%	-1.93%	11.77%	3.78%	4.70%
July	57,463	53,841	53,868	53,448	56,096	61,494	62,495	-6.30%	0.05%	-0.78%	4.95%	9.62%	1.63%	1.41%	5.55%
August	53,990	53,688	55,685	60,436	60,088	59,474	61,960	-0.56%	3.72%	8.53%	-0.58%	-1.02%	4.18%	2.32%	1.55%
September	52,055	54,288	54,528	58,356	55,634	57,535	63,486	4.29%	0.44%	3.35%	-1.28%	3.42%	10.34%	3.36%	6.82%
Garbage	699,516	692,764	683,039	734,025	724,759	742,808	783,112	-0.97%	-1.40%	7.46%	-1.26%	2.49%	5.43%	1.90%	3.95%

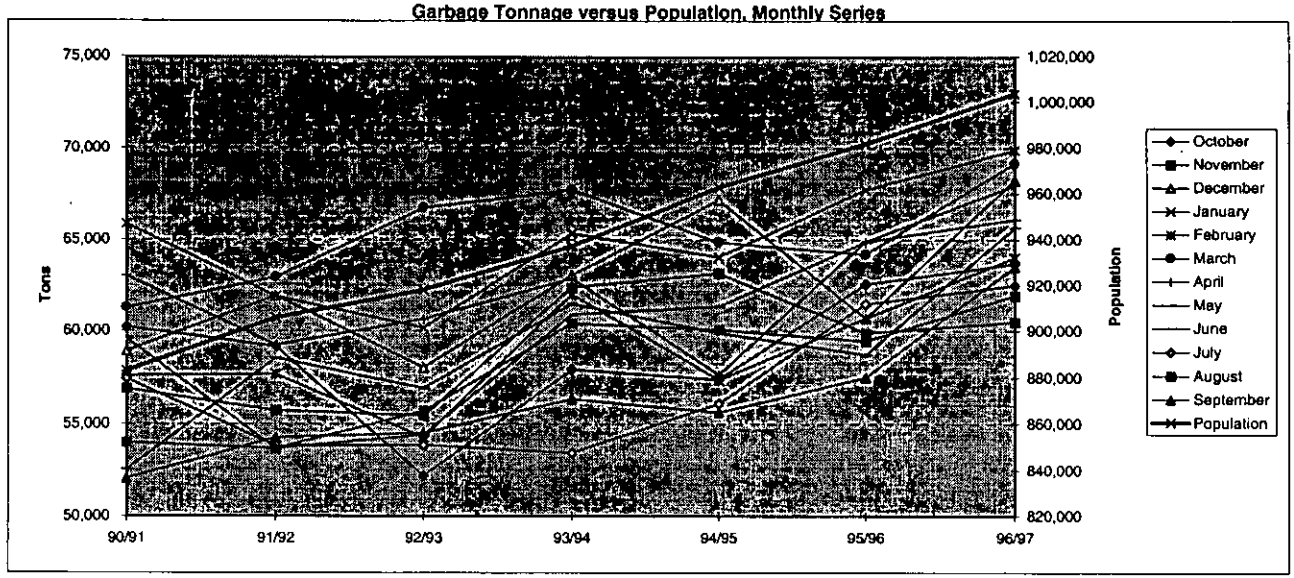
Trash

	90/91	91/92	92/93	93/94	94/95	95/96	96/97	91/92	92/93	93/94	94/95	95/96	96/97	Six Years	Three Years
October	16,930	17,724	13,869	13,921	13,852	14,032	12,500	4.69%	-21.75%	0.37%	-0.49%	1.30%	-10.91%	-4.93%	-5.01%
November	13,912	15,615	11,487	13,601	14,144	11,878	9,108	12.25%	-26.43%	18.40%	3.99%	-16.02%	-23.32%	-6.82%	-19.75%
December	12,265	14,068	13,145	13,520	14,622	11,757	9,111	14.70%	-6.56%	2.85%	8.15%	-19.59%	-22.51%	-4.83%	-21.06%
January	14,352	15,508	12,552	14,139	13,118	14,590	11,398	8.05%	-19.06%	12.64%	-7.22%	11.22%	-21.88%	-3.77%	-6.79%
February	12,743	14,136	12,382	12,716	10,892	12,745	10,278	10.93%	-12.40%	2.69%	-14.35%	17.02%	-19.36%	-3.52%	-2.86%
March	14,079	14,994	16,866	17,728	13,260	12,201	10,793	6.50%	12.48%	5.11%	-25.20%	-7.98%	-11.55%	-4.33%	-9.78%
April	14,570	14,924	16,725	16,596	12,583	13,827	11,789	2.43%	12.07%	-0.77%	-24.18%	9.89%	-14.74%	-3.47%	-3.21%
May	14,372	14,408	14,049	17,328	13,445	14,642	11,359	0.26%	-2.50%	23.34%	-22.41%	8.91%	-22.42%	-3.84%	-8.08%
June	13,240	16,482	17,305	16,593	13,712	12,868	12,539	24.48%	4.99%	-4.12%	-17.36%	-6.16%	-2.55%	-0.90%	-4.37%
July	15,385	17,080	15,398	14,684	13,851	14,743	16,304	11.02%	-9.85%	-4.63%	-5.68%	6.44%	10.59%	0.97%	8.50%
August	13,292	14,845	16,182	15,024	12,727	13,346	13,001	11.68%	9.01%	-7.16%	-15.29%	4.86%	-2.58%	-0.37%	1.07%
September	12,663	16,213	15,750	15,147	11,948	13,331	12,813	28.04%	-2.85%	-3.83%	-21.12%	11.57%	-3.88%	0.20%	3.56%
Trash	167,801	185,997	175,711	180,996	158,152	159,958	140,991	10.84%	-5.53%	3.01%	-12.62%	1.14%	-11.86%	-2.86%	-5.58%

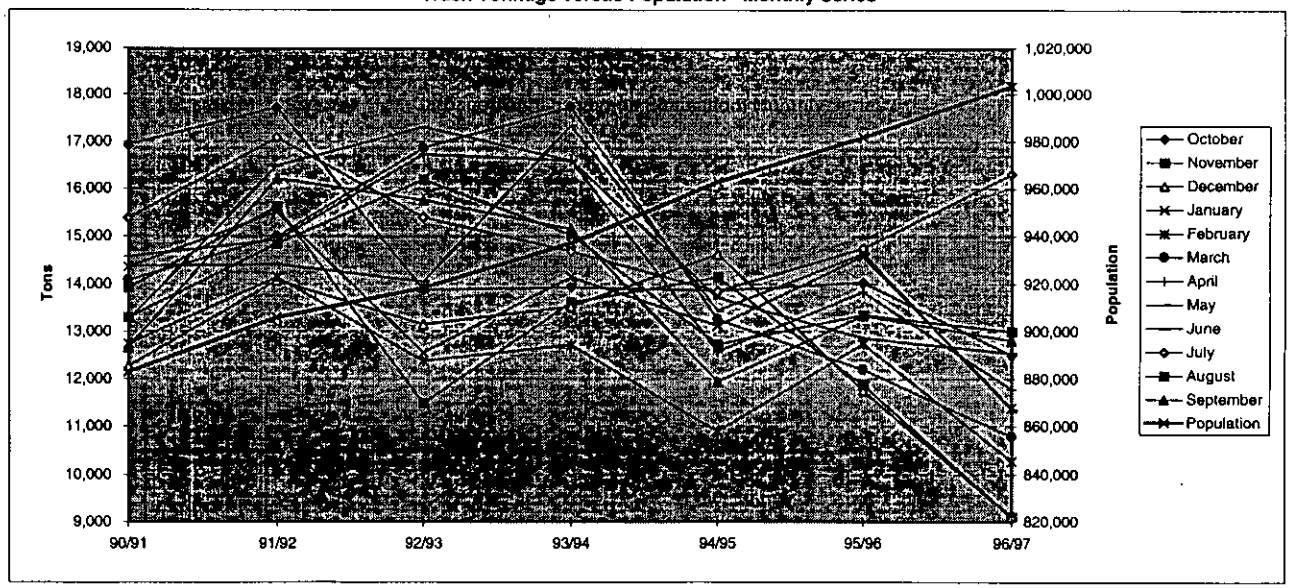
Garbage and Trash

	90/91	91/92	92/93	93/94	94/95	95/96	96/97	91/92	92/93	93/94	94/95	95/96	96/97	Six Years	Three Years
October	77,150	76,919	66,090	71,872	71,261	76,600	76,185	-0.30%	-14.08%	8.75%	-0.85%	7.49%	-0.54%	-0.21%	3.40%
November	70,815	71,350	66,956	75,990	77,316	71,798	69,601	0.76%	-6.16%	13.49%	1.75%	-7.14%	-3.06%	-0.29%	-5.12%
December	71,204	76,025	71,204	76,568	81,769	72,469	77,335	6.77%	-6.34%	7.53%	6.79%	-11.37%	6.72%	1.39%	-2.75%
January	80,206	77,408	72,754	79,486	77,176	82,297	81,288	-3.49%	-6.01%	9.25%	-2.91%	6.64%	-1.23%	0.22%	2.63%
February	70,370	71,850	66,652	74,744	68,293	73,457	74,282	2.10%	-7.24%	12.14%	-8.63%	7.56%	1.12%	0.91%	4.29%
March	75,382	77,945	83,577	85,452	78,091	76,379	79,965	3.40%	7.23%	2.24%	-8.61%	-2.19%	4.69%	0.99%	1.19%
April	77,603	74,172	77,405	79,488	70,251	78,718	79,757	-4.42%	4.36%	2.69%	-11.62%	12.05%	1.32%	0.46%	6.55%
May	73,956	68,095	68,457	78,248	74,801	79,518	77,434	-7.92%	0.53%	14.30%	-4.41%	6.31%	-2.62%	0.77%	1.75%
June	65,784	75,042	74,244	78,078	73,612	71,609	78,196	14.07%	-1.06%	5.16%	-5.72%	-2.72%	9.20%	2.92%	3.07%
July	72,848	70,921	69,265	68,132	69,946	76,236	78,799	-2.65%	-2.33%	-1.64%	2.66%	8.99%	3.36%	1.32%	6.14%
August	67,282	68,533	71,867	75,460	72,814	72,820	74,960	1.86%	4.87%	5.00%	-3.51%	0.01%	2.94%	1.82%	1.46%
September	64,718	70,501	70,278	71,503	67,582	70,866	76,299	8.94%	-0.32%	1.74%	-5.48%	4.86%	7.67%	2.78%	6.25%
	867,317	876,761	858,750	915,021	882,912	902,766	924,103	1.32%	-2.28%	6.55%	-3.51%	2.25%	2.36%	1.06%	2.31%
Population	**883,044**	**905,928**	**918,119**	**937,190**	**962,802**	**981,793**	**1,003,684**	**2.59%**	**1.35%**	**2.08%**	**2.73%**	**1.97%**	**2.23%**	**2.16%**	**2.10%**

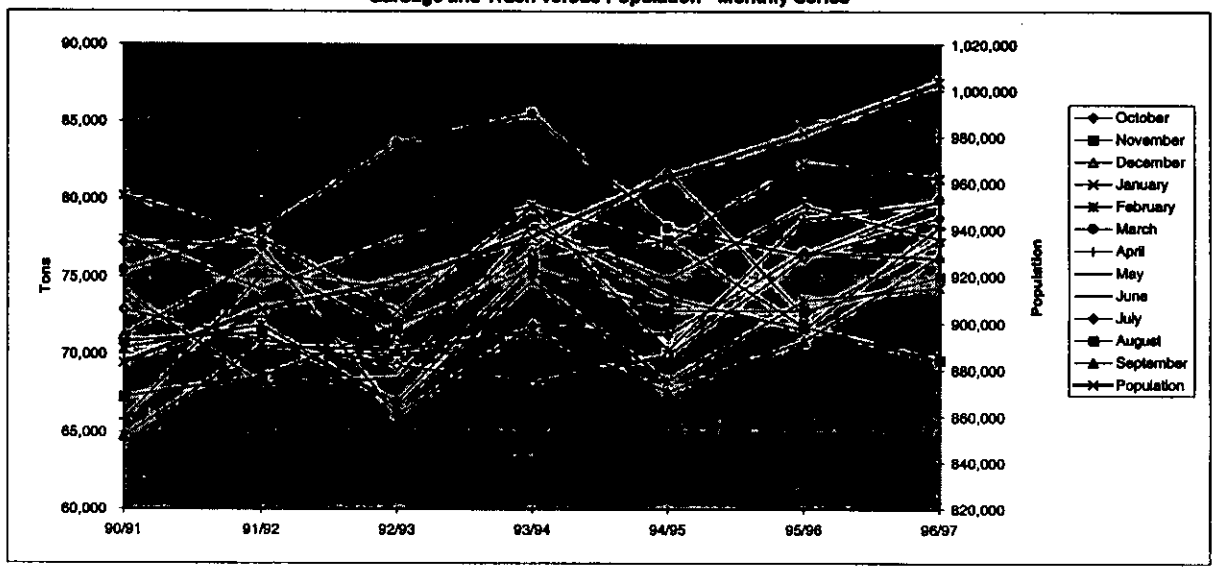
Garbage Tonnage versus Population, Monthly Series



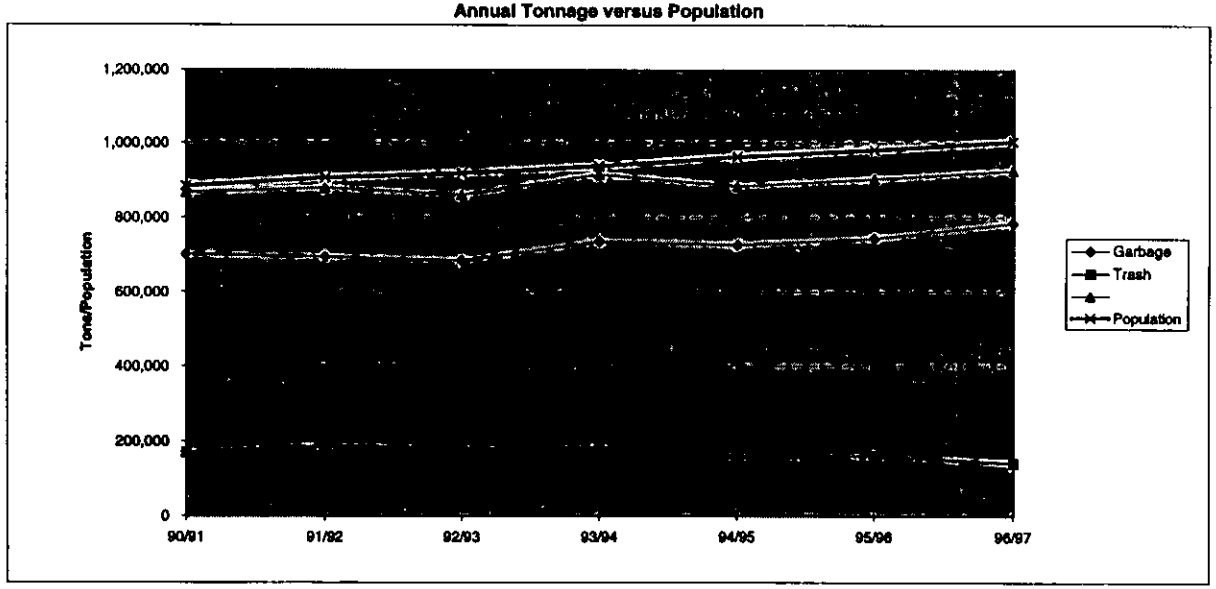
Trash Tonnage versus Population - Monthly Series



Garbage and Trash versus Population - Monthly Series



Annual Tonnage versus Population



Over the long term, the diversion of vegetation from the landfill is reasonably assured, however this does not preclude periodic periods in which the landfilling of this material may be required. The recent closure of the two cogeneration facilities in the western part of the county, which were the major outlet for mulched biomass material for the Authority's permitted processors and the Authority itself, is one example of a situation which may require the landfilling of vegetation, at least on a short term basis. The Authority is hopeful that these facilities will come back on-line. To date, no vegetation has been landfilled and the Authority is taking steps, including the permitting of an air curtain incinerator, to ensure that a long term permanent solution is available.

The per capita generation rate of garbage increased from 4.15 to 4.28 ppd, which is approximately the 1993/1994 level. As previously stated, this increase is probably the combined result of the accelerated development of the Acreage, the recapture of material that previously left the County for disposal, the commingling of trash with garbage at the curb, and increased rainfall. The trash quantity continued its steady decline, falling from .89 to .77 ppd. As can be seen on Page 5, the per capita generation rate for trash has declined steadily from 1.12 ppd in 1991/1992.

It may be coincidental, however it is interesting to note that over the past several years the garbage and trash quantities have been moving in opposite directions at comparable magnitudes. The schedule on Page 6 provides a history of garbage and trash deliveries to the Authority and compares the percentage change in solid waste deliveries to the percentage change in the annual population estimates. From 1991 to 1997, garbage deliveries have increased at an average annual rate of 1.90%, trash deliveries have decreased 2.86%, the total of both categories has increased 1.06%, and the Palm Beach County estimated permanent population has increased at an average annual rate of 2.16%. Since 1994, the average annual percentage change has been 3.95% for garbage, -5.58% for trash, 2.31% for the combined categories, and 2.10% for population.

2.2.2 Assumed Per Capita Generation Rates

In the model, incoming MSW and recyclables are grouped into four major categories, Class 1 (garbage), Class 3 (trash), vegetation, and sludge, of which vegetation and sludge are not considered in the model because of alternative disposal options. Class 1 material consists of the following waste classifications: garbage, recyclables, direct landfill, special handling, animals, and other miscellaneous wastes. Class 3 material consists of trash, building debris, land clearing debris, clean fill, tires, trailers, and asbestos. The values for the Class 1 and Class 3 categories for the last six years are as follows:

	Class 1 Material	Class 3 Material	Total
1991/1992	4.67	2.08	6.75
1992/1993	4.64	1.88	6.52
1993/1994	4.90	1.82	6.72
1994/1995	4.76	1.74	6.50
1995/1996	4.78	1.65	6.43
1996/1997	4.93	1.37	6.31

The trends in the Class 1 and Class 3 categories are consistent with the trends in the components of the waste stream that make up the categories. In comparison to the prior year, the per capita generation of Class 1 material increased 3%, the per capita generation of Class 3 material decreased 17%, and the total per capita generation of material that affects landfill longevity decreased 2%. The key elements that must be considered in establishing the per capita generation rate assumptions in this revision of the model are:

1) The general trends in the generation rates and the probability that they will continue or reverse,
2) The potential for the closure of the cogeneration plants to cause greater quantities of construction and demolition debris to flow to the Authority as well as the possibility that a portion of that material never returns to the private sector.

Based upon a review of the waste tonnage data and in light of the previous discussion, it is my opinion that the results for the 1996/1997 year represent extreme values. Given that the impact of the tipping fee reduction and the changes in the collection methods have probably already been felt, it is unlikely that the per capita generation rate will go much higher or that more trash will enter the garbage stream. Additionally, the constraints placed on the permitted recyclers by the closure of the cogeneration plants make it unlikely that the permitted processors will be able to divert any more construction and demolition debris and trash away from the Authority. On the contrary, it is more likely that the current conditions related to the disposal of recovered wood will create a shake-out among the recyclers resulting in greater quantities of construction and demolition debris flowing to the Authority.

The results of the current year warrant an increase in the assumed Class 1 generation rate and a decrease in the Class 3 generation rate. The Class 1 generation rate is increased from 4.80 to 4.90 p.p.d. under the assumption that the material that has returned to the County will remain in the County and that the population associated with the development in the Acreage will be accounted for in the population estimates for the next several years. The Class 3 generation rate is decreased from 1.70 p.p.d. to 1.50 p.p.d., reflecting the downward trend in the delivery of this material and the potential for some of this material to return.

The model can be programmed to incorporate changing per capita generation rates using an average annual growth/reduction rate. Historically, the per capita generation of solid waste in this country has increased at the rate of 3% to 4% per year throughout the 1960s and 1970s, largely due to the increased use of packaging materials and disposable products. This increase has slowed considerably as a result of increased awareness and concern for recycling and reuse of solid waste as well as improved markets for recovered materials. The Environmental Protection Agency projects stable per capita waste generation rates through 2000 (Characterization of Municipal Solid Waste in the United States: 1994 Update, pp.146-147, Tables 46 & 47) and the Authority has implemented a source reduction program to educate the public and attempt to reduce the generation of solid waste. In light of the above factors, the model assumes that per capita waste generation rates will remain stable in the future.

It must be noted that the per capita waste generation rates used in the model are not comparable to or derivative of the residential generation rates used for Annual Special Assessment purposes. The residential rates used for the Special Assessment incorporate only residential generation, whereas the rates used herein include both the residential and commercial solid waste impact as a function of permanent population. Additionally, these generation rates include only the waste the Authority receives and do not include materials delivered to permitted recyclers or shipped out of the county. It is assumed that the material not coming to the Authority's system will continue to be diverted from the system. To the extent that this assumption is incorrect, the estimated landfill life will be shorter than that predicted by the model.

Given the fact that the Authority performs an annual review of waste generation and consumption data as part of the landfill depletion model update, any substantive change will be detected, its potential impact evaluated, and any planning revisions made long before the disposal capacity of the landfill is significantly impacted.

2.3 Waste Disposal

Class 1 material is assumed to be delivered to the plant unless the plant is at capacity, in which case it is delivered to the Class 1 landfill as raw garbage. Class 3 material is assumed to be delivered to the Class 3 landfill. Currently considerable quantities of Class 3 material are commingled at the transfer stations and delivered to the Resource Recovery Facility. Approximately 97,000 tons of trash and vegetation were delivered to the plant by the transfer stations in 1996/1997. With projected growth in the waste stream and processing constraints at the plant, this diversion of Class 3 material will not be operationally feasible in the future, justifying the assumption used in the model. The model incorporates an adjustment factor for the years 1998 to 2001 to account for the delivery of Class 3 material to the plant. Based upon an estimated 97,000 tons of Class 3 material delivered to the plant in 1996/1997 and the estimated increase in the Class 1 waste stream of approximately 20,000 tons per year, the adjustment has been set at 77,000 tons in 1998 and decreases by 20,000 tons per year to 0 tons in 2002.

2.4 Unforeseen Event

The waste generation rates used in the model do not include an allowance for increased depletion resulting from a hurricane or other natural disaster. Additionally, the model assumes that the Resource Recovery Facility will be operating without any extended outages other than scheduled maintenance and minor outages. To the extent that these assumptions do not hold true, the estimated landfill life will be shorter than that predicted by the model.

2.5 Recycling Rate

The total annual generation of Class 1 and Class 3 material is adjusted to account for recycling and waste reduction activities. During FY 1996-1997, 131,644 tons of recyclables were delivered to Authority facilities (*WIMS 047C*). Subtracting 13,978 tons of Martin and St. Lucie County materials and dividing this tonnage by the sum of the total Class 1 generation and the recycling tonnage of 921,219 tons produces an average reduction rate of 13%, which is equal to the rate for the prior year. Given the assumption of increased participation and the potential for the addition of a portion of the mixed paper stream in approximately five years, a recycling rate of 15% of Class 1 material is assumed in the model.

During the year, the Authority received 19,551 tons of clean fill from various sources, amounting to 8% of total incoming Class 3 material (net of vegetation) of 252,149 tons. The rates for the previous three years were 8% in 1993/1994, and 12% in 1994/1995, and 7% in 1995/1996. Although the majority of this material is designated as limited use material and is not suitable for construction or use outside of the landfill, it is suitable for landfill cover and has been diverted for that purpose. Restrictions imposed by the Authority to control the delivery of this material resulted in a decline in clean fill deliveries in 1995/1996 and the level seems to have stabilized at or around the current level. For this reason, an 8% reduction rate is assumed to account for diverted fill material.

With picking on the Class 3 working face, additional recovered materials amounted to 4,849 tons of wood, road material, and tires. The net Class 3 material delivered to the landfill after the diversion of clean fill totaled 164,567 tons. Therefore, material recovered from the landfill through the waste reduction system and picking operations amounted to 3% of the remaining waste stream, compared to 5% the prior year. The reduction in the quantity of recovered materials was the result of the decision to cease operation of the Class 3 Reduction System. This system was eliminated because of the diversion of most of the suitable material to private building debris recyclers and the subsequently reduced waste stream. A 3% reduction rate is assumed to account for recovered materials other than incoming fill material separated on the landfill working face.

2.6 Compacted Densities

Incoming solid waste tonnage is converted to consumed landfill volume by multiplying by the average compacted density. Although industry standards do exist, in reality landfill compacted densities vary widely based on the type of material landfilled and the operating procedures employed. Because the Authority landfills primarily ash and process residue from an RDF Resource Recovery Facility in the Class 1 landfill and diverts all clean vegetation and operates a recycling operation on the Class 3 landfill, the accuracy of industry averages cannot be relied upon for Authority system planning purposes.

The Authority avoids some uncertainty in estimating the compacted densities by conducting an annual survey using GPS technology to determine the volume of landfill space consumed. The landfill is surveyed at least annually and the calculated waste volume for the prior year is subtracted from that for the present year to determine the volume depleted during the year. Using Authority waste tonnage data, the average landfill compacted density for the year and life-to-date is calculated. These densities are used to arrive at the density assumptions used in the model.

Solid Waste Authority of Palm Beach County
North County Landfill Depletion Summary

Class 1

	1992/1993	1993/1994	1994/1995	1995/1996	1996/1997 (1)
Direct Haul	4,744	10,781	13,791	12,001	23,249
Transfer	24,605	43,085	12,165	9,011	38,590
Non-Processible	22,161	25,834	12,630	209	60
Residue	163,304	209,799	194,575	216,584	221,235
Uncombusted RDF	0	0	1,685	0	0
Ash	121,839	138,484	136,887	138,081	116,106
Total Tonnage to Landfill Disposal	**336,653**	**427,983**	**371,733**	**375,886**	**399,240**
Cubic Yards Depleted	**291,615**	**491,445**	**423,000**	**285,000**	**464,936**
Estimated Average Density	**2,309**	**1,742**	**1,758**	**2,638**	**1,717**

Class 3

	1992/1993	1993/1994	1994/1995	1995/1996	1996/1997
Direct haul	214,854	207,363	202,935	199,613	143,311
Transfer	25,298	15,508	30,277	33,689	40,807
Total Tonnage	240,152	222,871	233,212	233,302	184,118
Transfer Out Tires	781	1,969	1,448	1,461	158
Recovered Fill	14,817	28,179	37,100	23,750	19,551
Recovered Road Material/Concrete	2,402	3,561	0	0	1,984
Recovered Ferrous and White Goods	3,098	0	2,707	2,572	0
Fuel to Okeelanta or Wheelabrator	1,874	17,334	0	0	0
Cardboard	0	0	0	0	58
Net Transfer to Reduction Program	0	0	20,423	0	0
Vegetation/Mulch	499	4,739	0	4,499	2,707
Total Recovered Material	23,471	55,782	61,678	32,282	24,458
Total Tonnage to Landfill Disposal	**216,681**	**167,089**	**171,534**	**201,020**	**159,660**
Cubic Yards Depleted	**241,677**	**318,571**	**264,000**	**172,000**	**420,541**
Estimated Average Density	**1,793**	**1,049**	**1,300**	**2,337**	**759**

Lifetime

	Class 1	Class 3
Tons Disposed Through 11/11/91	735,890	537,637
Less October 1991	22,374	20,127
Less 11 Days of November	8,529	5,211
Tons Disposed Through 9/30/91	704,987	512,299
Tons Disposed 10/01/91 - 9/30/92	320,385	268,449
Tons Disposed 10/01/92 - 9/30/93	336,653	216,681
Tons Disposed 10/01/93 - 9/30/94	427,983	167,089
Tons Disposed 10/01/94 - 9/30/95	371,733	171,534
Tons Disposed 10/01/95 - 9/30/96	375,886	201,020
Tons Disposed 10/01/96 - 9/30/97	399,240	159,660
Total Tonnage to Landfill Disposal Through 9/30/97	**2,936,866**	**1,696,732**
Cubic Yards Depleted at 10/10/93	1,743,555	1,569,429
Estimated Average Density to 10/10/93	1,562	1,271
Cubic Yards Depleted at 10/18/94	2,235,000	1,888,000
Estimated Average Density to 10/18/94	1,602	1,234
Cubic Yards Depleted at 11/26/95	2,658,000	2,152,000
Estimated Average Density to 11/26/95	1,627	1,242
Cubic Yards Depleted at 11/21/96	2,943,000	2,324,000
Estimated Average Density to 11/21/96	1,725	1,323
Cubic Yards Depleted at 9/30/97 (1)	3,349,000	2,690,000
Estimated Average Density to 9/30/97	1,754	1,262

(1) Yardage Pro-Rated for density calculation to account for timing differences.

As can be seen on the previous page, the average density over the life of the landfill is 1,754 pounds per cubic yard in the Class 1 landfill and 1,262 pounds per cubic yard in the Class 3 landfill. The annual average density varies from one year to the next. In order to eliminate extreme fluctuations, the life to date average is used. The 1995/1996 estimated compacted densities were considerably higher than usual at 2,638 pounds per cubic yard in the Class 1 and 2,337 pounds per cubic yard in the Class 3 landfill. Although the reason for the extreme values is unknown, there are several possible reasons, including settlement and measurement errors. The Authority has endeavored to decrease the measurement error through the use of GPS technology in the place of aerial topography.

The results for the current year seem to validate the existence of measurement error in the previous survey, particularly with respect to the Class 3 landfill. The average density for 1996/1997 is calculated at 759 pounds per cubic yard versus 2,337 for 1995/1996, indicating an underestimate of the prior year consumption estimate and an overestimate of the current year consumption. The average density of the Class 1 landfill for 1996/1997 is estimated at 1,717 pounds per cubic yard versus 2,638 in the previous year.

For this revision of the model, the assumed densities in the model are increased to the life-to-date averages of 1,750 pounds per cubic yard and 1,260 pounds per cubic yard versus the previously assumed 1,620 pounds per cubic yard and 1,240 pounds per cubic yard for the Class 1 and Class 3 landfills, respectively.

The model calculates the Class 1 volume depleted by applying the above compacted density to plant residues, which amounted to 85% of landfilled Class 1 material in FY 1996-1997, and the estimated density of raw garbage of 1,200 pounds per cubic yard to the estimated quantity of landfilled raw garbage, and summing the two. The Class 3 volume is calculated by multiplying the estimated compacted density by the pounds of landfilled solid waste.

Although some uncertainty does exist, the use of GPS survey data represents a substantial improvement in the Authority's ability to determine the landfill volume remaining and to predict landfill longevity. Additionally, the use of survey data has become an integral part of the Authority's annual reporting efforts as a means to determine the level of landfill closure financial responsibility funding requirements and to determine dredge fill production.

2.7 Cover Material

Because of the availability of incinerator ash and the nature of the operations, the Authority's daily cover requirements are minimal. Intermediate and final cover consuming landfill volume is assumed to be 15% of the waste volume. This is the same assumption used in the previous model.

2.8 Available Landfill

The available landfill volumes have been calculated using CAD analysis. The total estimated landfill volume is 42,191,321 cubic yards. Through September 30, 1997, 3,349,000 cubic yards of Class 1 volume and 2,690,000 cubic yards of Class 3 volume have been depleted.

Traditionally, the Authority has used two landfill depletion scenarios, referred to as the "Maximize Class 1" and the "Balanced Footprint" scenarios. The "Maximize Class 1" scenario consists of 229.89 acres and 29,015,684 cubic yards of Class 1 space and 104.39 acres and 13,175,637 cubic yards of Class 3 space with the boundary at N888,400. This approach was used when the ***Comprehensive Solid Waste Management Plan*** called for a separate Class 3 landfill operating concurrently with the North County site. The goal of this approach is to maximize Class 1 volume within permit limitations. The "Balanced Footprint" scenario consists of 167.14 acres and 21,095,661 cubic yards of both Class 1 and Class 3 space with the boundary at N888,170. The goal of this approach is to roughly balance the life of the site. Because of differing Class 1 and Class 3 volumes, the life of the site is not actually balanced, although the volume is.

With the change in planning strategy from operating two sites concurrently to operating consecutive sites, the Authority has added a third scenario called the "Balanced Life" scenario. This approach leaves the boundary between the Class 1 and Class 3 landfill somewhat fluid, with the exact position to be determined at a later date in an effort to balance the life of the site and to eliminate the need to operate two sites concurrently and the considerable expense associated with that.

The landfill depletion model provides results for all three scenarios and can be programmed to evaluate other potential scenarios if necessary.

2.9 Resource Recovery Facility (NCRRRF)

The NCRRRF's rated capacity is 624,000 tons per year, however the plant has surpassed 800,000 tons of processible waste for the past two years. Processible waste processed at the NCRRRF in FY 1996/1997 totaled 830,176 tons, compared to 812,528 tons in 1995/1996, 792,932 tons in 1994/1995, 771,550 tons in 1993/1994, and 726,842 tons in 1992/1993. Due to the fact that periodic extended outages for routine maintenance can be expected and that these outages will most likely increase in frequency as the plant ages, long term production at the level achieved over the past few years is not assumed. For this reason, the previous model projected average annual processible waste to be 730,000 tons, with waste in excess of 730,000 tons landfilled as raw garbage.

Given that additional increases in throughput at the plant in its current configuration cannot be expected, the plant capacity assumption remains at 730,000 tons of processible waste, which includes an allowance for 10% downtime over the life of the facility. For the purpose of the model, it is assumed that the plant will not experience a catastrophic failure that will hinder its ability to process an average of 730,000 tons per year.

The residuals from the plant include ash, process residue, and unprocessibles. Unprocessibles are estimated at 3% of total delivered waste in the present model, which is in line with recent experience (3.0% in 1992/1993, 3.2% in 1993/1994, 3.1% in 1994/1995, 2.9% in 1995/1996, and 3.4% in 1996/1997). Ash and residue are estimated at 40% of processible waste. Process residue and ash totaled, 39.2% in 1992/1993, 45.1% in 1993/1994, 41.8% in 1994/1995, 43.7% in 1995/1996, and 40.6% in 1996/1997. The Operating and Maintenance Agreement with the plant operator requires a minimum 60% reduction over the life of the contract. The high residue rates in recent years are largely the result of the high throughput. Because of the contractual agreement and the lower estimated throughput in the model, the 40% residuals percentage is justifiable.

As the addition of a third boiler to the Resource Recovery Facility is an option, the model includes a scenario for the addition of a third boiler to the resource recovery facility, adding an additional 1,000 tons per day (312,000 tons per year) of processible capacity. The boiler is assumed to be online in the year 2002. Addition of the boiler prior to this is of little marginal benefit, and sufficient waste quantities are not expected to be available to fuel it.

3.0 Model Results

3.1 Summary of Results

The summary results of the landfill depletion model for the three space allocation scenarios and the two Resource Recovery Facility scenarios are presented below in Table 3.1 and in the following paragraphs. The landfill depletion model results are included in Appendix A of the Report for further inspection.

In the "Maximize Class 1" scenario, the estimated landfill depletion dates for the Class 1 and Class 3 landfills are 2027 and 2016, respectively, compared to 2027 and 2015 in the 1996 model.

In the "Balanced Footprint" scenario, the estimated landfill depletion dates for the Class 1 and Class landfills are 2021 and 2027, respectively, compared to 2021 and 2025 in the prior model.

If the life of the site is balanced to produce simultaneous depletion of both landfills, final depletion is expected to take place in 2023, unchanged from the previous model. The volume allocation associated with the "Balanced Life" scenario is approximately 57% Class 1 and 43% Class 3 landfill volume.
Finally, constructing a third boiler at the Resource Recovery Facility is anticipated to add approximately four years to the life of the site on a balanced basis, placing the ultimate depletion in the year 2028. The volume allocation associated with the "Balanced Life" scenario and the third boiler is approximately 48% Class 1 and 52% Class 3.

Table 3.1 Landfill Depletion Using Present Configuration

Scenario	Class 1	Class 3
Maximize Class 1	2027 (230 AC)	2016 (104 AC)
Balanced Footprint	2021 (167 AC)	2027 (167 AC)
Balanced Landfill Life	2023 (191 AC)	2023 (143 AC)
Third Boiler Results		
Maximize Class 1	2042 (230 AC)	2016 (104 AC)
Balanced Footprint	2029 (167 AC)	2027 (167 AC)
Balanced Landfill Life	2028 (160 AC)	2028 (174 AC)

3.2 Sensitivity Analysis - Three States of Nature

The above results are based upon a set of assumptions that represents a reasonable best guess. As with any model, these assumptions are based upon current circumstances and information. Some assumptions will inevitably vary; therefore, the actual results will deviate from the projections. In order to ascertain the potential magnitude of these deviations, the model has been run using "Most Likely", "Optimistic", and "Pessimistic" assumption sets.

The Optimistic assumption set uses waste generation rates 5% lower than the Most Likely assumption set, or 4.66 and 1.43 p.p.d. for Class 1 material and Class 3 material, respectively. Additional assumptions are a Class 1 recycling rate of 18%, a Class 3 recycling rate of 5%, a Class 3 compacted density of 1,600 pounds per cubic yard (the 1991-1992 rounded value) and a plant residue compacted density of 1,800 pounds per cubic yard (the 1994-1995 rounded value).

The Pessimistic assumption set uses a Class 1 waste generation rate of 5.15 p.p.d., which is 5% higher than the Most Likely assumption. The Class 3 waste generation rate is 1.80 p.p.d. to account for the possibility that a significant quantity of material currently managed by private recyclers returns to the system. Additional assumptions include a Class 1 recycling rate of 12%, a Class 3 recycling rate of 1%, a Class 3 compacted density of 1,000 pounds per cubic yard (the 1993-1994 rounded value), and a plant residue compacted density of 1,500 pounds per cubic yard.

The results of the sensitivity analysis are presented on Page 17. The analysis indicates that based on the current configuration, the landfills can be reasonably expected to be fully depleted at a time ranging from 2017 to 2029. Assuming addition of a third boiler at the NCRRRF and using the current landfill configuration, the landfills can be reasonably expected to be depleted during the time period ranging from 2020 to 2035.

This exercise was undertaken to demonstrate how the estimate can vary given the realization of extreme values of the

key assumptions. On a balanced life basis, the earliest predicted depletion date is 2017, which is seven years beyond the life of the bonds issued to finance the SWA facilities. Given an estimated ten year lead time to site, permit, and construct a replacement landfill, the earliest a decision regarding the development of future capacity must be made is approximately 2007. If a 3rd boiler is constructed at the NCRRRF the earliest a decision is required is approximately 2010.

4.0 Summary and Conclusions

The landfill depletion model is designed to forecast the estimated life of the Authority's North County landfills in order to facilitate facilities planning decisions and assess the impact of alternatives and alternative states of nature on landfill life. The model was last updated in February 1997 and was based on 1995/1996 operating data and existing assumptions. Given current information and expectations of future events, the ***1998 Landfill Depletion Model*** predicts the estimated life of the North County landfills as follows:

Current Configuration Depletion Year	2023
Current Configuration Remaining Life in Years	26
Current Configuration w/ 3rd Boiler Depletion Year	2028
Current Configuration w/3rd Boiler Remaining Life	31
Acreage	334.28 Acres
Landfill Capacity Available	42,191,321 Cubic Yards
Landfill Capacity Remaining	36,152,321 Cubic Yards
Projected Volume Class 1 (57%)	24,049,053 Cubic Yards
Projected Volume Class 3 (43%)	18,142,268 Cubic Yards
Projected Volume Class 1 w/ 3rd Boiler (48%)	20,251,834 Cubic Yards
Projected Volume Class 3 w/ 3rd Boiler (52%)	21,939,487 Cubic Yards

The above estimate is based on a reasonable Most Likely set of assumptions. As with any forecast, the result is subject to uncertainty. To assess the potential magnitude of this uncertainty, three sets of assumptions or States of Nature were evaluated: "Most Likely", "Optimistic", and "Pessimistic". Based on these states of nature, the predicted balanced North County Landfill depletion date ranges from 2017 to 2029, given two boilers at the NCRRRF, or 2020 to 2035, given the addition of a 3rd boiler at the NCRRRF in 2002.

In order to ensure the availability of landfill capacity and taking into consideration current reasonable average lead times, the Authority must make a decision regarding the development and/or availability of future landfill disposal capacity as early as 2007 under pessimistic circumstances and most likely in 2013 given the current configuration or in 2018 if the 3rd boiler option is elected.

This model is scheduled to be updated in the Spring of 1999 and may me updated sooner should conditions warrant.

Landfill Depletion Model Scenario Summary Report

Scenario Summary	Most Likely	Optimistic	Pessimistic
Changing Cells:			
Class_1_Generation Rate	4.90	4.66	5.15
Class_3_Generation Rate	1.50	1.43	1.80
Class 1 Recycling Rate	15%	18%	12%
Class 3 Recycling Rate	3%	5%	1%
Trash Density in Pounds per CY	1,260	1,600	1,000
Garbage Density in Pounds per CY	1,200	1,200	1,200
Plant Residuals Density in Pounds per CY	1,750	1,800	1,500
Result Cells:			
Class 1 Depletion - Maximize Class 1	2027	2033	2023
Class 3 Depletion - Maximize Class 1	2016	2022	2011
[illegible]			
Class 1 Depletion with 3rd Boiler	2042	2049	2031
Class 3 Depletion with 3rd Boiler	2016	2021	2010
[illegible]			

Note: The model assumes zero population growth beyond 2020, which is consistent with Palm Beach County's assumption that the BEBR medium population projection for 2020 approximates the Palm Beach County build-out population. Potential prediction error increases as projected depletion extends beyond 2020.

Appendix A

Landfill Depletion Model Output

Palm Beach County

Landfill Depletion Model Summary Results

		Maximixe Class 1	Balanced Footprint
Total Estimated Volume		42,191,321	42,191,321
Class 1		29,015,684	21,095,661
Class 3		13,175,637	21,095,661
Volume Depleted to Date			
Class 1		3,349,000	3,349,000
Class 3		2,690,000	2,690,000
Total		6,039,000	6,039,000
Additional Volume			
			0
			0
			0
			0
		0	0
Class 1 Allocation	0.00%	0	0
Class 3 Allocation	0.00%	0	0
Estimated Acreage			
Class 1		229.89	167.14
Class 3		104.39	167.14
Total		334.28	334.28
Volume Remaining			
Class 1		25,666,684	17,746,661
Class 3		10,485,637	18,405,661
Total		36,152,321	36,152,321
Estimated Depletion			
Class 1		**2027**	**2021**
Class 3		**2016**	**2027**
Balanced Life		**2023**	**2023**
Class 1 w/ Third Boiler in the Year 2002		**2042**	**2029**
Class 3 w/ Third Boiler in the Year 2002		**2016**	**2027**
Balanced Life w/ Third Boiler in the Year 2002		**2028**	**2028**

Assumptions

	Class 1	Class 3
Per Capita Generation Rate	4.90	1.50
Fill as a % of Class 3 Generation	na	8%
Recycling Rate	15%	3%
Cover Material as a Percent of Landfill Volume	15%	15%
Raw Waste Density in Pounds per Cubic Yard	1,200	1,260
Plant Residue Density in Pounds per Cubic Yard	1,750	na

Solid Waste Authority of Palm Beach County

Estimated Population and Solid Waste Generation

Table 1

	Palm Beach County Permanent Population	Daily Per Capita Trash Generation	Annual Per Capita Trash Generation	Annual Estimated Trash Generation	Daily Per Capita Garbage Generation	Annual Per Capita Garbage Generation	Annual Estimated Garbage Generation	Daily Per Capita MSW Generation	Annual Per Capita MSW Generation	Annual Estimated MSW Generation
	(1)	lbs	lbs	tons	lbs	lbs	tons	lbs	lbs	tons
1998	1,023,496	1.50	548	280,182	4.9	1,789	915,261	6.40	2,336	1,195,443
1999	1,043,698	1.50	548	285,712	4.9	1,789	933,327	6.40	2,336	1,219,040
2000	1,064,300	1.50	548	291,352	4.9	1,789	951,750	6.40	2,336	1,243,102
2001	1,083,551	1.50	548	296,622	4.9	1,789	968,965	6.40	2,336	1,265,587
2002	1,103,150	1.50	548	301,987	4.9	1,789	986,492	6.40	2,336	1,288,479
2003	1,123,104	1.50	548	307,450	4.9	1,789	1,004,335	6.40	2,336	1,311,785
2004	1,143,418	1.50	548	313,011	4.9	1,789	1,022,502	6.40	2,336	1,335,512
2005	1,164,100	1.50	548	318,672	4.9	1,789	1,040,996	6.40	2,336	1,359,669
2006	1,183,090	1.50	548	323,871	4.9	1,789	1,057,978	6.40	2,336	1,381,849
2007	1,202,390	1.50	548	329,154	4.9	1,789	1,075,237	6.40	2,336	1,404,392
2008	1,222,005	1.50	548	334,524	4.9	1,789	1,092,778	6.40	2,336	1,427,302
2009	1,241,940	1.50	548	339,981	4.9	1,789	1,110,605	6.40	2,336	1,450,586
2010	1,262,200	1.50	548	345,527	4.9	1,789	1,128,722	6.40	2,336	1,474,250
2011	1,281,519	1.50	548	350,816	4.9	1,789	1,145,999	6.40	2,336	1,496,815
2012	1,301,135	1.50	548	356,186	4.9	1,789	1,163,540	6.40	2,336	1,519,725
2013	1,321,050	1.50	548	361,637	4.9	1,789	1,181,349	6.40	2,336	1,542,986
2014	1,341,270	1.50	548	367,173	4.9	1,789	1,199,431	6.40	2,336	1,566,604
2015	1,361,800	1.50	548	372,793	4.9	1,789	1,217,790	6.40	2,336	1,590,582
2016	1,381,294	1.50	548	378,129	4.9	1,789	1,235,222	6.40	2,336	1,613,351
2017	1,401,067	1.50	548	383,542	4.9	1,789	1,252,904	6.40	2,336	1,636,446
2018	1,421,123	1.50	548	389,032	4.9	1,789	1,270,839	6.40	2,336	1,659,871
2019	1,441,466	1.50	548	394,601	4.9	1,789	1,289,031	6.40	2,336	1,683,632
2020	1,462,100	1.50	548	400,250	4.9	1,789	1,307,483	6.40	2,336	1,707,733
2021	1,462,100	1.50	548	400,250	4.9	1,789	1,307,483	6.40	2,336	1,707,733
2022	1,462,100	1.50	548	400,250	4.9	1,789	1,307,483	6.40	2,336	1,707,733
2023	1,462,100	1.50	548	400,250	4.9	1,789	1,307,483	6.40	2,336	1,707,733
2024	1,462,100	1.50	548	400,250	4.9	1,789	1,307,483	6.40	2,336	1,707,733
2025	1,462,100	1.50	548	400,250	4.9	1,789	1,307,483	6.40	2,336	1,707,733
2026	1,462,100	1.50	548	400,250	4.9	1,789	1,307,483	6.40	2,336	1,707,733
2027	1,462,100	1.50	548	400,250	4.9	1,789	1,307,483	6.40	2,336	1,707,733
Annual Growth Rate to 2020	1.63%	0.00%	0.00%	1.63%	0.00%	0.00%	1.63%	0.00%	0.00%	1.63%

Sources and Notes:

(1) Bureau of Business and Economic Research, University of Florida, Florida Population Studies; As summarized in Table 1A.

(2) Per capita generation rates include commercial generation and thus are not related to the residential household generation rates used in the Assessment Billing Program.

(3) Waste quantity includes only waste received at SWA facilities.

Palm Beach County
Estimated Permanent Population Growth
Table 1A

Year Ended September	Palm Beach County Estimated Permanent Population
1994	937,190
1995	962,802
1996	981,793
1997	1,003,684
1998	1,023,496
1999	1,043,698
2000	1,064,300
2001	1,083,551
2002	1,103,150
2003	1,123,104
2004	1,143,418
2005	1,164,100
2006	1,183,090
2007	1,202,390
2008	1,222,005
2009	1,241,940
2010	1,262,200
2011	1,281,519
2012	1,301,135
2013	1,321,050
2014	1,341,270
2015	1,361,800
2016	1,381,294
2017	1,401,067
2018	1,421,123
2019	1,441,466
2020	1,462,100
2021	1,462,100
2022	1,462,100
2023	1,462,100
2024	1,462,100
2025	1,462,100

BEBR Estimated Permanent Population	
1994	937,190
1995	962,802
1996	981,793
1997	1,003,684
2000	1,064,300
2005	1,164,100
2010	1,262,200
2015	1,361,800
2020	1,462,100

Calculated Population Growth Rates	
1994-1997	2.28%
1997-2000	1.95%
2000-2005	1.79%
2005-2010	1.62%
2010-2015	1.52%
2015-2020	1.42%
1997-2020	1.64%

(1) Population estimates from Bureau of Economic and Business Research, Florida Population Studies, Bulletin No. 117, February 1997.

(2) Population estimates calculated as follows (for 1998):

P2/P1 = e^(nr)

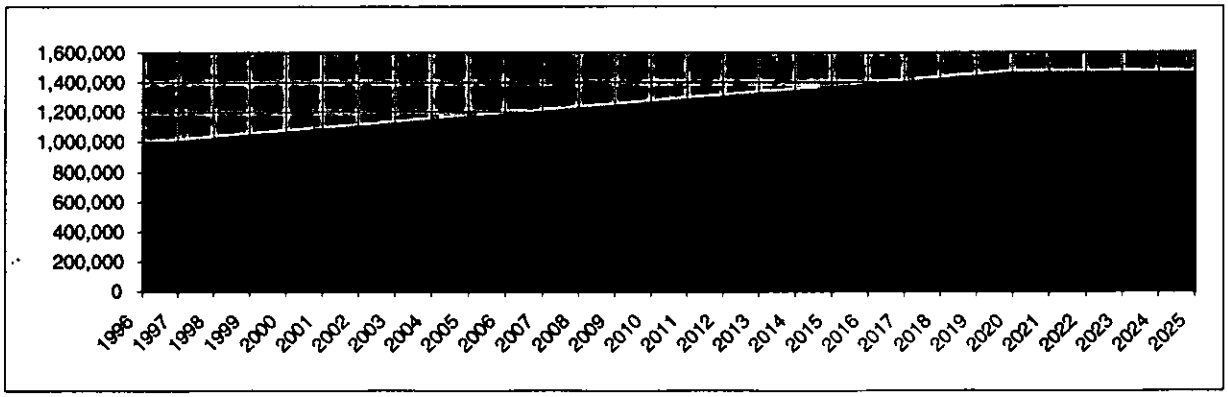
P2 = P1e^(nr)

P2 = 1003684e^(1(.0195467))

P2 = 1003684(1.019738988)

P2 = 1023495

(3) Build-out population equals 2020 estimate (Palm Beach County PZ&B).



Solid Waste Authority of Palm Beach County

Estimated Class 1 Landfill Depletion

Table 2

	Palm Beach County Garbage Generation Tons Per Year	Palm Beach County Garbage Generation Less Recycling	Plant Unprocessibles to Landfill	Plant Overcapacity and Direct Landfill	Plant Process Residue, Ash, and RDF to Landfill	Landfill Volume Consumed In Cubic Yards	Landfill Volume Consumed Including Cover	Landfill Volume Remaining 229.89 Acres N 888,400	Landfill Volume Remaining 167.14 Acres N 888,170
Total Estimated Volume to +160 NGVD								**29,015,684**	**21,095,661**
Volume Depleted Through Fiscal Year 1996/1997								**3,349,000**	**3,349,000**
Remaining Volume								**25,666,684**	**17,746,661**
1998	915,261	854,972	0	102,395	292,000	504,372	580,028	25,086,656	17,166,633
1999	933,327	850,328	0	97,751	292,000	496,632	571,127	24,515,529	16,595,505
2000	951,750	845,988	0	93,410	292,000	489,398	562,808	23,952,721	16,032,697
2001	968,965	840,621	0	88,043	292,000	480,453	552,521	23,400,200	15,480,176
2002	986,492	838,518	0	85,941	292,000	476,949	548,491	22,851,709	14,931,685
2003	1,004,335	853,685	0	101,108	292,000	502,227	577,561	22,274,147	14,354,124
2004	1,022,502	869,126	0	116,549	292,000	527,963	607,157	21,666,990	13,746,967
2005	1,040,996	884,847	0	132,270	292,000	554,164	637,288	21,029,702	13,109,679
2006	1,057,978	899,282	0	146,704	292,000	578,222	664,955	20,364,747	12,444,724
2007	1,075,237	913,952	0	161,375	292,000	602,672	693,073	19,671,675	11,751,651
2008	1,092,778	928,861	0	176,284	292,000	627,521	721,649	18,950,025	11,030,002
2009	1,110,605	944,014	0	191,437	292,000	652,776	750,692	18,199,334	10,279,310
2010	1,128,722	959,414	0	206,837	292,000	678,442	780,208	17,419,125	9,499,102
2011	1,145,999	974,099	0	221,522	292,000	702,917	808,355	16,610,771	8,690,747
2012	1,163,540	989,009	0	236,431	292,000	727,767	836,932	15,773,839	7,853,816
2013	1,181,349	1,004,147	0	251,569	292,000	752,996	865,946	14,907,893	6,987,870
2014	1,199,431	1,019,516	0	266,939	292,000	778,613	895,404	14,012,489	6,092,465
2015	1,217,790	1,035,121	0	282,544	292,000	804,621	925,314	13,087,175	5,167,151
2016	1,235,222	1,049,939	0	297,361	292,000	829,317	953,714	12,133,461	4,213,437
2017	1,252,904	1,064,968	0	312,391	292,000	854,366	982,521	11,150,940	3,230,916
2018	1,270,839	1,080,213	0	327,636	292,000	879,774	1,011,740	10,139,200	2,219,176
2019	1,289,031	1,095,676	0	343,099	292,000	905,546	1,041,377	9,097,822	1,177,799
2020	1,307,483	1,111,360	0	358,783	292,000	931,686	1,071,439	8,026,383	106,360
2021	1,307,483	1,111,360	0	358,783	292,000	931,686	1,071,439	6,954,944	(965,080)
2022	1,307,483	1,111,360	0	358,783	292,000	931,686	1,071,439	5,883,505	(2,036,519)
2023	1,307,483	1,111,360	0	358,783	292,000	931,686	1,071,439	4,812,065	(3,107,958)
2024	1,307,483	1,111,360	0	358,783	292,000	931,686	1,071,439	3,740,626	(4,179,397)
2025	1,307,483	1,111,360	0	358,783	292,000	931,686	1,071,439	2,669,187	(5,250,836)
2026	1,307,483	1,111,360	0	358,783	292,000	931,686	1,071,439	1,597,748	(6,322,275)
2027	1,307,483	1,111,360	0	358,783	292,000	931,686	1,071,439	526,309	(7,393,715)

Assumptions:

MSW Growth Rate	**1.63%**
Recycling Rate (Net of Ferrous)	**15.00%**
Recycling Growth Rate	**0.00%**
Cover Material	**15.00%**
Raw Garbage Density In Lbs per Cubic Yard	**1,200**
Process Residue Density In Lbs per Cubic Yard	**1,750**
Daily Average Plant Throughput	**2,000**
Plant Capacity (Processible Tons)	**730,000**
Process Residue, Ash, and RDF to Landfill	**40.00%**
Unprocessibles to Landfill (Percent of Delivered)	**3.00%**
Percent of Unprocessibles to Class 1	**0.00%**

Depletion Dates	**229.89 Acres**	**2027**
	167.14 Acres	**2021**
	Balanced Life	**2023**

Note: Net Class 1 adjusted upward 1998-2001 to reflect incinerated Class 3 material, starting with 77,000 tons in 1998.

Solid Waste Authority
Estimated Class 1 Landfill Depletion
Third Boiler at NCRRRF
Table 2A

	Palm Beach County Garbage Generation Tons Per Year	Palm Beach County Garbage Generation Less Recycling	Plant Unprocessibles to Landfill	Plant Overcapacity and Direct Landfill	Plant Process Residue, Ash, and RDF to Landfill	Landfill Volume Consumed In Cubic Yards	Landfill Volume Consumed Including Cover	Landfill Volume Remaining 229.89 Acres N 888,400	Landfill Volume Remaining 167.14 Acres N 888,170
Total Estimated Volume to +160 NGVD								**29,015,684**	**21,095,661**
Volume Depleted Through Fiscal Year 1995/1996								**3,349,000**	**3,349,000**
Remaining Volume								**25,666,684**	**17,746,661**
1998	915,261	854,972	0	102,395	292,000	504,372	580,028	25,086,656	17,166,633
1999	933,327	850,328	0	97,751	292,000	496,632	571,127	24,515,529	16,595,505
2000	951,750	845,988	0	93,410	292,000	489,398	562,808	23,952,721	16,032,697
2001	968,965	840,621	0	88,043	292,000	480,453	552,521	23,400,200	15,480,176
2002	986,492	838,518	0	0	335,407	383,323	440,821	22,959,379	15,039,356
2003	1,004,335	853,685	0	0	341,474	390,256	448,794	22,510,584	14,590,561
2004	1,022,502	869,126	0	0	347,651	397,315	456,912	22,053,672	14,133,649
2005	1,040,996	884,847	0	0	353,939	404,501	465,177	21,588,496	13,668,472
2006	1,057,978	899,282	0	0	359,713	411,100	472,765	21,115,730	13,195,707
2007	1,075,237	913,952	0	0	365,581	417,807	480,478	20,635,253	12,715,229
2008	1,092,778	928,861	0	0	371,545	424,622	488,316	20,146,937	12,226,914
2009	1,110,605	944,014	0	0	377,606	431,549	496,282	19,650,655	11,730,632
2010	1,128,722	959,414	0	0	383,766	438,589	504,378	19,146,278	11,226,254
2011	1,145,999	974,099	0	0	389,640	445,302	512,098	18,634,180	10,714,157
2012	1,163,540	989,009	0	0	395,603	452,118	519,936	18,114,244	10,194,221
2013	1,181,349	1,004,147	0	0	401,659	459,038	527,894	17,586,350	9,666,326
2014	1,199,431	1,019,516	0	0	407,807	466,065	535,974	17,050,376	9,130,352
2015	1,217,790	1,035,121	0	0	414,048	473,198	544,178	16,506,198	8,586,174
2016	1,235,222	1,049,939	0	0	419,975	479,972	551,968	15,954,230	8,034,206
2017	1,252,904	1,064,968	0	0	425,987	486,843	559,869	15,394,361	7,474,337
2018	1,270,839	1,080,213	0	5,986	416,800	486,320	559,268	14,835,093	6,915,069
2019	1,289,031	1,095,676	0	21,449	416,800	512,092	588,906	14,246,187	6,326,164
2020	1,307,483	1,111,360	0	37,134	416,800	538,232	618,967	13,627,220	5,707,197
2021	1,307,483	1,111,360	0	37,134	416,800	538,232	618,967	13,008,253	5,088,229
2022	1,307,483	1,111,360	0	37,134	416,800	538,232	618,967	12,389,286	4,469,262
2023	1,307,483	1,111,360	0	37,134	416,800	538,232	618,967	11,770,318	3,850,295
2024	1,307,483	1,111,360	0	37,134	416,800	538,232	618,967	11,151,351	3,231,328
2025	1,307,483	1,111,360	0	37,134	416,800	538,232	618,967	10,532,384	2,612,361
2026	1,307,483	1,111,360	0	37,134	416,800	538,232	618,967	9,913,417	1,993,394
2027	1,307,483	1,111,360	0	37,134	416,800	538,232	618,967	9,294,450	1,374,426

Assumptions:

MSW Growth Rate	**1.63%**
Recycling Rate (Net of Ferrous)	**15.00%**
Recycling Growth Rate	**0.00%**
Cover Material	**15.00%**
Raw Garbage Density In Lbs per Cubic Yard	**1,200**
Process Residue Density In Lbs per Cubic Yard	**1,750**
Daily Average Plant Throughput	**2,000**
Plant Capacity (Processible Tons)	**730,000**
Process Residue, Ash, and RDF to Landfill	**40.00%**
Unprocessibles to Landfill (Percent of Delivered)	**3.00%**
Add Third Boiler In Year	**2002**
New Plant Capacity	**1,042,000**
Percent of Unprocessibles to Class 1	**0.00%**

Depletion Dates		
	229.89 Acres	**2042**
	167.14 Acres	**2029**
	Balanced Life	**2028**

Note: Net Class 1 adjusted upward 1998-2001 to reflect incinerated Class 3 material, starting with 77,000 tons in 1998.

Solid Waste Authority of Palm Beach County

Estimated Class 3 Landfill Depletion

Table 3

	Palm Beach County Trash Generation Tons Per Year	Palm Beach County Fill Generation Tons Per Year	Solid Waste Authority Class 3 Reduction	Palm Beach County Trash Generation Net of Reduction	Plant Unprocessibles to Landfill	Palm Beach County Class 3 Landfill Disposal	Landfill Volume Consumed In Cubic Yards	Landfill Volume Consumed Including Cover	Landfill Volume Remaining 104.39 Acres N 888,400	Landfill Volume Remaining 167.14 Acres N 888,170
Total Estimated Volume to +160 NGVD									**13,175,637**	**21,095,661**
Volume Depleted Through Fiscal Year 1996/1997									**2,690,000**	**2,690,000**
Remaining Volume									**10,485,637**	**18,405,661**
1998	280,182	22,415	7,733	173,034	22,577	195,612	310,495	357,069	10,128,568	18,048,592
1999	285,712	22,857	7,886	197,970	22,577	220,547	350,075	402,586	9,725,982	17,646,006
2000	291,352	23,308	8,041	223,003	22,577	245,580	389,809	448,281	9,277,701	17,197,725
2001	296,622	23,730	8,187	247,706	22,577	270,283	429,020	493,373	8,784,328	16,704,351
2002	301,987	24,159	8,335	269,493	22,577	292,071	463,604	533,145	8,251,183	16,171,206
2003	307,450	24,596	8,486	274,368	22,577	296,945	471,342	542,043	7,709,140	15,629,163
2004	313,011	25,041	8,639	279,331	22,577	301,908	479,219	551,102	7,158,038	15,078,061
2005	318,672	25,494	8,795	284,383	22,577	306,961	487,239	560,325	6,597,713	14,517,736
2006	323,871	25,910	8,939	289,022	22,577	311,600	494,603	568,793	6,028,920	13,948,943
2007	329,154	26,332	9,085	293,737	22,577	316,315	502,087	577,400	5,451,520	13,371,543
2008	334,524	26,762	9,233	298,529	22,577	321,106	509,693	586,147	4,865,373	12,785,397
2009	339,981	27,198	9,383	303,399	22,577	325,976	517,423	595,036	4,270,337	12,190,360
2010	345,527	27,642	9,537	308,349	22,577	330,926	525,279	604,071	3,666,266	11,586,289
2011	350,816	28,065	9,683	313,068	22,577	335,645	532,771	612,686	3,053,580	10,973,603
2012	356,186	28,495	9,831	317,860	22,577	340,437	540,377	621,433	2,432,147	10,352,170
2013	361,637	28,931	9,981	322,725	22,577	345,303	548,099	630,314	1,801,832	9,721,856
2014	367,173	29,374	10,134	327,665	22,577	350,242	555,940	639,331	1,162,501	9,082,525
2015	372,793	29,823	10,289	332,680	22,577	355,258	563,901	648,486	514,015	8,434,038
2016	378,129	30,250	10,436	337,442	22,577	360,020	571,460	657,179	(143,164)	7,776,859
2017	383,542	30,683	10,586	342,273	22,577	364,850	579,127	665,996	(809,160)	7,110,863
2018	389,032	31,123	10,737	347,172	22,577	369,750	586,904	674,940	(1,484,100)	6,435,923
2019	394,601	31,568	10,891	352,142	22,577	374,719	594,793	684,012	(2,168,112)	5,751,911
2020	400,250	32,020	11,047	357,183	22,577	379,760	602,794	693,213	(2,861,325)	5,058,698
2021	400,250	32,020	11,047	357,183	22,577	379,760	602,794	693,213	(3,554,539)	4,365,485
2022	400,250	32,020	11,047	357,183	22,577	379,760	602,794	693,213	(4,247,752)	3,672,271
2023	400,250	32,020	11,047	357,183	22,577	379,760	602,794	693,213	(4,940,965)	2,979,058
2024	400,250	32,020	11,047	357,183	22,577	379,760	602,794	693,213	(5,634,178)	2,285,845
2025	400,250	32,020	11,047	357,183	22,577	379,760	602,794	693,213	(6,327,392)	1,592,632
2026	400,250	32,020	11,047	357,183	22,577	379,760	602,794	693,213	(7,020,605)	899,418
2027	400,250	32,020	11,047	357,183	22,577	379,760	602,794	693,213	(7,713,818)	206,205

Assumptions:

MSW Growth Rate	**1.63%**
Recycling/Reduction Rate	**3.00%**
Recycling Growth Rate	**0.00%**
Clean Fill Material Deliveries	**8.00%**
Cover Material	**15.00%**
Trash Density In Lbs per Cy	**1,260**
Percent of NCRRRF Unprocessibles to Class 3	**100.00%**

Depletion Dates		
	104.39 Acres	**2016**
	167.14 Acres	**2027**
	Balanced Life	**2023**

Note: Net Class 3 adjusted downward 1998-2001 to reflect incinerated Class 3 Material, starting with 77,000 tons in 1998.

Solid Waste Authority of Palm Beach County

Estimated Class 3 Landfill Depletion
Third Boiler at NCRRRF
Table 3A

	Palm Beach County Trash Generation Tons Per Year	Palm Beach County Fill Generation Tons Per Year	Solid Waste Authority Class 3 Reduction	Palm Beach County Trash Generation Net of Reduction	Plant Unprocessibles to Landfill	Palm Beach County Class 3 Landfill Disposal	Landfill Volume Consumed in Cubic Yards	Landfill Volume Consumed Including Cover	Landfill Volume Remaining 104.39 Acres N 888,400	Landfill Volume Remaining 167.14 Acres N 888,170
Total Estimated Volume to +160 NGVD									**13,175,637**	**21,095,661**
Volume Depleted Through Fiscal Year 1996/1997									**2,690,000**	**2,690,000**
Remaining Volume									**10,485,637**	**18,405,661**
1998	280,182	22,415	7,733	178,034	22,577	200,612	318,431	366,196	10,119,441	18,039,465
1999	285,712	22,857	7,886	202,970	22,577	225,547	358,011	411,713	9,707,728	17,627,752
2000	291,352	23,308	8,041	228,003	22,577	250,580	397,746	457,408	9,250,320	17,170,344
2001	296,622	23,730	8,187	252,706	22,577	275,283	436,957	502,500	8,747,820	16,667,843
2002	301,987	24,159	8,335	269,493	25,156	294,649	467,697	537,851	8,209,969	16,129,992
2003	307,450	24,596	8,486	274,368	25,611	299,979	476,156	547,580	7,662,389	15,582,412
2004	313,011	25,041	8,639	279,331	26,074	305,405	484,769	557,484	7,104,904	15,024,928
2005	318,672	25,494	8,795	284,383	26,545	310,929	493,538	567,568	6,537,336	14,457,359
2006	323,871	25,910	8,939	289,022	26,978	316,001	501,589	576,827	5,960,509	13,880,532
2007	329,154	26,332	9,085	293,737	27,419	321,156	509,771	586,237	5,374,272	13,294,295
2008	334,524	26,762	9,233	298,529	27,866	326,395	518,087	595,800	4,778,472	12,698,495
2009	339,981	27,198	9,383	303,399	28,320	331,720	526,539	605,520	4,172,952	12,092,975
2010	345,527	27,642	9,537	308,349	28,782	337,131	535,128	615,398	3,557,554	11,477,578
2011	350,816	28,065	9,683	313,068	29,223	342,291	543,319	624,817	2,932,737	10,852,760
2012	356,186	28,495	9,831	317,860	29,670	347,530	551,635	634,381	2,298,356	10,218,380
2013	361,637	28,931	9,981	322,725	30,124	352,850	560,079	644,091	1,654,266	9,574,289
2014	367,173	29,374	10,134	327,665	30,585	358,250	568,651	653,949	1,000,317	8,920,340
2015	372,793	29,823	10,289	332,680	31,054	363,734	577,355	663,959	336,358	8,256,381
2016	378,129	30,250	10,436	337,442	31,498	368,941	585,620	673,463	(337,105)	7,582,918
2017	383,542	30,683	10,586	342,273	31,949	374,222	594,003	683,104	(1,020,209)	6,899,815
2018	389,032	31,123	10,737	347,172	32,227	379,399	602,221	692,554	(1,712,763)	6,207,260
2019	394,601	31,568	10,891	352,142	32,227	384,369	610,109	701,626	(2,414,389)	5,505,634
2020	400,250	32,020	11,047	357,183	32,227	389,410	618,111	710,827	(3,125,216)	4,794,807
2021	400,250	32,020	11,047	357,183	32,227	389,410	618,111	710,827	(3,836,044)	4,083,980
2022	400,250	32,020	11,047	357,183	32,227	389,410	618,111	710,827	(4,546,871)	3,373,152
2023	400,250	32,020	11,047	357,183	32,227	389,410	618,111	710,827	(5,257,698)	2,662,325
2024	400,250	32,020	11,047	357,183	32,227	389,410	618,111	710,827	(5,968,526)	1,951,497
2025	400,250	32,020	11,047	357,183	32,227	389,410	618,111	710,827	(6,679,353)	1,240,670
2026	400,250	32,020	11,047	357,183	32,227	389,410	618,111	710,827	(7,390,181)	529,843
2027	400,250	32,020	11,047	357,183	32,227	389,410	618,111	710,827	(8,101,008)	(180,985)

Assumptions:

MSW Growth Rate	**1.63%**
Recycling/Reduction Rate	**3.00%**
Recycling Growth Rate	**0.00%**
Clean Fill Material Deliveries	**8.00%**
Cover Material	**15.00%**
Trash Density In Lbs per Cy	**1,260**
Percent of NCRRRF Unprocessibles to Class 3	**100.00%**

Note: Net Class 3 adjusted downward 1997-2000 to reflect incinerated Class 3 Material, starting with 72,000 tons in 1997.

Depletion Dates	
104.39 Acres	**2016**
167.14 Acres	**2027**
Balanced Life	**2028**

Solid Waste Authority
North County Landfill Depletion
Assuming Balanced Landfill Life
Table 4

	Class 1 Landfill Volume Depleted	Class 3 Landfill Volume Depleted	Total Landfill Volume Depleted	Cumulative Class 1 Volume Depleted	Cumulative Class 3 Volume Depleted	Cumulative Class 1 Percentage Volume	Cumulative Class 3 Percentage Volume	Landfill Volume Remaining
Total Estimated Volume to +160 NGVD								**42,191,321**
Volume Depleted Through Fiscal Year 1996/1997								**6,039,000**
Remaining Volume								**36,152,321**
1998	580,028	357,069	937,097	3,929,028	3,047,069	56.32%	43.68%	**35,215,224**
1999	571,127	402,586	973,713	4,500,155	3,449,655	56.61%	43.39%	**34,241,511**
2000	562,808	448,281	1,011,089	5,062,963	3,897,936	56.50%	43.50%	**33,230,422**
2001	552,521	493,373	1,045,894	5,615,484	4,391,309	56.12%	43.88%	**32,184,528**
2002	548,491	533,145	1,081,636	6,163,975	4,924,454	55.59%	44.41%	**31,102,891**
2003	577,561	542,043	1,119,604	6,741,537	5,466,497	55.22%	44.78%	**29,983,287**
2004	607,157	551,102	1,158,259	7,348,694	6,017,599	54.98%	45.02%	**28,825,028**
2005	637,288	560,325	1,197,613	7,985,982	6,577,924	54.83%	45.17%	**27,627,415**
2006	664,955	568,793	1,233,748	8,650,937	7,146,717	54.76%	45.24%	**26,393,667**
2007	693,073	577,400	1,270,472	9,344,009	7,724,117	54.75%	45.25%	**25,123,195**
2008	721,649	586,147	1,307,796	10,065,658	8,310,264	54.78%	45.22%	**23,815,399**
2009	750,692	595,036	1,345,728	10,816,350	8,905,300	54.85%	45.15%	**22,469,671**
2010	780,208	604,071	1,384,279	11,596,559	9,509,371	54.94%	45.06%	**21,085,391**
2011	808,355	612,686	1,421,041	12,404,913	10,122,057	55.07%	44.93%	**19,664,350**
2012	836,932	621,433	1,458,365	13,241,845	10,743,491	55.21%	44.79%	**18,205,986**
2013	865,946	630,314	1,496,260	14,107,791	11,373,805	55.36%	44.64%	**16,709,725**
2014	895,404	639,331	1,534,736	15,003,195	12,013,136	55.53%	44.47%	**15,174,990**
2015	925,314	648,486	1,573,800	15,928,509	12,661,622	55.71%	44.29%	**13,601,190**
2016	953,714	657,179	1,610,893	16,882,223	13,318,801	55.90%	44.10%	**11,990,297**
2017	982,521	665,996	1,648,517	17,864,744	13,984,797	56.09%	43.91%	**10,341,779**
2018	1,011,740	674,940	1,686,680	18,876,484	14,659,738	56.29%	43.71%	**8,655,099**
2019	1,041,377	684,012	1,725,389	19,917,862	15,343,749	56.49%	43.51%	**6,929,710**
2020	1,071,439	693,213	1,764,652	20,989,301	16,036,963	56.69%	43.31%	**5,165,058**
2021	1,071,439	693,213	1,764,652	22,060,740	16,730,176	56.87%	43.13%	**3,400,405**
2022	1,071,439	693,213	1,764,652	23,132,179	17,423,389	57.04%	42.96%	**1,635,753**
2023	1,071,439	693,213	1,764,652	24,203,618	18,116,602	57.19%	42.81%	**(128,900)**
2024	1,071,439	693,213	1,764,652	25,275,058	18,809,816	57.33%	42.67%	**(1,893,552)**
2025	1,071,439	693,213	1,764,652	26,346,497	19,503,029	57.46%	42.54%	**(3,658,205)**
2026	1,071,439	693,213	1,764,652	27,417,936	20,196,242	57.58%	42.42%	**(5,422,857)**
2027	1,071,439	693,213	1,764,652	28,489,375	20,889,455	57.70%	42.30%	**(7,187,509)**

Assumptions: **See Table 1, Table 2, and Table 3.**

Solid Waste Authority
North County Landfill Depletion
Assuming Balanced Landfill Life
Third Boiler at NCRRRF
Table 4A

	Class 1 Landfill Volume Depleted	Class 3 Landfill Volume Depleted	Total Landfill Volume Depleted	Cumulative Class 1 Volume Depleted	Cumulative Class 3 Volume Depleted	Cumulative Class 1 Percentage Volume	Cumulative Class 3 Percentage Volume	Landfill Volume Remaining
Total Estimated Volume to +160 NGVD								**42,191,321**
Volume Depleted Through Fiscal Year 1996/1997								**6,039,000**
Remaining Volume								**36,152,321**
1998	580,028	366,196	946,224	3,929,028	3,056,196	56.25%	43.75%	**35,206,097**
1999	571,127	411,713	982,840	4,500,155	3,467,909	56.48%	43.52%	**34,223,257**
2000	562,808	457,408	1,020,216	5,062,963	3,925,317	56.33%	43.67%	**33,203,041**
2001	552,521	502,500	1,055,021	5,615,484	4,427,817	55.91%	44.09%	**32,148,020**
2002	440,821	537,851	978,672	6,056,305	4,965,669	54.95%	45.05%	**31,169,347**
2003	448,794	547,580	996,374	6,505,099	5,513,248	54.13%	45.87%	**30,172,973**
2004	456,912	557,484	1,014,397	6,962,012	6,070,733	53.42%	46.58%	**29,158,576**
2005	465,177	567,568	1,032,745	7,427,188	6,638,301	52.80%	47.20%	**28,125,832**
2006	472,765	576,827	1,049,592	7,899,953	7,215,128	52.27%	47.73%	**27,076,239**
2007	480,478	586,237	1,066,714	8,380,431	7,801,365	51.79%	48.21%	**26,009,525**
2008	488,316	595,800	1,084,116	8,868,747	8,397,165	51.37%	48.63%	**24,925,409**
2009	496,282	605,520	1,101,801	9,365,028	9,002,685	50.99%	49.01%	**23,823,607**
2010	504,378	615,398	1,119,775	9,869,406	9,618,083	50.64%	49.36%	**22,703,832**
2011	512,098	624,817	1,136,915	10,381,504	10,242,900	50.34%	49.66%	**21,566,917**
2012	519,936	634,381	1,154,317	10,901,440	10,877,281	50.06%	49.94%	**20,412,601**
2013	527,894	644,091	1,171,985	11,429,334	11,521,371	49.80%	50.20%	**19,240,616**
2014	535,974	653,949	1,189,923	11,965,308	12,175,321	49.57%	50.43%	**18,050,692**
2015	544,178	663,959	1,208,137	12,509,486	12,839,279	49.35%	50.65%	**16,842,555**
2016	551,968	673,463	1,225,431	13,061,454	13,512,742	49.15%	50.85%	**15,617,125**
2017	559,869	683,104	1,242,973	13,621,323	14,195,846	48.97%	51.03%	**14,374,152**
2018	559,268	692,554	1,251,822	14,180,591	14,888,400	48.78%	51.22%	**13,122,330**
2019	588,906	701,626	1,290,531	14,769,497	15,590,026	48.65%	51.35%	**11,831,798**
2020	618,967	710,827	1,329,795	15,388,464	16,300,853	48.56%	51.44%	**10,502,004**
2021	618,967	710,827	1,329,795	16,007,431	17,011,681	48.48%	51.52%	**9,172,209**
2022	618,967	710,827	1,329,795	16,626,398	17,722,508	48.40%	51.60%	**7,842,415**
2023	618,967	710,827	1,329,795	17,245,365	18,433,336	48.34%	51.66%	**6,512,620**
2024	618,967	710,827	1,329,795	17,864,333	19,144,163	48.27%	51.73%	**5,182,825**
2025	618,967	710,827	1,329,795	18,483,300	19,854,990	48.21%	51.79%	**3,853,031**
2026	618,967	710,827	1,329,795	19,102,267	20,565,818	48.16%	51.84%	**2,523,236**
2027	618,967	710,827	1,329,795	19,721,234	21,276,645	48.10%	51.90%	**1,193,442**

Assumptions: **See Table 1, Table 2, and Table 3.**

Appendix B

Incoming Waste Tonnages
Ten Year History

Solid Waste Authority of Palm Beach County
Historical Solid Waste Tonnages
Adjusted for Revised Solid Waste Densities

85/86	Month	Animals	Reef	Asbestos	C/D	Residue	Tires	Sludge	Direct	Fill	Furn.	Garbage	LC	Pesticide	Special	Trailers	Mulch	Trash/Other	Vegetation	Total
	OCT	0.00	0 00	32.65	23,716.52	0.00	273.71	23.91	0.00	116.76	0.00	42,504 37	0 00	1.74	329.35	3 75	0.00	22,933.28	3,407.00	93,345.03
	NOV	0.00	0.00	12 24	23,075 80	0.00	473 52	0.00	0.00	141.25	0 00	41,433 41	0.00	12 88	43.04	0 00	0 00	24,610.05	2,415.65	92,217 84
	DEC	0 00	0.00	58 16	27,322.69	0.00	181.58	17.25	0 00	37.50	0 00	45,837.13	0 00	0 18	1,124 52	0 00	0 00	23,147.46	2,041 56	99,768 03
	JAN	0.00	0 00	25.28	26,489.35	0.00	143 27	36.89	0 00	228 75	0.00	48,896.31	0 00	15.15	273 62	4.52	0.00	30,082.72	1,862 85	106,058 71
	FEB	0 00	0.00	25.61	22,411.99	0.00	111.69	4.37	0.00	43.75	0.00	43,533 76	603 38	0.84	209 93	4.25	0.00	21,172.99	2,015.95	90,138 51
	MAR	0.00	0 00	14.89	19,738.94	0.00	108.36	3.22	0 00	63 64	0.00	49,707.50	3,421.84	47.39	360.65	4.30	0 00	20,162.28	2,022.01	95,655.02
	APR	0.00	0.00	25.56	22,019.13	0.00	124 56	4.42	0.00	90.00	0 00	45,560.25	10,059.82	0 66	333.27	0.45	0.00	23,828.78	2,510.97	104,557 87
	MAY	0.00	0.00	57.31	17,657.65	0.00	65 71	0.00	0.00	18.75	0.00	44,131.03	16,623.31	32 85	77.54	3.55	0.00	24,649 83	2,815 36	106,132.69
	JUN	0.00	0.00	21.24	21,010.29	0.00	182 23	4.69	0.00	360 00	0 00	44,881.97	17,375 65	2.36	3,727.63	1 00	0 00	25,140 90	3,172.81	115,880.96
	JUL	0.00	0.00	9 71	18,951.66	0.00	212 54	10.09	0.00	438.75	0.00	45,445 73	11,316.05	2.15	74 82	1.00	0.00	27,363.67	3,076.43	106,902 61
	AUG	0.00	0 00	23.17	19,685.82	0 00	373 49	8.93	0 00	195.00	0.00	42,704 94	12,186 03	18 05	63.36	7.70	0 00	23,020.79	2,809.52	101,074 80
	SEP	0.00	0 00	40.82	25,350 12	0 00	439 80	4.68	0 00	36 92	0 00	44,136 87	13,578 23	19 09	606.22	3 67	0 00	22,406 48	2,573.91	109,198 80
	Total	**0.00**	**0.00**	**346.66**	**267,409.86**	**0.00**	**2,690.44**	**116.55**	**0.00**	**1,773.06**	**0.00**	**536,776.27**	**97,164.31**	**161.34**	**7,223.95**	**34.19**	**0.00**	**288,519.24**	**30,724.02**	**1,222,931.09**
	Average	**0.00**	**0.00**	**28.89**	**22,284.16**	**0.00**	**224.20**	**9.88**	**0.00**	**147.76**	**0.00**	**44,731.27**	**7,263.69**	**12.61**	**602.00**	**2.85**	**0.00**	**24,043.27**	**2,560.34**	**101,910.92**
	Percent	**0.00%**	**0.00%**	**0.03%**	**21.87%**	**0.00%**	**0.22%**	**0.01%**	**0.00%**	**0.14%**	**0.00%**	**43.89%**	**7.13%**	**0.01%**	**0.59%**	**0.00%**	**0.00%**	**23.59%**	**2.51%**	**100.00%**

86/87	Month	Animals	Reef	Asbestos	C/D	Residue	Tires	Sludge	Direct	Fill	Furniture	Garbage	LC	Pesticide	Special	Trailers	Mulch	Trash/Other	Vegetation	Total
	OCT	0.00	0 00	28.36	33,776 62	0.00	393.77	0.00	0 00	48.75	0.00	45,630.96	16,590.42	4 58	290.22	2.30	0 00	18,833 42	2,699 80	118,299 22
	NOV	0.00	0.00	35 32	28,495.31	0.00	261.49	8.77	0 00	27.50	0 00	45,504 00	13,112.31	2 66	281.09	1 05	0 00	16,581 92	2,188 44	106,497 86
	DEC	0.00	0.00	62.87	31,451.67	0 00	413 85	44.54	0 00	57 32	0.00	55,055 42	11,845 30	1.27	269.71	8 33	0 00	16,425.12	2,097.92	117,733 31
	JAN	0.00	0 00	60 67	30,277.69	0 00	411.70	10.72	0 00	150 62	0 00	51,699 28	6,856 43	0.38	660 98	5.59	0 00	16,772.10	2,270.95	111,177.09
	FEB	0 00	0.00	100.20	29,516.31	0.00	1,078.77	7.71	0.00	85.25	0.00	47,977.67	9,284.64	1 68	117.89	2.50	0.00	18,070.80	2,079 80	108,323.02
	MAR	0.00	0 00	35.46	17,241.63	0.00	363 16	10.84	0 00	998 68	0 00	55,711 68	6,426.25	3.75	44 54	0 95	0 00	17,750.43	2,587.70	103,175 27
	APR	0.00	0 00	42.75	20,831.52	0.00	352 68	11.94	0 00	904.41	0.00	50,328 29	4,609.04	2.18	77.00	0 00	0 00	17,033.33	2,875 57	97,068 72
	MAY	0.00	0.00	77 52	23,435 69	0.00	305 62	0.00	0 00	322.29	0 00	48,960 85	4,957.82	12.12	3 63	3 90	0 00	16,032.65	2,521.97	98,634 27
	JUN	0 00	0.00	23.43	25,624 36	0.00	316 31	6 30	0 00	281.98	0 00	48,957 20	4,176.42	0 14	14.95	0 00	0 00	17,931.40	3,207.86	100,542 15
	JUL	0.00	0.00	33.14	24,345.24	0.00	300 39	0.00	0.00	208.12	0 00	49,564.90	3,889.55	10 04	39.45	1.25	0 00	17,884.48	3,288 51	99,565 06
	AUG	0.00	0.00	47.99	23,557.19	0.00	368.11	7.77	0.00	253.39	0.00	45,242.58	4,685.84	0 47	99.52	3.70	0.00	16,262.77	2,835.51	93,364.81
	SEP	0.00	0 00	96.14	22,685.71	0 00	434 22	3.51	0 00	288 68	0 00	48,129 41	4,062.24	8 01	286.98	0.00	0 00	18,587.31	2,980 59	97,762 80
	Total	**0.00**	**0.00**	**643.85**	**311,438.92**	**0.00**	**5,002.27**	**112.10**	**0.00**	**3,627.19**	**0.00**	**592,762.22**	**94,496.26**	**47.28**	**2,185.96**	**29.57**	**0.00**	**208,165.74**	**31,832.22**	**1,250,143.56**
	Average	**0.00**	**0.00**	**53.65**	**25,953.24**	**0.00**	**416.86**	**9.34**	**0.00**	**302.27**	**0.00**	**49,396.85**	**7,874.69**	**3.94**	**182.16**	**2.46**	**0.00**	**17,347.14**	**2,636.02**	**104,178.63**
	Percent	**0.00%**	**0.00%**	**0.05%**	**24.91%**	**0.00%**	**0.40%**	**0.01%**	**0.00%**	**0.29%**	**0.00%**	**47.42%**	**7.56%**	**0.00%**	**0.17%**	**0.00%**	**0.00%**	**16.65%**	**2.53%**	**100.00%**

SWA scale system output converts volume transactions to tonnage using assumed waste densities. Currently available information allows the retrieval of tonnage information on volume transactions. For 92/93 and on "actuals" are used. For prior years, assumed weights have been replaced with more accurate estimates based on reasonable and reliable density estimates. Animals not included due to inconsistent recording. Animal tonnage is insignificant.

97/98

Month	Animals	Reef	Asbestos	C/D	Residue	Tires	Sludge	Direct	Fill	Furniture	Garbage	LC	Pesticide	Special	Trailers	Mulch	Trash/Other	Vegetation	Total
OCT	0.00	0.00	210.76	23,142.80	0.00	203.09	7.83	0.00	307.66	0.00	50,146.73	3,761.04	0.55	216.55	0.00	0.00	18,797.22	3,223.35	100,016.39
NOV	0.00	0.00	211.56	21,964.85	0.00	75.86	3.62	0.00	899.60	0.00	50,279.05	3,089.62	0.24	162.25	0.00	0.00	17,028.29	2,546.12	96,231.30
DEC	0.00	0.00	215.23	22,948.80	0.00	93.09	9.50	0.00	318.23	0.00	53,532.36	2,812.24	3.67	1,052.80	1.62	0.00	16,727.68	1,980.80	99,677.01
JAN	0.00	0.00	45.98	20,303.32	0.00	162.03	36.04	0.00	224.83	0.00	52,228.10	4,137.48	0.74	83.03	1.12	0.00	17,945.73	1,270.15	96,437.34
FEB	0.00	0.00	71.86	19,236.14	0.00	205.13	14.48	0.00	929.91	0.00	53,829.24	3,425.54	0.80	940.59	0.00	0.00	17,840.77	1,274.36	97,768.82
MAR	0.00	0.00	124.40	24,563.60	0.00	136.00	8.63	0.00	940.87	0.00	58,845.36	3,345.92	0.55	19.45	7.24	0.00	16,832.27	1,554.55	106,380.83
APR	0.00	0.00	116.41	21,334.22	0.00	84.34	5.74	0.00	1,460.20	0.00	52,492.48	3,665.82	0.00	22.53	0.00	0.00	16,182.37	1,501.87	96,895.78
MAY	0.00	0.00	110.49	21,145.85	0.00	136.40	83.25	0.00	786.55	0.00	53,790.88	5,029.27	0.23	22.85	1.00	0.00	19,461.15	1,530.05	102,106.57
JUN	0.00	0.00	166.33	26,428.47	0.00	259.92	200.85	0.00	394.63	0.00	54,840.00	3,378.51	23.07	0.00	2.85	0.00	20,494.74	1,850.50	108,059.47
JUL	0.00	0.00	153.27	25,480.82	0.00	125.89	283.15	0.00	677.80	0.00	51,892.97	2,277.22	2.35	207.87	1.40	0.00	19,431.31	1,728.82	102,222.86
AUG	0.00	0.00	140.45	30,459.87	0.00	168.71	55.92	0.00	122.71	0.00	56,576.19	3,671.20	0.00	320.77	3.92	0.00	20,805.62	2,373.05	114,506.21
SEP	0.00	0.00	158.48	27,851.54	0.00	195.98	4.21	0.00	165.84	0.00	50,675.04	4,385.25	0.81	66.96	2.42	0.00	19,089.34	2,219.36	104,815.21
Total	0.00	0.00	1,745.24	284,830.84	0.00	1,848.44	672.22	0.00	7,228.65	0.00	639,227.20	42,978.11	33.01	3,115.45	21.37	0.00	224,476.48	23,032.78	1, 229,206.80
Average	0.00	0.00	145.44	23,736.80	0.00	154.04	56.02	0.00	602.39	0.00	53,268.93	3,581.51	2.75	259.62	1.78	0.00	18,706.37	1,919.40	102,434.15
Percent	0.00%	0.00%	0.14%	23.17%	0.00%	0.15%	0.05%	0.00%	0.59%	0.00%	52.00%	3.50%	0.00%	0.25%	0.00%	0.00%	18.26%	1.87%	100.00%

98/99

Month	Animals	Reef	Asbestos	C/D	Residue	Tires	Sludge	Direct	Fill	Furniture	Garbage	LC	Pesticide	Special	Trailers	Mulch	Trash/Other	Vegetation	Total
OCT	0.00	0.00	87.69	26,161.30	0.00	148.86	3.96	0.00	160.12	0.00	52,270.66	3,934.38	3.99	51.09	7.27	0.00	19,745.70	2,979.17	105,804.20
NOV	0.00	0.00	115.50	20,594.23	0.00	65.51	3.21	0.00	134.98	0.00	55,707.52	4,166.16	2.84	6.56	3.65	0.00	20,423.35	2,816.71	104,042.22
DEC	0.00	0.00	22.82	19,791.84	0.00	59.12	36.39	0.00	78.28	0.00	57,471.56	4,655.35	1.51	54.53	2.25	0.00	20,760.60	3,043.60	105,977.87
JAN	0.00	0.00	36.53	18,400.88	0.00	221.87	4.54	0.00	196.23	0.00	60,790.77	4,118.88	2.24	73.82	2.75	0.00	21,503.73	2,531.37	107,883.60
FEB	0.00	0.00	10.38	16,629.32	0.00	155.11	0.00	0.00	401.14	0.00	54,998.22	6,719.66	2.12	1.90	0.00	0.00	21,566.86	2,437.62	103,242.34
MAR	0.00	0.00	18.99	18,682.59	0.00	150.81	0.00	0.00	389.27	0.00	63,944.25	7,583.63	20.20	28.09	2.80	0.00	26,236.49	2,993.14	120,050.26
APR	0.00	0.00	21.40	19,336.78	0.00	120.56	20.54	0.00	579.52	0.00	57,997.92	4,766.47	5.33	7.79	2.12	0.00	23,904.27	3,076.20	109,862.89
MAY	0.00	0.00	27.21	17,633.23	0.00	57.52	4.79	0.00	959.36	0.00	62,303.88	5,934.25	6.65	0.16	0.00	0.00	27,354.77	3,292.16	117,573.97
JUN	0.00	0.00	7.74	16,336.71	0.00	59.44	232.67	0.00	1,156.07	0.00	58,867.27	6,022.51	0.94	14.66	0.00	0.00	26,288.47	3,557.21	114,545.90
JUL	0.00	0.00	0.00	19,422.48	0.00	104.99	421.12	0.00	870.20	0.00	58,348.08	3,449.17	0.94	3,900.13	0.00	0.00	24,201.07	3,230.77	111,849.95
AUG	0.00	0.00	44.01	22,220.62	0.00	126.50	391.36	0.00	802.56	0.00	58,738.55	3,791.56	1.16	8.65	3.65	0.00	27,373.20	3,348.82	116,852.85
SEP	0.00	0.00	54.98	17,290.95	0.00	123.76	123.09	0.00	816.26	0.00	53,969.32	2,401.99	0.28	21.99	1.20	0.00	27,657.25	3,247.14	105,706.20
Total	0.00	0.00	447.23	234,524.89	0.00	1,396.05	1,241.88	0.00	8,543.98	0.00	683,409.02	57,567.89	48.22	3,899.59	25.49	0.00	287,335.77	36,553.91	1, 322,994.25
Average	0.00	0.00	37.27	19,543.74	0.00	116.34	103.48	0.00	545.33	0.00	57,784.08	4,797.33	4.02	324.97	2.14	0.00	23,944.65	3,046.16	110,249.52
Percent	0.00%	0.00%	0.03%	17.73%	0.00%	0.11%	0.09%	0.00%	0.49%	0.00%	52.41%	4.35%	0.00%	0.29%	0.00%	0.00%	21.72%	2.76%	100.00%

99/00

Month	Animals	Reef	Asbestos	C/D	Residue	Tires	Sludge	Direct	Fill	Furniture	Garbage	LC	Pesticide	Special	Trailers	Mulch	Trash/Other	Vegetation	Total
OCT	0.00	0.00	34.55	15,313.72	0.00	66.78	9.28	0.00	478.88	0.00	56,519.68	2,248.03	0.71	2.55	2.00	0.00	24,348.28	2,919.45	101,943.68
NOV	0.00	0.00	6.85	14,758.80	0.00	188.91	9.31	0.00	498.72	0.00	57,318.34	1,997.30	0.01	0.00	0.00	0.00	22,957.82	2,555.82	100,291.68
DEC	0.00	0.00	13.63	13,037.13	0.00	190.40	2.62	0.00	455.70	0.00	56,819.71	1,835.76	0.80	23.66	0.00	0.00	20,140.62	807.94	93,127.97
JAN	0.00	0.00	63.78	11,003.99	0.00	334.94	5.72	0.00	544.56	0.00	66,580.11	1,929.79	0.00	5.82	3.14	0.00	25,278.96	2,658.09	111,386.91
FEB	0.00	0.00	107.26	11,903.85	0.00	132.15	5.32	0.00	332.27	0.00	45,456.98	2,467.67	1.82	364.42	1.50	0.00	23,693.25	2,406.02	86,874.51
MAR	0.00	0.00	121.91	14,178.32	0.00	117.73	13.22	0.00	223.16	0.00	61,876.36	2,280.23	1.15	96.84	5.67	0.00	24,046.59	2,418.85	105,380.24
APR	0.00	0.00	70.06	8,975.36	0.00	143.65	92.00	0.00	283.16	0.00	59,283.07	1,999.96	1.57	28.23	1.25	0.00	21,566.82	2,035.72	94,480.87
MAY	0.00	175.80	95.69	9,895.40	0.00	184.30	1.01	0.00	329.16	0.00	59,631.02	1,758.35	0.06	3.36	8.61	0.00	23,251.28	1,920.19	97,052.27
JUN	0.00	726.91	53.07	9,083.53	0.00	92.51	6.20	0.00	750.67	0.00	58,762.99	2,060.84	0.17	52.03	8.21	0.00	23,143.72	1,720.30	94,463.15
JUL	0.00	219.05	37.98	9,191.74	0.00	237.13	3.03	0.00	406.45	0.00	56,961.91	2,328.84	0.00	9.94	0.00	0.00	24,150.09	1,915.79	95,461.94
AUG	0.00	0.00	77.17	8,980.82	0.00	339.17	8.47	0.00	356.32	0.00	57,663.01	1,715.79	0.13	14.82	7.28	0.00	26,692.09	1,814.19	97,649.26
SEP	0.00	14.29	61.25	7,838.11	0.00	151.46	51.45	0.00	348.85	0.00	51,194.57	1,042.39	0.00	118.67	5.12	0.00	20,909.52	1,805.17	83,340.87
Total	0.00	1,136.05	743.20	133,940.77	0.00	2,179.15	207.63	0.00	5,007.84	0.00	685,847.77	23,884.95	6.42	720.36	40.98	0.00	283,177.01	24,779.33	1,1 61,453.58
Average	0.00	94.84	61.93	11,161.73	0.00	181.60	17.30	0.00	417.33	0.00	57,153.98	1,972.08	0.54	60.03	3.42	0.00	23,598.08	2,064.94	96,787.80
Percent	0.00%	0.10%	0.06%	11.53%	0.00%	0.19%	0.02%	0.00%	0.43%	0.00%	59.05%	2.04%	0.00%	0.06%	0.00%	0.00%	24.38%	2.13%	100.00%

90/91

Month	Animals	Reef	Asbestos	C/D	Residue	Tires	Sludge	Direct	Fill	Furniture	Garbage	LC	Pesticide	Special	Trailers	Mulch	Trash/Other	Vegetation	Total
OCT	0.00	81.97	47.00	15,023.85	0.00	155.57	2,944.28	2.79	2,282.29	23.19	60,219.29	2,636.54	0.82	97.73	0.00	0.00	16,930.47	2,367.97	102,815.55
NOV	0.00	152.42	112.59	12,342.72	0.00	123.36	2,921.79	333.82	914.45	20.37	56,903.50	1,195.99	0.54	0.96	1.30	0.00	13,911.55	1,876.25	90,811.81
DEC	0.00	551.38	88.92	8,354.20	0.00	106.59	3,487.84	18.00	615.22	34.28	58,938.83	1,833.42	1.44	22.60	4.11	0.00	12,264.96	1,548.83	87,870.64
JAN	0.00	162.13	31.28	9,378.26	0.00	197.17	3,678.14	405.14	819.44	28.88	65,854.11	1,284.45	2.29	27.50	7.10	0.00	14,351.88	1,743.10	97,768.87
FEB	0.00	110.51	50.75	10,874.66	0.00	173.16	3,591.33	501.01	650.82	19.63	57,626.91	1,519.55	0.89	43.23	0.00	0.00	12,742.73	1,741.77	89,646.95
MAR	0.00	99.10	120.63	11,729.20	0.00	170.90	19.29	523.50	730.80	18.10	61,303.55	2,064.84	0.51	15.54	2.40	0.00	14,078.85	2,060.76	92,937.77
APR	0.00	38.37	24.84	10,741.84	0.00	173.16	6,368.85	264.17	480.14	24.89	53,033.24	2,393.04	0.22	6.46	0.00	0.00	14,569.79	2,130.92	100,249.97
MAY	0.00	18.62	10.70	10,753.04	0.00	513.74	4,164.68	217.91	780.23	25.62	59,583.95	2,370.90	0.25	7.88	0.00	0.00	14,371.58	2,330.98	95,130.05
JUN	0.00	49.02	55.42	10,355.46	0.00	975.99	3,713.10	85.43	780.24	24.41	52,543.94	748.90	0.07	19.30	0.00	0.00	13,240.29	2,428.46	85,000.03
JUL	0.00	17.41	75.77	10,986.06	0.00	275.30	2,332.06	858.40	344.48	17.92	57,463.19	1,312.80	107.00	8.70	0.00	0.00	15,364.84	2,501.05	91,683.00
AUG	0.00	6.31	160.56	9,707.51	0.00	1,365.18	2,732.13	894.21	463.60	8.14	53,990.34	2,419.23	0.13	7.33	0.00	1,612.39	13,291.99	2,852.12	89,421.16
SEP	0.00	12.34	69.50	8,912.47	0.00	236.89	3,607.27	269.53	551.36	14.34	52,055.03	8,429.70	0.70	20.06	0.00	2,294.24	12,662.70	2,907.03	93,043.18
Total	0.00	1,298.58	848.16	130,248.25	0.00	4,467.03	39,558.98	4,373.91	9,193.07	258.77	596,515.88	28,211.16	114.66	275.11	14.91	3,906.63	167,801 .44	26,289.22	1,116,378.78
Average	0.00	108.30	70.68	10,854.10	0.00	372.25	3,296.58	364.49	766.09	21.65	58,292.99	2,350.93	9.56	22.93	1.24	325.55	13,983.45	2,190.77	93,031.56
Percent	0.00%	0.12%	0.08%	11.67%	0.00%	0.40%	3.54%	0.39%	0.82%	0.02%	62.66%	2.53%	0.01%	0.02%	0.00%	0.35%	15.03%	2.35%	100.00%

91/92

Month	Animals	Reef	Asbestos	C/D	Residue	Tires	Sludge	Direct	Fill	Furniture	Garbage	LC	Pesticide	Special	Trailers	Mulch	Trash/Other	Vegetation	Total
OCT	0.00	97.97	60.44	14,291.72	0.00	368.07	5,853.25	126.68	633.89	11.74	59,194.73	5,611.94	0.33	13.20	8.08	3,360.38	17,724.19	3,038.66	110,195.28
NOV	0.00	50.14	31.27	11,422.61	0.00	203.73	5,882.20	348.30	402.53	5.14	55,735.10	3,220.66	0.46	4.19	0.00	585.82	15,615.25	2,392.27	95,899.67
DEC	0.00	125.20	207.95	10,238.59	0.00	305.73	4,821.20	93.66	302.03	4.28	61,957.35	1,891.35	0.49	777.78	0.00	39.12	14,068.06	2,606.02	97,239.00
JAN	0.00	74.80	247.83	10,700.41	0.00	203.96	6,149.55	700.52	556.79	9.76	61,899.91	3,128.39	1.33	42.50	0.00	49.29	15,507.89	2,327.81	101,598.74
FEB	0.00	47.65	50.30	9,091.28	0.00	261.68	5,901.09	907.57	819.70	8.08	57,714.58	4,371.96	0.57	16.10	6.92	116.04	14,135.61	1,964.27	95,413.40
MAR	0.00	99.03	88.50	8,953.63	0.00	329.54	5,885.62	787.74	517.68	5.45	62,950.66	1,891.59	1.07	15.87	0.00	140.89	14,994.37	2,391.42	98,852.64
APR	0.00	172.15	61.54	9,295.16	0.00	342.67	5,403.70	663.97	481.84	3.65	59,248.00	1,754.76	2.12	12.23	0.00	843.81	14,924.16	2,388.89	95,578.65
MAY	0.00	600.29	77.67	8,078.46	0.00	333.76	6,094.18	565.52	598.91	4.21	53,686.53	1,533.65	0.46	8.81	0.00	827.11	14,408.37	2,337.98	89,356.09
JUN	0.00	25.81	86.78	8,445.59	0.00	534.43	3,918.78	877.36	1,154.30	5.59	58,559.67	1,040.53	5.71	21.28	0.00	1,177.30	16,462.16	2,717.83	95,052.91
JUL	0.00	127.42	105.47	10,180.89	0.00	426.52	3,572.38	638.21	816.48	4.36	53,841.19	1,533.45	0.00	29.84	4.94	1,120.77	17,079.69	2,597.87	91,879.48
AUG	0.00	25.72	30.74	9,716.42	0.00	438.89	3,357.42	631.90	682.15	15.04	53,688.20	1,336.96	0.17	17.20	0.00	963.06	14,844.67	3,157.92	88,926.48
SEP	0.00	148.34	43.33	9,364.14	0.00	506.17	4,205.66	562.92	783.66	4.54	54,287.71	1,312.58	1.45	40.36	5.49	613.00	16,212.91	3,982.62	92,054.87
Total	0.00	1,794.52	1,082.02	119,778.89	0.00	4,255.15	60,645.01	6,904.55	7,548.95	81.84	692,783.63	28,425.82	14.18	998.36	25.43	9,856.39	185,997 .33	31,883.36	1,152,047.42
Average	0.00	148.54	91.00	9,981.57	0.00	354.60	5,053.75	575.38	629.16	6.82	57,730.30	2,368.82	1.18	83.28	2.12	821.37	15,499.78	2,655.28	96,003.95
Percent	0.00%	0.16%	0.09%	10.40%	0.00%	0.37%	5.26%	0.60%	0.66%	0.01%	60.13%	2.47%	0.00%	0.09%	0.00%	0.86%	16.14%	2.77%	100.00%

92/93

Month	Animals	Reef	Asbestos	C/D	Residue	Tires	Sludge	Direct	Fill	Furniture	Garbage	LC	Pesticide	Special	Trailers	Mulch	Trash/Other	Vegetation	Total
OCT	0.00	77.35	14.38	10,903.42	0.00	355.68	3,533.10	321.79	376.56	3.01	52,221.19	901.66	0.12	4.19	8.19	220.34	13,869.03	5,002.03	87,812.04
NOV	0.00	360.79	27.92	8,825.62	0.00	394.90	2,549.39	428.23	302.53	1.50	55,468.68	561.06	0.45	21.22	0.00	2,157.91	11,487.47	3,756.22	86,343.89
DEC	0.00	331.07	27.28	9,499.07	0.00	552.32	5,181.17	310.89	444.92	14.05	58,058.68	2,300.00	1.21	19.42	0.00	5,062.61	13,145.16	3,909.95	98,858.20
JAN	0.00	173.61	40.13	9,114.27	0.00	434.67	6,400.60	186.23	341.62	6.81	60,202.58	1,050.70	0.71	41.92	3.63	4,579.96	12,551.50	4,215.28	99,346.22
FEB	0.00	14.40	23.15	9,584.71	0.00	478.89	5,723.80	152.05	617.92	2.32	54,269.58	735.62	0.70	0.54	53.51	3,976.35	12,382.16	4,007.23	92,022.93
MAR	0.00	75.86	110.47	8,841.61	0.00	530.04	6,273.66	121.46	491.57	7.54	66,710.54	2,392.36	0.98	336.72	0.00	7,070.72	16,666.14	8,198.21	118,027.70
APR	0.00	34.12	76.43	8,944.01	0.00	383.12	5,183.91	79.52	56.96	9.32	60,680.25	2,131.30	1.27	63.35	11.05	5,985.82	16,724.81	6,605.81	107,981.07
MAY	0.00	227.65	42.26	9,593.94	0.00	486.49	4,864.85	78.87	0.00	3.83	54,408.59	1,060.04	0.35	34.43	0.00	4,944.42	14,048.62	5,107.11	94,701.45
JUN	0.00	564.37	5.13	9,468.19	0.00	709.25	2,861.06	123.27	0.00	5.47	56,938.35	478.75	0.00	0.86	2.47	4,029.72	17,305.44	5,757.86	98,270.21
JUL	0.00	0.00	22.51	8,472.31	0.00	495.89	2,498.41	83.05	0.00	11.07	53,867.84	546.89	0.00	6.05	0.00	3,854.97	15,397.63	4,623.59	89,881.01
AUG	0.00	0.00	14.73	9,564.47	0.00	480.30	2,210.00	73.47	0.00	6.02	55,685.09	1,060.26	0.00	10.20	2.14	3,433.70	16,182.33	6,013.31	94,736.02
SEP	0.00	0.00	19.50	9,200.25	0.00	1,969.37	1,642.74	125.07	0.00	8.33	54,527.79	1,013.15	0.00	100.88	14.12	4,910.03	15,750.49	6,438.13	95,719.85
Total	0.00	1,858.04	423.89	113,031.87	0.00	7,370.72	48,733.71	2,083.90	2,632.19	81.27	683,039.36	14,231.78	5.78	639.78	95.11	50,226.75	175,710.7 8	63,634.73	1,163,700.59
Average	0.00	154.92	35.32	9,419.32	0.00	605.89	4,061.14	173.66	219.34	6.77	56,919.95	1,185.98	0.48	53.32	7.93	4,185.56	14,642.57	5,302.88	96,975.05
Percent	0.00%	0.16%	0.04%	9.71%	0.00%	0.62%	4.19%	0.18%	0.23%	0.01%	58.70%	1.22%	0.00%	0.05%	0.01%	4.32%	15.10%	5.47%	100.00%

93/94

Month	Animals	Reef	Asbestos	C/D	Residue	Tires	Sludge	Direct	Fill	Furniture	Garbage	LC	Pesticide	Special	Trailers	Mulch	Trash/Other	Vegetation	Total
OCT	0.00	0.00	15.93	10,898.23	0.00	346.29	2,527.73	326.80	0.00	7.53	57,951.42	921.08	0.00	0.00	0.00	36.45	13,920.78	5,952.24	92,904.28
NOV	0.00	0.00	9.15	9,295.81	0.00	236.24	2,049.64	259.26	0.00	4.24	62,386.65	947.14	1.04	26.25	4.38	126.35	13,600.95	5,691.64	94,640.96
DEC	0.00	0.00	7.92	8,534.30	0.00	318.63	3,862.78	214.95	0.00	12.35	63,047.82	535.88	0.00	5.46	2.63	36.00	13,519.71	5,135.75	95,232.18
JAN	0.00	0.00	0.35	8,276.81	0.00	236.84	3,665.13	98.45	2.50	7.75	65,347.52	1,754.17	0.00	1.90	0.00	105.57	14,138.58	5,471.68	97,105.25
FEB	0.00	0.00	2.00	8,307.13	0.00	253.80	3,298.75	141.71	4.59	5.88	62,027.92	1,343.54	0.00	5.35	0.00	48.83	12,715.75	5,618.47	91,771.72
MAR	0.00	0.00	2.80	9,042.00	0.00	284.63	4,961.57	270.71	0.00	7.69	67,724.24	1,384.55	0.00	15.64	12.20	104.71	17,727.87	7,680.00	109,221.61
APR	0.00	0.00	0.00	8,296.71	0.00	423.56	3,881.48	288.96	461.88	7.76	62,691.48	1,738.27	0.00	0.11	0.00	51.21	16,596.09	7,319.86	99,957.16
MAY	0.00	0.00	0.00	8,896.98	0.00	377.93	4,172.70	190.47	3,060.32	3.12	60,920.42	742.46	0.00	2.22	0.00	67.42	17,328.07	8,672.39	102,454.50
JUN	0.00	0.00	2.02	5,636.53	0.00	221.18	3,419.74	138.00	3,885.26	6.58	61,485.20	1,400.25	0.00	2.89	5.77	48.30	16,592.79	11,183.68	103,827.99
JUL	0.00	0.00	0.21	5,197.67	0.00	208.80	3,820.97	132.24	6,816.33	1.12	53,447.76	1,223.95	0.00	5.37	0.00	64.41	14,684.40	9,794.67	95,197.90
AUG	0.00	0.00	10.50	5,050.36	0.00	494.78	4,393.45	150.32	8,129.79	6.60	60,436.46	2,871.95	0.00	0.86	0.00	33.21	15,023.95	12,306.78	106,909.04
SEP	0.00	0.00	1.82	4,376.04	0.00	200.69	4,016.09	153.86	6,411.05	7.45	58,355.87	900.89	0.09	0.69	0.92	37.79	15,147.24	11,711.81	99,322.30
Total	0.00	0.00	52.70	83,808.56	0.00	3,601.35	44,068.01	2,363.55	26,391.64	78.07	734,024.58	15,764.13	1.13	69.76	25.90	760.25	180,996.18	96,539.17	1,188,544.89
Average	0.00	0.00	4.39	6,984.06	0.00	300.11	3,672.33	196.96	2,199.30	6.51	61,168.72	1,313.68	0.09	5.81	2.16	63.35	15,083.02	8,044.93	99,045.41
Percent	0.00%	0.00%	0.00%	7.05%	0.00%	0.30%	3.71%	0.20%	2.22%	0.01%	61.78%	1.33%	0.00%	0.01%	0.00%	0.06%	15.23%	8.12%	100.00%

94/95

Month	Animals	Reef	Asbestos	C/D	Residue	Tires	Sludge	Direct	Fill	Furniture	Garbage	LC	Pesticide	Special	Trailers	Mulch	Trash/Other	Vegetation	Total
OCT	0.00	0.00	0.00	5,613.06	0.00	202.61	4,639.19	214.12	9,027.82	10.12	57,408.68	1,606.69	0.00	8.08	0.00	19.50	13,852.18	12,080.84	104,682.89
NOV	0.00	0.00	1.97	4,464.06	0.00	184.84	4,102.55	204.08	8,342.22	5.18	63,172.61	1,175.89	0.00	12.21	13.24	29.68	14,143.77	13,141.75	106,994.05
DEC	0.00	0.00	0.00	5,763.37	0.00	191.33	5,677.86	206.60	833.47	13.07	67,147.84	816.11	0.00	3.14	0.00	11.59	14,621.54	12,004.79	107,292.81
JAN	0.00	0.00	0.00	7,631.11	0.00	225.85	6,158.41	238.23	1,607.99	2.74	64,057.30	1,579.91	0.00	0.00	0.00	10.61	13,118.35	11,430.76	106,061.46
FEB	0.00	0.00	4.65	5,355.27	0.00	463.72	5,417.67	181.67	1,418.42	2.85	57,401.18	2,525.08	0.00	7.80	0.00	46.08	10,891.54	10,027.76	93,741.69
MAR	0.00	0.00	4.10	7,823.84	0.00	800.66	6,077.03	235.31	2,509.41	1.49	64,831.59	7,332.05	0.00	0.00	13.25	23.37	13,259.57	12,993.26	115,904.93
APR	0.00	0.00	10.51	6,420.77	0.00	323.54	4,683.70	220.77	2,379.72	4.27	57,667.76	2,796.72	0.00	0.00	0.00	23.90	12,583.10	11,831.56	98,946.32
MAY	0.00	0.00	1.13	7,308.66	0.00	148.32	5,265.93	237.67	3,901.20	2.11	61,356.02	3,000.30	0.00	8.36	0.00	12.43	13,444.89	12,966.37	107,653.39
JUN	0.00	0.00	1.93	5,473.81	0.00	191.70	4,361.86	179.77	3,357.07	3.09	59,899.47	1,774.45	0.00	1.69	0.00	18.11	13,712.41	13,554.72	102,530.08
JUL	0.00	0.00	0.73	5,676.56	0.00	122.51	4,679.20	156.66	2,262.42	0.20	58,095.61	1,686.89	0.00	21.63	0.00	22.30	13,850.54	11,848.61	98,441.86
AUG	0.00	0.00	0.43	6,887.61	0.00	166.29	4,063.45	334.92	2,270.35	2.15	60,087.61	2,989.14	0.19	36.80	1.66	23.92	12,726.66	11,365.38	100,958.76
SEP	0.00	0.00	2.20	8,365.02	0.00	149.53	4,019.46	503.70	1,171.57	5.50	55,633.63	2,584.50	0.09	0.00	0.00	288.87	11,947.97	12,312.66	97,084.72
Total	0.00	0.00	27.65	76,803.36	0.00	3,150.90	59,346.41	2,913.70	37,099.86	52.77	724,759.30	29,969.73	0.28	101.71	28.15	530.54	158,152.32	145,358.48	1,238,292.96
Average	0.00	0.00	2.30	6,400.28	0.00	262.58	4,945.53	242.81	3,091.64	4.40	60,396.61	2,497.48	0.02	8.48	2.35	44.21	13,179.36	12,113.04	103,191.08
Percent	0.00%	0.00%	0.00%	6.20%	0.00%	0.25%	4.79%	0.24%	3.00%	0.00%	58.53%	2.42%	0.00%	0.01%	0.00%	0.04%	12.77%	11.74%	100.00%

95/96

Month	Animals	Reef	Asbestos	C/D	Residue	Tires	Sludge	Direct	Fill	Furn.	Garbage	LC	Pesticide	Special	Trailers	Mulch	Trash/Other	Vegetation	Total
OCT	0.00	0.00	5.49	8,306.43	0.00	150.58	3,529.75	639.43	1,103.24	0.30	62,568.40	713.09	0.00	2.48	0.00	109.85	14,031.60	10,258.85	101,419.49
NOV	0.00	0.00	0.47	7,577.50	0.00	165.44	3,848.98	151.54	1,170.79	5.80	59,920.30	1,236.95	0.00	0.51	0.00	30.75	11,877.69	9,065.06	95,051.78
DEC	0.00	0.00	0.09	6,466.83	0.00	146.73	4,637.98	196.79	1,110.82	4.64	60,711.75	1,830.56	0.00	8.21	0.00	23.32	11,756.81	8,628.18	93,540.71
JAN	0.00	0.00	0.00	8,199.45	0.00	164.29	5,781.94	355.70	1,088.16	4.97	67,707.15	30.16	0.00	0.00	0.00	49.41	14,569.86	6,771.91	104,741.00
FEB	0.00	0.00	0.19	8,921.47	0.00	315.23	6,827.95	218.42	1,240.79	2.55	60,711.78	0.00	0.00	1.75	0.00	6.85	12,744.63	6,960.11	97,949.92
MAR	0.00	0.00	0.00	9,752.63	0.00	145.62	6,749.53	212.68	1,724.66	5.14	64,177.95	0.00	0.00	1.92	0.00	7.23	12,201.36	7,431.40	102,410.12
APR	0.00	0.00	0.00	11,704.69	0.00	273.41	8,566.69	285.33	1,489.64	2.62	64,890.16	0.00	0.00	8.26	0.00	21.58	13,827.35	7,629.74	106,699.47
MAY	0.00	0.00	0.37	9,958.33	0.00	196.96	5,977.02	253.66	1,185.88	2.70	64,875.94	0.00	0.00	0.00	3.41	15.31	14,642.38	11,365.54	108,455.50
JUN	0.00	0.00	0.22	9,174.17	0.00	65.15	4,261.28	142.95	1,704.25	4.08	58,741.40	0.00	0.00	1.77	0.00	62.75	12,887.57	11,064.11	98,089.70
JUL	0.00	0.00	0.00	9,420.41	0.00	63.50	3,693.83	166.17	4,162.89	4.62	61,493.70	0.00	0.00	1.11	4.59	9.05	14,742.65	10,223.82	103,986.34
AUG	0.00	0.00	0.03	9,586.82	0.00	152.44	4,174.49	162.07	3,233.39	6.98	59,474.35	0.00	0.00	0.00	0.00	1.16	13,345.50	10,894.01	101,031.24
SEP	0.00	0.00	2.35	9,021.73	0.00	83.17	3,486.62	324.83	2,771.44	2.51	57,535.10	0.00	0.00	0.00	0.00	5.56	13,330.75	11,579.33	98,143.21
Total	0.00	0.00	9.21	108,108.46	0.00	1,922.52	59,536.06	3,107.37	21,963.95	46.91	742,807.98	3,810.76	0.00	24.01	8.00	342.84	159,958.35	110,072.06	1,211,518.48
Average	0.00	0.00	0.77	9,009.04	0.00	160.21	4,961.34	258.95	1,830.33	3.91	61,900.67	300.90	0.00	2.00	0.67	28.57	13,329.86	9,172.67	100,959.87
Percent	0.00%	0.00%	0.00%	8.92%	0.00%	0.16%	4.91%	0.26%	1.81%	0.00%	61.31%	0.30%	0.00%	0.00%	0.00%	0.03%	13.20%	9.09%	100.00%

96/97

Month	Animals	Reef	Asbestos	C/D	Residue	Tires	Sludge	Direct	Fill	Furn.	Garbage	LC	Pesticide	Special	Trailers	Mulch	Trash/Other	Vegetation	Total
OCT	24 08	0.00	0 00	4,899 37	2,604 72	74 95	5,092 65	299 32	3,420 44	9 87	63,684 82	0 00	0 00	0 30	0 00	25 27	12,500.11	12,159 05	104,794 95
NOV	25.16	0 00	0 00	3,735 92	3,700.11	64.80	4,816.39	251.30	2,871 07	9 65	60,493 45	0 00	0 00	0 00	1 23	74 90	9,107 87	10,911.68	96,063 73
DEC	32.73	0 00	0 00	3,539.05	3,364 94	121.22	6,343 78	253 36	2,370 37	6 20	68,224 69	0 00	0 00	0 00	0 00	4 25	9,110 56	8,784 40	102,155 57
JAN	30 40	0.00	0 00	4,926.70	2,674 21	105 04	7,023 80	359 02	1,726 88	5 61	69,890.70	0 00	0 00	0 00	0 00	0 00	11,397.53	9,101.15	107,241 04
FEB	36 48	0.00	0.18	5,586.94	2,458.25	137.71	5,184.91	143.22	1,943 51	4 82	64,004.73	0.00	0 00	0 91	0.00	18 64	10,277.50	8,723 38	98,523 18
MAR	25.11	0 00	0 05	3,669 92	2,483.20	66.34	5,759.53	187.09	853 66	5.71	69,172.09	0 00	0 00	0 00	0 00	15.21	10,792.54	10,725 87	103,776 32
APR	29.80	0.00	0.54	3,866.09	2,559.37	154.13	4,890.37	237.72	1,172 69	4.97	67,967.76	0.00	0 00	0 00	0.00	23.80	11,789 09	10,722.18	103,220 31
MAY	24.29	0.00	1.29	3,551.83	3,433 44	62 48	4,838.42	154.66	1,295.94	4.71	66,075.02	0 00	0 00	0 00	1.95	32 44	11,359 21	11,390.90	102,226.60
JUN	24.27	0.00	0.00	4,166.48	3,215 69	109.49	3,227.39	185.34	1,808.05	5 57	65,657.00	0 00	0 00	0 00	11.11	45 31	12,539 44	14,122.95	102,679.50
JUL	27.17	0.00	6 29	4,738.95	3,393.17	106 50	3,323 82	143.17	779 05	7.73	62,495 40	0.00	0 00	1.97	3.38	268 59	16,303.78	15,178 51	106,777.48
AUG	24.29	0.00	0 00	5,565.27	3,561.30	174 93	3,555 21	155.23	1,135.23	6 11	61,959 66	0.00	0.00	0.00	0.00	343 32	16,084.09	14,136 26	106,702 92
SEP	22 07	0 00	0 00	4,599 54	2,210 41	97 91	4,044 28	119 86	174 06	4 63	63,486 23	0 00	0 00	0 00	0 00	337.57	12,613.18	15,228 09	103,137.81
Total	327.85	0.00	8.35	52,868.08	35,658.81	1,275.50	57,900.55	2,489.33	19,550.95	75.58	783,111.57	0.00	0.00	3.18	17.67	1,169.10	146,074.88	141,186.62	1,239,299.41
Average	27.32	0.00	0.70	4,405.67	2,971.57	106.29	4,825.05	207.44	1,629.25	6.30	65,259.30	0.00	0.00	0.27	1.47	98.09	12,172.91	11,765.55	103,274.95
Percent	0.03%	0.00%	0.00%	4.27%	2.88%	0.10%	4.67%	0.20%	1.58%	0.01%	63.19%	0.00%	0.00%	0.00%	0.00%	0.10%	11.79%	11.39%	100.00%

Solid Waste Authority of Palm Beach County
Twelve Year Waste Tonnage Study

Construction and Demolition Debris

Year Ended September	Tons Delivered	Percent Change	Tipping Fee	Comments
1986	267,410		$21.00	
1987	311,439	16.46%	$26.00	
1988	284,831	-8.54%	$30.00	
1989	234,525	-17.66%	$33.50	
1990	133,941	-42.89%	$46.50	First Permitted Processors; Site 7 Class 3 Open May
1991	130,249	-2.76%	$50.00	
1992	119,779	-8.04%	$37.00	
1993	113,032	-5.63%	$43.00	
1994	83,809	-25.85%	$46.00	
1995	76,803	-8.36%	$46.00	
1996	108,108	40.76%	$40.00	
1997	88,527	-18.11%	$37.00	
Average Annual Rate		-9.56%		

Land Clearing Debris

Year Ended September	Tons Delivered	Percent Change	Tipping Fee	Comments
1986	87,164		$21.00	
1987	94,496	8.41%	$26.00	
1988	42,978	-54.52%	$30.00	
1989	57,568	33.95%	$33.50	
1990	23,665	-58.89%	$46.50	First Permitted Processors; Site 7 Class 3 Open May
1991	28,211	19.21%	$20.00	
1992	28,426	0.76%	$37.00	
1993	14,232	-49.93%	$43.00	
1994	15,764	10.76%	$46.00	
1995	29,970	90.12%	$46.00	
1996	3,611	-87.95%	$40.00	Waste Code Deleted; Combined with CD
1997	0	-100.00%	$37.00	Waste Code Deleted; Combined with CD
Average Annual Rate		-100.00%		

Trash

Year Ended September	Tons Delivered	Percent Change	Tipping Fee	Comments
1986	288,519		$21.00	
1987	208,166	-27.85%	$26.00	
1988	224,476	7.84%	$30.00	
1989	287,336	28.00%	$33.50	
1990	283,177	-1.45%	$46.50	First Permitted Processors; Site 7 Class 3 Open May
1991	167,801	-40.74%	$50.00	First Year of Assessment
1992	185,997	10.84%	$37.00	
1993	175,711	-5.53%	$43.00	
1994	180,996	3.01%	$46.00	
1995	158,152	-12.62%	$40.00	
1996	159,958	1.14%	$40.00	
1997	146,075	-8.68%	$23.00	
Average Annual Rate		-6.00%		

Vegetation

Year Ended September	Tons Delivered	Percent Change	Tipping Fee	Comments
1986	30,724		$21.00	
1987	31,632	2.96%	$26.00	
1988	23,033	-27.18%	$30.00	
1989	36,554	58.70%	$33.50	
1990	24,779	-32.21%	$46.50	First Permitted Processors; Site 7 Class 3 Open May
1991	26,289	6.09%	$25.00	First Year of Assessment
1992	31,863	21.20%	$37.00	
1993	63,635	99.71%	$25.00	
1994	96,539	51.71%	$18.00	Negotiated Rate; Residential Credit paid to Privates
1995	145,356	50.57%	$18.00	
1996	110,072	-24.27%	$25.00	
1997	141,187	28.27%	$20.00	
Average Annual Rate		14.87%		

Mulch

Year Ended September	Tons Delivered	Percent Change	Tipping Fee	Comments
1986	0		$21.00	
1987	0	0.00%	$36.00	
1988	0	0.00%	$30.00	
1989	0	0.00%	$33.50	
1990	0	0.00%	$46.50	First Permitted Processors; Site 7 Class 3 Open May
1991	3,907	0.00%	$25.00	First Year of Assessment
1992	9,856	152.27%	$37.00	
1993	50,227	409.61%	$0.00	High Permitted Processor Inventories Disposed
1994	760	-98.49%	$4.00	Negotiated Rate
1995	531	-30.22%	$0.00	
1996	343	-35.35%	$0.00	
1997	1,189	246.65%	$20.00	
Average Annual Rate		na		

Garbage

Year Ended September	Tons Delivered	Percent Change	Tipping Fee	Comments
1986	536,775		$21.00	
1987	592,762	10.43%	$26.00	
1988	639,227	7.84%	$30.00	
1989	693,409	8.48%	$33.00	
1990	685,848	-1.09%	$46.50	Plant Operational; Class 1 at Site 7 Open in August.
1991	699,516	1.99%	$83.50	First Year of Assessment
1992	692,764	-0.97%	$37.00	
1993	683,039	-1.40%	$43.00	
1994	734,025	7.46%	$46.00	
1995	724,759	-1.26%	$40.00	
1996	742,808	2.49%	$40.00	
1997	783,112	5.43%	$23.00	Tipping Fee Reduced for Economic Flow Control
Average Annual Rate		3.49%		

Year Ended September	Tons Delivered	Percent Change	Total Tipping Fee	Comments
1986	1,222,931			
1987	1,250,144	2.23%		
1988	1,229,210	-1.67%		
1989	1,322,994	7.63%		
1990	1,161,454	-12.21%		Plant Operational, First Permitted Processors
1991	1,116,379	-3.88%		First Year of Assessment
1992	1,152,047	3.19%		
1993	1,163,701	1.01%		
1994	1,188,544	2.13%		
1995	1,238,293	4.19%		
1996	1,211,518	-2.16%		
1997	1,239,299	2.29%		
Average Annual Rate		0.12%		

Notes:

(1) Above figures include only weighed waste and no "each" charges, such as animals, passenger cars, and appliances, are included. The quantities are immaterial.

(2) The Authority has a "miscellaneous" waste code which is used primarily to account for SWA internal transfers. Waste coded to "miscellaneous" is not included above. The quantities are immaterial.

(3) SWA scale system output converts volume transactions to tonnage using assumed waste densities. Currently available information allows for the retrieval of tonnage information on volume transactions. For 92/93 and on "actual" weights are presented. For prior years, assumed weights for trash, building debris, and land clearing debris have been replaced with more accurate estimates based on reasonable density estimates, as the conversion rates used at the time weren't reasonable.

ATTACHMENT B

U.S. EPA'S LANDFILL AIR EMISSIONS ESTIMATION MODEL

Solid Waste Authority of Palm Beach County
North County Resource Recovery Facility Class I and III Landfills
Solid Waste Acceptance Rates

Year	Historic / Projected Mass Acceptance Rates in Tons per Year Class I (tons)	Class III (tons)	Mass Acceptance Rates in Mg Incremental Class I (Mg)	Cumulative Class I (Mg)	Incremental Class III (Mg)	Cumulative Class III (Mg)
1990	352,493	256,150	319,781	0	232,379	0
1991	352,494	256,150	319,782	319,781	232,379	232,379
1992	320,385	268,449	290,653	639,563	243,537	464,758
1993	336,653	216,681	305,412	930,217	196,573	708,295
1994	427,983	167,089	388,266	1,235,628	151,583	904,868
1995	371,733	171,534	337,236	1,623,894	155,616	1,056,451
1996	375,886	201,020	341,004	1,961,131	182,365	1,212,066
1997	399,240	159,660	362,191	2,302,134	144,844	1,394,432
Subtotal	2,936,866	1,696,732	---	---	---	---
1998	394,395	195,612	357,795	2,664,325	177,459	1,539,275
1999	389,751	220,547	353,582	3,022,120	200,080	1,716,734
2000	385,410	245,580	349,644	3,375,702	222,790	1,916,815
2001	380,043	270,283	344,775	3,725,346	245,201	2,139,605
2002	377,941	292,071	342,868	4,070,121	264,967	2,384,806
2003	393,108	296,945	356,628	4,412,989	269,389	2,649,772
2004	408,549	301,908	370,636	4,769,617	273,891	2,919,161
2005	424,270	306,961	384,898	5,140,252	278,475	3,193,052
2006	438,704	311,600	397,992	5,525,150	282,684	3,471,527
2007	453,375	316,315	411,302	5,923,142	286,961	3,754,210
2008	468,284	321,106	424,827	6,334,444	291,307	4,041,171
2009	483,437	325,976	438,574	6,759,271	295,725	4,332,479
2010	498,837	330,926	452,545	7,197,845	300,216	4,628,204
2011	513,522	335,645	465,867	7,650,390	304,497	4,928,420
2012	528,431	340,437	479,393	8,116,258	308,844	5,232,917
2013	543,569	345,303	493,126	8,595,650	313,259	5,541,762
2014	558,939	350,242	507,069	9,088,776	317,740	5,855,021
2015	574,544	355,258	521,226	9,595,845	322,290	6,172,760
2016	589,361	360,020	534,668	10,117,072	326,610	6,495,050
2017	604,391	364,850	548,304	10,651,740	330,992	6,821,660
2018	619,636	369,750	562,134	11,200,044	335,437	7,152,652
2019	635,099	374,719	576,162	11,762,177	339,945	7,488,090
2020	650,783	379,760	590,390	12,338,339	344,518	7,828,035
2021	650,783	379,760	590,390	12,928,729	344,518	8,172,553
2022	650,783	379,760	590,390	13,519,120	344,518	8,517,071
2023	650,783	379,760	590,390	14,109,510	344,518	8,861,589
2024				14,699,900		9,206,108

Source: SWA, November 15, 1997, *1988 Landfill Depletion Model*, Density Comparison Table, and Appendix A.

Note: It is assumed that process residue, ash, unprocessibles, and C&D are all biodegradable. These are included in the totals shown, and will produce conservative estimates of gas production.

Solid Waste Authority of Palm Beach County

North County Resource Recovery Facility Class I and III Landfills

LAEEM Calculated Landfill Gas Generation Rates

	Class I Landfill				Class III Landfill			
Year	Methane (m3/yr)	Gas (m3/yr)	Gas (ft3/yr)	Gas (cfm)	Methane (m3/yr)	Gas (m3/yr)	Gas (ft3/yr)	Gas (cfm)
1990	0	0	0	0	0	0	0	0
1991	1,279,000	2,558,000	90,322,980	172	650,400	929,500	32,820,645	62
1992	2,508,000	5,016,000	177,114,960	337	1,257,000	1,823,000	64,370,130	122
1993	3,572,000	7,144,000	252,254,640	480	1,790,000	2,725,000	96,219,750	183
1994	4,654,000	9,308,000	328,665,480	625	2,268,000	3,405,000	120,230,550	229
1995	6,025,000	12,050,000	425,485,500	810	2,586,000	3,878,000	136,932,180	261
1996	7,137,000	14,274,000	504,014,940	959	2,858,000	4,348,000	153,527,880	292
1997	8,221,000	16,442,000	580,567,020	1,105	3,274,000	4,907,000	173,266,170	330
1998	9,348,000	18,696,000	660,155,760	1,256	3,736,000	5,294,000	186,931,140	356
1999	10,410,000	20,820,000	735,154,200	1,399	4,243,000	5,796,000	204,656,760	389
2000	11,420,000	22,840,000	806,480,400	1,534	4,794,000	6,369,000	224,889,390	428
2001	12,370,000	24,740,000	873,569,400	1,662	5,392,000	7,011,000	247,558,410	471
2002	13,260,000	26,520,000	936,421,200	1,782	5,982,000	7,717,000	272,487,270	518
2003	14,110,000	28,220,000	996,448,200	1,896	6,560,000	8,474,000	299,216,940	569
2004	14,990,000	29,980,000	1,058,593,800	2,014	7,133,000	9,219,000	325,522,890	619
2005	15,880,000	31,760,000	1,121,445,600	2,134	7,700,000	9,953,000	351,440,430	669
2006	16,800,000	33,600,000	1,186,416,000	2,257	8,260,000	10,680,000	377,110,800	717
2007	17,730,000	35,460,000	1,252,092,600	2,382	8,813,000	11,390,000	402,180,900	765
2008	18,680,000	37,360,000	1,319,181,600	2,510	9,358,000	12,090,000	426,897,900	812
2009	19,650,000	39,300,000	1,387,683,000	2,640	9,896,000	12,780,000	451,261,800	859
2010	20,630,000	41,260,000	1,456,890,600	2,772	10,430,000	13,460,000	475,272,600	904
2011	21,630,000	43,260,000	1,527,510,600	2,906	10,950,000	14,140,000	499,283,400	950
2012	22,650,000	45,300,000	1,599,543,000	3,043	11,480,000	14,800,000	522,588,000	994
2013	23,680,000	47,360,000	1,672,281,600	3,182	11,990,000	15,450,000	545,539,500	1,038
2014	24,720,000	49,440,000	1,745,726,400	3,321	12,500,000	16,100,000	568,491,000	1,082
2015	25,780,000	51,560,000	1,820,583,600	3,464	13,000,000	16,740,000	591,089,400	1,125
2016	26,860,000	53,720,000	1,896,853,200	3,609	13,500,000	17,370,000	613,334,700	1,167
2017	27,940,000	55,880,000	1,973,122,800	3,754	12,970,000	18,000,000	635,580,000	1,209
2018	29,040,000	58,080,000	2,050,804,800	3,902	12,460,000	18,620,000	657,472,200	1,251
2019	30,150,000	60,300,000	2,129,193,000	4,051	11,970,000	19,230,000	679,011,300	1,292
2020	31,270,000	62,540,000	2,208,287,400	4,201	11,510,000	19,840,000	700,550,400	1,333
2021	32,410,000	64,820,000	2,288,794,200	4,355	11,050,000	20,440,000	721,736,400	1,373
2022	33,500,000	67,000,000	2,365,770,000	4,501	10,620,000	21,010,000	741,863,100	1,411
2023	34,550,000	69,100,000	2,439,921,000	4,642	10,200,000	21,570,000	761,636,700	1,449
2024	35,550,000	71,100,000	2,510,541,000	4,777	9,804,000	22,100,000	780,351,000	1,485
2025	34,160,000	68,320,000	2,412,379,200	4,590	9,420,000	21,230,000	749,631,300	1,426

Landfill Air Emissions Estimation Model, Version 1.1 for Windows, August 1997
SWA NCRRF Class I Landfill, Methane

Run Date: 12/9/98
Source: c:\landfill\swa_cl1a.prm

Model Parameters

Lo : 100.00 m^3 / Mg
k : 0.0400 1/yr
NMOC : 595.00 ppmv
Methane : 50.0000 % volume
Carbon Dioxide : 50.0000 % volume

Landfill Parameters

Landfill type : No Co-Disposal
Year Opened : 1990 Current Year : 1998 Closure Year: 2024
Capacity : 14699900 Mg
Average Acceptance Rate Required from
Current Year to Closure Year : 0.00 Mg/year

Model Results

Year	Refuse In Place (Mg)	Methane Emission Rate (Mg/yr)	(Cubic m/yr)
1991	3.198E+05	8.534E+02	1.279E+06
1992	6.396E+05	1.673E+03	2.508E+06
1993	9.302E+05	2.383E+03	3.572E+06
1994	1.236E+06	3.105E+03	4.654E+06
1995	1.624E+06	4.019E+03	6.025E+06
1996	1.961E+06	4.762E+03	7.137E+06
1997	2.302E+06	5.485E+03	8.221E+06
1998	2.664E+06	6.236E+03	9.348E+06
1999	3.022E+06	6.947E+03	1.041E+07
2000	3.376E+06	7.618E+03	1.142E+07
2001	3.725E+06	8.252E+03	1.237E+07
2002	4.070E+06	8.849E+03	1.326E+07
2003	4.413E+06	9.417E+03	1.411E+07
2004	4.770E+06	9.999E+03	1.499E+07
2005	5.140E+06	1.060E+04	1.588E+07
2006	5.525E+06	1.121E+04	1.680E+07
2007	5.923E+06	1.183E+04	1.773E+07
2008	6.334E+06	1.246E+04	1.868E+07

Model Results

Year	Refuse In Place (Mg)	Methane Emission Rate (Mg/yr)	Methane Emission Rate (Cubic m/yr)
2009	6.759E+06	1.311E+04	1.965E+07
2010	7.198E+06	1.377E+04	2.063E+07
2011	7.650E+06	1.443E+04	2.163E+07
2012	8.116E+06	1.511E+04	2.265E+07
2013	8.596E+06	1.580E+04	2.368E+07
2014	9.089E+06	1.649E+04	2.472E+07
2015	9.596E+06	1.720E+04	2.578E+07
2016	1.012E+07	1.792E+04	2.686E+07
2017	1.065E+07	1.864E+04	2.794E+07
2018	1.120E+07	1.937E+04	2.904E+07
2019	1.176E+07	2.011E+04	3.015E+07
2020	1.234E+07	2.086E+04	3.127E+07
2021	1.293E+07	2.162E+04	3.241E+07
2022	1.352E+07	2.235E+04	3.350E+07
2023	1.411E+07	2.305E+04	3.455E+07
2024	1.470E+07	2.372E+04	3.555E+07
2025	1.470E+07	2.279E+04	3.416E+07
2026	1.470E+07	2.190E+04	3.282E+07
2027	1.470E+07	2.104E+04	3.153E+07
2028	1.470E+07	2.021E+04	3.030E+07
2029	1.470E+07	1.942E+04	2.911E+07
2030	1.470E+07	1.866E+04	2.797E+07
2031	1.470E+07	1.793E+04	2.687E+07
2032	1.470E+07	1.722E+04	2.582E+07
2033	1.470E+07	1.655E+04	2.480E+07
2034	1.470E+07	1.590E+04	2.383E+07
2035	1.470E+07	1.528E+04	2.290E+07
2036	1.470E+07	1.468E+04	2.200E+07
2037	1.470E+07	1.410E+04	2.114E+07
2038	1.470E+07	1.355E+04	2.031E+07
2039	1.470E+07	1.302E+04	1.951E+07
2040	1.470E+07	1.251E+04	1.875E+07
2041	1.470E+07	1.202E+04	1.801E+07
2042	1.470E+07	1.155E+04	1.731E+07
2043	1.470E+07	1.109E+04	1.663E+07
2044	1.470E+07	1.066E+04	1.597E+07
2045	1.470E+07	1.024E+04	1.535E+07
2046	1.470E+07	9.838E+03	1.475E+07
2047	1.470E+07	9.453E+03	1.417E+07

Landfill Air Emissions Estimation Model, Version 1.1 for Windows, August 1997
SWA NCRRF Class I Landfill, NMOC

Run Date: 12/9/98
Source: C:\LANDFILL\SWA_CL1A.PRM

Model Parameters

Lo : 100.00 m^3 / Mg
k : 0.0400 1/yr
NMOC : 595.00 ppmv
Methane : 50.0000 % volume
Carbon Dioxide : 50.0000 % volume

Landfill Parameters

Landfill type : No Co-Disposal
Year Opened : 1990 Current Year : 1998 Closure Year: 2024
Capacity : 14699900 Mg
Average Acceptance Rate Required from
Current Year to Closure Year : 0.00 Mg/year

Model Results

Year	Refuse In Place (Mg)	NMOC Emission Rate (Mg/yr)	NMOC Emission Rate (Cubic m/yr)
1991	3.198E+05	5.456E+00	1.522E+03
1992	6.396E+05	1.070E+01	2.985E+03
1993	9.302E+05	1.524E+01	4.251E+03
1994	1.236E+06	1.985E+01	5.538E+03
1995	1.624E+06	2.570E+01	7.169E+03
1996	1.961E+06	3.044E+01	8.493E+03
1997	2.302E+06	3.507E+01	9.783E+03
1998	2.664E+06	3.987E+01	1.112E+04
1999	3.022E+06	4.441E+01	1.239E+04
2000	3.376E+06	4.871E+01	1.359E+04
2001	3.725E+06	5.276E+01	1.472E+04
2002	4.070E+06	5.658E+01	1.578E+04
2003	4.413E+06	6.021E+01	1.680E+04
2004	4.770E+06	6.393E+01	1.784E+04
2005	5.140E+06	6.775E+01	1.890E+04
2006	5.525E+06	7.166E+01	1.999E+04
2007	5.923E+06	7.564E+01	2.110E+04
2008	6.334E+06	7.969E+01	2.223E+04

Model Results

Year	Refuse In Place (Mg)	NMOC Emission Rate (Mg/yr)	NMOC Emission Rate (Cubic m/yr)
2009	6.759E+06	8.382E+01	2.338E+04
2010	7.198E+06	8.801E+01	2.455E+04
2011	7.650E+06	9.228E+01	2.574E+04
2012	8.116E+06	9.661E+01	2.695E+04
2013	8.596E+06	1.010E+02	2.818E+04
2014	9.089E+06	1.055E+02	2.942E+04
2015	9.596E+06	1.100E+02	3.068E+04
2016	1.012E+07	1.146E+02	3.196E+04
2017	1.065E+07	1.192E+02	3.325E+04
2018	1.120E+07	1.239E+02	3.456E+04
2019	1.176E+07	1.286E+02	3.588E+04
2020	1.234E+07	1.334E+02	3.721E+04
2021	1.293E+07	1.382E+02	3.856E+04
2022	1.352E+07	1.429E+02	3.986E+04
2023	1.411E+07	1.474E+02	4.111E+04
2024	1.470E+07	1.517E+02	4.231E+04
2025	1.470E+07	1.457E+02	4.065E+04
2026	1.470E+07	1.400E+02	3.906E+04
2027	1.470E+07	1.345E+02	3.752E+04
2028	1.470E+07	1.292E+02	3.605E+04
2029	1.470E+07	1.242E+02	3.464E+04
2030	1.470E+07	1.193E+02	3.328E+04
2031	1.470E+07	1.146E+02	3.198E+04
2032	1.470E+07	1.101E+02	3.072E+04
2033	1.470E+07	1.058E+02	2.952E+04
2034	1.470E+07	1.017E+02	2.836E+04
2035	1.470E+07	9.767E+01	2.725E+04
2036	1.470E+07	9.384E+01	2.618E+04
2037	1.470E+07	9.016E+01	2.515E+04
2038	1.470E+07	8.662E+01	2.417E+04
2039	1.470E+07	8.323E+01	2.322E+04
2040	1.470E+07	7.996E+01	2.231E+04
2041	1.470E+07	7.683E+01	2.143E+04
2042	1.470E+07	7.382E+01	2.059E+04
2043	1.470E+07	7.092E+01	1.979E+04
2044	1.470E+07	6.814E+01	1.901E+04
2045	1.470E+07	6.547E+01	1.826E+04
2046	1.470E+07	6.290E+01	1.755E+04
2047	1.470E+07	6.044E+01	1.686E+04

Landfill Air Emissions Estimation Model, Version 1.1 for Windows, August 1997
SWA NCRRF Class III Landfill, Methane

Run Date: 12/9/98
Source: C:\LANDFILL\SWA_CL3A.PRM

Model Parameters

Lo : 100.00 m^3 / Mg
k : 0.0400 1/yr
NMOC : 595.00 ppmv
Methane : 50.0000 % volume
Carbon Dioxide : 50.0000 % volume

Landfill Parameters

Landfill type : No Co-Disposal
Year Opened : 1990 Current Year : 1998 Closure Year: 2024
Capacity : 9206108 Mg
Average Acceptance Rate Required from
Current Year to Closure Year : 0.00 Mg/year

Model Results

Year	Refuse In Place (Mg)	Methane Emission Rate (Mg/yr)	Methane Emission Rate (Cubic m/yr)
1991	2.324E+05	6.201E+02	9.295E+05
1992	4.648E+05	1.216E+03	1.823E+06
1993	7.083E+05	1.818E+03	2.725E+06
1994	9.049E+05	2.271E+03	3.405E+06
1995	1.056E+06	2.587E+03	3.878E+06
1996	1.212E+06	2.901E+03	4.348E+06
1997	1.394E+06	3.274E+03	4.907E+06
1998	1.539E+06	3.532E+03	5.294E+06
1999	1.717E+06	3.867E+03	5.796E+06
2000	1.917E+06	4.249E+03	6.369E+06
2001	2.140E+06	4.677E+03	7.011E+06
2002	2.385E+06	5.148E+03	7.717E+06
2003	2.650E+06	5.653E+03	8.474E+06
2004	2.919E+06	6.151E+03	9.219E+06
2005	3.193E+06	6.640E+03	9.953E+06
2006	3.472E+06	7.123E+03	1.068E+07
2007	3.754E+06	7.598E+03	1.139E+07

Model Results

Year	Refuse In Place (Mg)	Methane Emission Rate (Mg/yr)	Methane Emission Rate (Cubic m/yr)
2008	4.041E+06	8.066E+03	1.209E+07
2009	4.332E+06	8.527E+03	1.278E+07
2010	4.628E+06	8.982E+03	1.346E+07
2011	4.928E+06	9.431E+03	1.414E+07
2012	5.233E+06	9.874E+03	1.480E+07
2013	5.542E+06	1.031E+04	1.545E+07
2014	5.855E+06	1.074E+04	1.610E+07
2015	6.173E+06	1.117E+04	1.674E+07
2016	6.495E+06	1.159E+04	1.737E+07
2017	6.822E+06	1.201E+04	1.800E+07
2018	7.153E+06	1.242E+04	1.862E+07
2019	7.488E+06	1.283E+04	1.923E+07
2020	7.828E+06	1.323E+04	1.984E+07
2021	8.173E+06	1.363E+04	2.044E+07
2022	8.517E+06	1.402E+04	2.101E+07
2023	8.862E+06	1.439E+04	2.157E+07
2024	9.206E+06	1.474E+04	2.210E+07
2025	9.206E+06	1.417E+04	2.123E+07
2026	9.206E+06	1.361E+04	2.040E+07
2027	9.206E+06	1.308E+04	1.960E+07
2028	9.206E+06	1.256E+04	1.883E+07
2029	9.206E+06	1.207E+04	1.809E+07
2030	9.206E+06	1.160E+04	1.738E+07
2031	9.206E+06	1.114E+04	1.670E+07
2032	9.206E+06	1.071E+04	1.605E+07
2033	9.206E+06	1.029E+04	1.542E+07
2034	9.206E+06	9.883E+03	1.481E+07
2035	9.206E+06	9.495E+03	1.423E+07
2036	9.206E+06	9.123E+03	1.367E+07
2037	9.206E+06	8.765E+03	1.314E+07
2038	9.206E+06	8.421E+03	1.262E+07
2039	9.206E+06	8.091E+03	1.213E+07
2040	9.206E+06	7.774E+03	1.165E+07
2041	9.206E+06	7.469E+03	1.120E+07
2042	9.206E+06	7.176E+03	1.076E+07
2043	9.206E+06	6.895E+03	1.033E+07
2044	9.206E+06	6.625E+03	9.930E+06
2045	9.206E+06	6.365E+03	9.540E+06
2046	9.206E+06	6.115E+03	9.166E+06

Landfill Air Emissions Estimation Model, Version 1.1 for Windows, August 1997
SWA NCRRF Class III Landfill, NMOC

Run Date: 12/9/98
Source: C:\LANDFILL\SWA_CL3A.PRM

Model Parameters

Lo : 170.00 m^3 / Mg
k : 0.0500 1/yr
NMOC : 4000.00 ppmv
Methane : 50.0000 % volume
Carbon Dioxide : 50.0000 % volume

Landfill Parameters

Landfill type : No Co-Disposal
Year Opened : 1990 Current Year : 1998 Closure Year: 2024
Capacity : 9206108 Mg
Average Acceptance Rate Required from
Current Year to Closure Year : 0.00 Mg/year

Model Results

Year	Refuse In Place (Mg)	NMOC Emission Rate (Mg/yr)	NMOC Emission Rate (Cubic m/yr)
1991	2.324E+05	5.664E+01	1.580E+04
1992	4.648E+05	1.105E+02	3.083E+04
1993	7.083E+05	1.645E+02	4.589E+04
1994	9.049E+05	2.044E+02	5.702E+04
1995	1.056E+06	2.314E+02	6.455E+04
1996	1.212E+06	2.580E+02	7.198E+04
1997	1.394E+06	2.899E+02	8.087E+04
1998	1.539E+06	3.110E+02	8.678E+04
1999	1.717E+06	3.391E+02	9.461E+04
2000	1.917E+06	3.714E+02	1.036E+05
2001	2.140E+06	4.075E+02	1.137E+05
2002	2.385E+06	4.474E+02	1.248E+05
2003	2.650E+06	4.902E+02	1.368E+05
2004	2.919E+06	5.320E+02	1.484E+05
2005	3.193E+06	5.728E+02	1.598E+05
2006	3.472E+06	6.127E+02	1.709E+05
2007	3.754E+06	6.517E+02	1.818E+05
2008	4.041E+06	6.899E+02	1.925E+05

Model Results

Year	Refuse In Place (Mg)	NMOC Emission Rate (Mg/yr)	NMOC Emission Rate (Cubic m/yr)
2009	4.332E+06	7.273E+02	2.029E+05
2010	4.628E+06	7.639E+02	2.131E+05
2011	4.928E+06	7.998E+02	2.231E+05
2012	5.233E+06	8.350E+02	2.329E+05
2013	5.542E+06	8.696E+02	2.426E+05
2014	5.855E+06	9.035E+02	2.521E+05
2015	6.173E+06	9.369E+02	2.614E+05
2016	6.495E+06	9.697E+02	2.705E+05
2017	6.822E+06	1.002E+03	2.796E+05
2018	7.153E+06	1.034E+03	2.884E+05
2019	7.488E+06	1.065E+03	2.972E+05
2020	7.828E+06	1.096E+03	3.058E+05
2021	8.173E+06	1.127E+03	3.143E+05
2022	8.517E+06	1.156E+03	3.224E+05
2023	8.862E+06	1.183E+03	3.301E+05
2024	9.206E+06	1.210E+03	3.374E+05
2025	9.206E+06	1.151E+03	3.210E+05
2026	9.206E+06	1.094E+03	3.053E+05
2027	9.206E+06	1.041E+03	2.904E+05
2028	9.206E+06	9.903E+02	2.763E+05
2029	9.206E+06	9.420E+02	2.628E+05
2030	9.206E+06	8.960E+02	2.500E+05
2031	9.206E+06	8.523E+02	2.378E+05
2032	9.206E+06	8.108E+02	2.262E+05
2033	9.206E+06	7.712E+02	2.152E+05
2034	9.206E+06	7.336E+02	2.047E+05
2035	9.206E+06	6.978E+02	1.947E+05
2036	9.206E+06	6.638E+02	1.852E+05
2037	9.206E+06	6.314E+02	1.762E+05
2038	9.206E+06	6.006E+02	1.676E+05
2039	9.206E+06	5.713E+02	1.594E+05
2040	9.206E+06	5.435E+02	1.516E+05
2041	9.206E+06	5.170E+02	1.442E+05
2042	9.206E+06	4.918E+02	1.372E+05
2043	9.206E+06	4.678E+02	1.305E+05
2044	9.206E+06	4.450E+02	1.241E+05
2045	9.206E+06	4.233E+02	1.181E+05
2046	9.206E+06	4.026E+02	1.123E+05
2047	9.206E+06	3.830E+02	1.068E+05

ATTACHMENT C

APPLICATION REPLACEMENT PAGES

Application Processing Fee

Check one :

[ ] Attached - Amount : $0.00 [X] Not Applicable.

Construction/Modification Information

1. Description of Proposed Project or Alterations : The increase in landfill gas generation at both the Class I and III landfills requires the existing landfill ga collection flare blowers to be upgraded. The existing blowers are designed and permitted for up to 1,050 scfm of landfill gas to each blower. The SWA has replaced the existing blowers with ones that will be designed to handle 1,800 scfm for each flare. The information provided in this application is related to th requested incremental increase in potential landfill gas flow to each flare. The increase is calculated as t future potential flow (1,800 scfm) minus the existing actual flow (1,000 scfm at the Class I Landfill and scfm at the Class III Landfill). This application contains a request to modify the existing PSD Permit No. PSD-FL-108(B) for the incremental increase in design gas flow rate to each of two flares, to update the permit to reflect applicab requirements from 40 CFR 60 Subpart WWW and Chapter 62-204.800(7)(b)72., and a request to modify existing permit condition limiting the sulfur inlet concentration in the landfill gas to each flare. The modified gas collection and flare system will meet the requirements of 40 CFR 60 Subpart WWW.
2. Projected or Actual Date of Commencement of Construction : 09-Feb-1998
3. Projected Date of Completion of Construction : 01-Apr-1998

Professional Engineer Certification

1. Professional Engineer Name : Alex H. Makled Registration Number : 45935
2. Professional Engineer Mailing Address : Organization/Firm : Camp Dresser & McKee, Inc. Street Address : 1601 Belvedere Road City : West Palm Beach State : FL Zip Code : 33406
3. Professional Engineer Telephone Numbers :

Telephone : (561)689-3336	Fax : (561)689-9713

Application Contact

1. Name and Title of Application Contact :

Name : Alex H. Makled
Title : Principal Engineer

2. Application Contact Mailing Address :

Organization/Firm : Camp Dresser & McKee, Inc.
Street Address : 1601 Belvedere Road
City : West Palm Beach
State : FL Zip Code : 33406

3. Application Contact Telephone Numbers :

Telephone : (561)689-3336 Fax : (561)689-9713

Application Comment

This is an Air Construction Permit Application for a proposed minor modification to the existing PSD permit and PPSA for North County Resource Recovery Facility (NCRRF) site landfill gas systems. This application covers the replacement of 1,050-scfm flare blowers with ones that are designed to handle 1,800 scfm each at the Class I and III landfills. Both landfills are subject to 40 CFR 60 Subpart WWW New Source Performance Standards for Municipal Solid Waste Landfills and Chapter 62-204.800(7)(b)72., F.A.C.. This application, in addition to containing information on the proposed upgrade of the gas flare blower system, does the following:

- Addresses the applicable requirements for 40 CFR 60 Subpart WWW and Chapter 62-204.800(7)(b)72., F.A.C. for MSW landfills;

-Updates emissions calculations based on the November, 1997, version of AP-42,

- Presents controlled emissions calculations based on the future-potential-minus-existing-actual incremental increase of 800 scfm at the Class I Landfill flare, and 1,200 scfm at the Class III Landfill flare, and

-Requests revisions to existing air permit conditions for the flares to reflect applicable requirements in 40 CFR 60 Subpart WWW, and to remove the sulfur flare inlet condition.

II. FACILITY INFORMATION

A. GENERAL FACILITY INFORMATION

Facility, Location, and Type

1. Facility UTM Coordinates :
   Zone : 17 East (km) : 585.80 North (km) : 2960.20

2. Facility Latitude/Longitude :
   Latitude (DD/MM/SS) : 26 46 Longitude (DD/MM/SS) : 80 8 45

3. Governmental Facility Code :	4. Facility Status Code :	5. Facility Major Group SIC Code :	6. Facility SIC(s) :
3	A	49	

7. Facility Comment :

This is an active municipal solid waste landfill facility with a Class I and III landfill, each equipped with existing active gas collection and control systems. The SWA has upgraded the flare blower system for both its Class I and Class III landfills. The existing two flare blowers were originally designed to handle 1,050 scfm, and have been replaced with ones designed to handle 1,800 scfm, each.

Facility Contact

1. Name and Title of Facility Contact :

Marc Bruner
Director, Planning & Env. Programs

2. Facility Contact Mailing Address :
   Organization/Firm : Solid Waste Auth. of Palm Beach Co.
   Street Address : 7501 North Jog Road
   City : West Palm Beach State : FL Zip Code : 33412-2414

3. Facility Contact Telephone Numbers :
   Telephone : (561)640-4000 Fax : (561)683-4067

Emissions Unit Information Section 1

B. GENERAL EMISSIONS UNIT INFORMATION
(Regulated and Unregulated Emissions Units)

Emissions Unit Description and Status

1. Description of Emissions Unit Addressed in This Section : Class I Landfill Gas Collection System Flare		
2. Emissions Unit Identification Number : 001 [ ] No Corresponding ID [ ] Unknown		
3. Emissions Unit Status Code : A	4. Acid Rain Unit? [ ] Yes [X] No	5. Emissions Unit Major Group SIC Code : 49
6. Emissions Unit Comment : Emission estimates for the flare are based on 1997 landfill gas sampling data, EPA 's AP-42 Emission Factor Document, and vendor information. Emissions were calculated on the future potential gas flow (1,800 scfm) minus existing actual gas flow (1,000 scfm) incremental increase of 800 scfm to the flare. Existing actual gas flow is based on recent data, rather than on a 2-year average, because the gas flow rate has increased exponentially. See Appendix D.		

Emissions Unit Information Section 1

Class I Landfill Gas Collection System Flare

Emissions Unit Control Equipment 1

1. Description : The existing active gas collection and open flare system is designed to handle 1,050 scfm. The flare blower has been replaced with one that is designed for a 1,800 scfm gas flow rate.
2. Control Device or Method Code : 23

C. EMISSIONS UNIT DETAIL INFORMATION
(Regulated Emissions Units Only)

Emissions Unit Information Section 1
Class I Landfill Gas Collection System Flare

Emissions Unit Details

1. Initial Startup Date :	01-Apr-1998
2. Long-term Reserve Shutdown Date :	
3. Package Unit : Manufacturer : LFG Specialties, Inc.	Model Number : PCF82018
4. Generator Nameplate Rating :	MW
5. Incinerator Information : Dwell Temperature : Dwell Time : Incinerator Afterburner Temperature :	 Degrees Fahrenheit Seconds Degrees Fahrenheit

Emissions Unit Operating Capacity

1. Maximum Heat Input Rate :	60	mmBtu/hr	
2. Maximum Incinerator Rate :		lb/hr	tons/day
3. Maximum Process or Throughput Rate :	1800	scfm of LFG	
4. Maximum Production Rate :			
5. Operating Capacity Comment : Blower and flare capacity is 1,800 scfm of gas w/ heat content up to 550 Btu/scf. Emission estimates are based on the potential-minus-actual incremental increase in gas flow rate (800 scfm).			

Emissions Unit Operating Schedule

Requested Maximum Operating Schedule :	
24 hours/day	7 days/week
52 weeks/year	8,760 hours/year

F. SEGMENT (PROCESS/FUEL) INFORMATION

Emissions Unit Information Section 1

Class I Landfill Gas Collection System Flare

Segment Description and Rate : Segment 1

1. Segment Description (Process/Fuel Type and Associated Operating Method/Mode) : Flaring of landfill gas from Class I Landfill	
2. Source Classification Code (SCC) : 3-06-001-08	
3. SCC Units : Million Cubic Feet Burned (all gaseous fuels)	
4. Maximum Hourly Rate : 0.11	5. Maximum Annual Rate : 946.08
6. Estimated Annual Activity Factor :	
7. Maximum Percent Sulfur : 0.00	8. Maximum Percent Ash : 0.00
9. Million Btu per SCC Unit : 550	
10. Segment Comment : Percent sulfur is 0.0020 (20 ppm) based on rounding up of '96 & '97 gas samples. See App. D. MMcu.ft. burned is based on 1,800 scfm total flow. Application is for 800-scfm increase only.	

G. EMISSIONS UNIT POLLUTANTS
(Regulated and Unregulated Emissions Units)

Emissions Unit Information Section 1
Class I Landfill Gas Collection System Flare

1. Pollutant Emitted	2. Primary Control Device Code	3. Secondary Control Device Code	4. Pollutant Regulatory Code
1 - CO			NS
2 - VOC	023		EL
3 - NOX			NS

H. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION
(Regulated Emissions Units Only - Emissions Limited Pollutants Only)

Emissions Unit Information Section 1
Class I Landfill Gas Collection System Flare

Pollutant Potential/Estimated Emissions : Pollutant 1

1. Pollutant Emitted : **CO**
2. Total Percent Efficiency of Control : 0.00 %
3. Potential Emissions : 8.7000000 lb/hour 38.1200000 tons/year
4. Synthetically Limited? [ ] Yes [X] No
5. Range of Estimated Fugitive/Other Emissions: to tons/year
6. Emissions Factor 0 Units lb/MMBtu Reference AP-42, 11/97
7. Emissions Method Code : 3
8. Calculations of Emissions : 800 scfm increase in landfill gas flow 50% of gas by volume is methane: 400 scfm increase in flow Energy content of methane: 980 Btu/scf 400 scfm * 60 min/hr * 980 Btu/scf = 23.52 MMBtu/hr 23.52 MMBtu/hr * 0.37 lb CO / MMBtu = 8.7 lb/hr 8.7 lb/hr * 8760 hr/yr * 1/2000 ton/lb = 38.1 tons per year
9. Pollutant Potential/Estimated Emissions Comment : Based on the incremental increase of 800 scfm of landfill gas flow rate and the CO emission factor referenced in AP-42 Section 13 Industrial Flares, 11/97, confirmed by vendor. See App. D.

H. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION
(Regulated Emissions Units Only - Emissions Limited Pollutants Only)

Emissions Unit Information Section 1
Class I Landfill Gas Collection System Flare

H. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION
(Regulated Emissions Units Only - Emissions Limited Pollutants Only)

Emissions Unit Information Section 1
Class I Landfill Gas Collection System Flare

Pollutant Potential/Estimated Emissions : Pollutant 2

1. Pollutant Emitted : **VOC**
2. Total Percent Efficiency of Control : 98.00 %
3. Potential Emissions : 0.1300000 lb/hour 0.5600000 tons/year
4. Synthetically Limited? [ ] Yes [X] No
5. Range of Estimated Fugitive/Other Emissions: to tons/year
6. Emissions Factor 595 Units ppmv Reference AP-42, 11/97
7. Emissions Method Code : 3
8. Calculations of Emissions : gas flow to flare: 800 scfm * 1/35.31 m3/cf = 22.66 std m3/min 22.66 m3/min * 60 min/hr = 1359.4 m3/hr Conc. of NMOC in gas: 595 ppmv MW of NMOC (as hexane): 86.18 g/mol 595 ppm * 41.57 mol/m3 (@ std. conditions) * 86.18 g/mol = 2.13 g/m3 2.13 g/m3 * 1359.4 m3/hr * 1/453.6 lb/g = 6.39 lb/hr uncontrolled NMOC 6.39 lb/hr * (1 - 0.98) = 0.13 lb/hr controlled NMOC 0.13 lb/hr * 8760 hr/yr * 1/2000 ton/lb = 0.56 tons per year

H. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION
(Regulated Emissions Units Only - Emissions Limited Pollutants Only)

Emissions Unit Information Section 1

Class I Landfill Gas Collection System Flare

9. Pollutant Potential/Estimated Emissions Comment :

Calculations are based on incremental increase of 800 scfm in landfill gas flow rate and AP-42 Section 2.4 (updated 11/97).

H. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION
(Regulated Emissions Units Only - Emissions Limited Pollutants Only)

Emissions Unit Information Section 1
Class I Landfill Gas Collection System Flare

Pollutant Potential/Estimated Emissions : Pollutant 3

1. Pollutant Emitted : **NOX**
2. Total Percent Efficiency of Control : %
3. Potential Emissions : 1.6000000 lb/hour 7.0100000 tons/year
4. Synthetically Limited? [ ] Yes [X] No
5. Range of Estimated Fugitive/Other Emissions: to tons/year
6. Emissions Factor 0 Units lb/MMBtu Reference AP-42, 11/97
7. Emissions Method Code : 3
8. Calculations of Emissions : 800 scfm increase in landfill gas flow 50% of gas by volume is methane: 400 scfm increase in flow Energy content of methane: 980 Btu/scf 400 scfm * 60 min/hr * 980 Btu/scf = 23.52 MMBtu/hr 23.52 MMBtu/hr * 0.068 lb NOx / MMBtu = 1.6 lb/hr 1.6 lb/hr * 8760 hr/yr * 1/2000 ton/lb = 7.01 tons per year
9. Pollutant Potential/Estimated Emissions Comment : Based on the incremental increase of 800 scfm of landfill gas flow rate and the NOx emission factor referenced in AP-42 Section 13 Industrial Flares, 11/97, confirmed by vendor. See App. D.

Emissions Unit Information Section 2

B. GENERAL EMISSIONS UNIT INFORMATION
(Regulated and Unregulated Emissions Units)

Emissions Unit Description and Status

1. Description of Emissions Unit Addressed in This Section : Class III Landfill Gas Collection System Flare		
2. Emissions Unit Identification Number : 002 [ ] No Corresponding ID [ ] Unknown		
3. Emissions Unit Status Code : A	4. Acid Rain Unit? [ ] Yes [X] No	5. Emissions Unit Major Group SIC Code : 49
6. Emissions Unit Comment : Emission estimates for the flare are based on 1997 landfill gas sampling data, EPA 's AP-42 Emission Factor Document, and vendor information. Emissions were calculated on the future potential gas flow (1,800 scfm) minus existing actual gas flow (600 scfm) incremental increase of 1,200 scfm to the flare. Existing actual gas flow is based on recent data, rather than on a 2-year average, because the gas flow rate has increased exponentially. See Appendix D.		

Emissions Unit Information Section 2

Class III Landfill Gas Collection System Flare

Emissions Unit Control Equipment 1

1. Description :
   The existing active gas collection and open flare system is designed to handle 1,050 scfm. The flare blower has been replaced with one that is designed for 1,800 scfm gas flow rate.

2. Control Device or Method Code : 23

C. EMISSIONS UNIT DETAIL INFORMATION
(Regulated Emissions Units Only)

Emissions Unit Information Section 2
Class III Landfill Gas Collection System Flare

Emissions Unit Details

1. Initial Startup Date :	01-Apr-1998
2. Long-term Reserve Shutdown Date :	
3. Package Unit : Manufacturer : LFG Specialties, Inc.	Model Number : PCF82018
4. Generator Nameplate Rating :	MW
5. Incinerator Information : Dwell Temperature : Dwell Time : 0.00 Incinerator Afterburner Temperature :	 Degrees Fahrenheit Seconds Degrees Fahrenheit

Emissions Unit Operating Capacity

1. Maximum Heat Input Rate :	60	mmBtu/hr	
2. Maximum Incinerator Rate :		lb/hr	tons/day
3. Maximum Process or Throughput Rate :		1800	scfm of LFG
4. Maximum Production Rate :			
5. Operating Capacity Comment : Blower and flare capacity is 1,800 scfm of gas w/ heat content up to 550 Btu/scf. Emission estimates are based on the incremental increase in gas flow rate (1,200 scfm)			

Emissions Unit Operating Schedule

Requested Maximum Operating Schedule :	
24 hours/day	7 days/week
52 weeks/year	8,760 hours/year

F. SEGMENT (PROCESS/FUEL) INFORMATION

Emissions Unit Information Section 2

Class III Landfill Gas Collection System Flare

Segment Description and Rate : Segment 1

1. Segment Description (Process/Fuel Type and Associated Operating Method/Mode) : Flaring of landfill gas from Class III Landfill	
2. Source Classification Code (SCC) : 3-06-001-08	
3. SCC Units : Million Cubic Feet Burned (all gaseous fuels)	
4. Maximum Hourly Rate : 0.11	5. Maximum Annual Rate : 946.08
6. Estimated Annual Activity Factor :	
7. Maximum Percent Sulfur : 0.04	8. Maximum Percent Ash : 0.00
9. Million Btu per SCC Unit : 550	
10. Segment Comment : Percent sulfur is 0.04 (400 ppm) based on rounding up of '96 & '97 gas samples (see App. D). MMcu.ft. burned is for 1,800 scfm total flow. Application is for 1,200 scfm increase only.	

G. EMISSIONS UNIT POLLUTANTS
(Regulated and Unregulated Emissions Units)

Emissions Unit Information Section 2
Class III Landfill Gas Collection System Flare

1. Pollutant Emitted	2. Primary Control Device Code	3. Secondary Control Device Code	4. Pollutant Regulatory Code
1 - CO			NS
2 - SO2			NS
3 - VOC	023		EL
4 - NOX			NS

H. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION
(Regulated Emissions Units Only - Emissions Limited Pollutants Only)

Emissions Unit Information Section 2
Class III Landfill Gas Collection System Flare

Pollutant Potential/Estimated Emissions : Pollutant 1

1. Pollutant Emitted : **CO**
2. Total Percent Efficiency of Control : 0.00 %
3. Potential Emissions : 13.0500000 lb/hour 57.2000000 tons/year
4. Synthetically Limited? [ ] Yes [X] No
5. Range of Estimated Fugitive/Other Emissions: to tons/year
6. Emissions Factor 0 Units lb/MMBtu Reference AP-42, 11/97
7. Emissions Method Code : 3
8. Calculations of Emissions : 1,200 scfm increase in landfill gas flow 50% of gas by volume is methane: 600 scfm increase in flow Energy content of methane: 980 Btu/scf 600 scfm * 60 min/hr * 980 Btu/scf = 35.28 MMBtu/hr 35.28 MMBtu/hr * 0.37 lb CO / MMBtu = 13.05 lb/hr 13.05 lb/hr * 8760 hr/yr * 1/2000 ton/lb = 57.2 tons per year
9. Pollutant Potential/Estimated Emissions Comment : Based on the incremental increase of 1,200 scfm of landfill gas flow rate and the CO emission factor referenced in AP-42 Section 13 Industrial Flares, 11/97, confirmed by vendor. See App. D.

H. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION
(Regulated Emissions Units Only - Emissions Limited Pollutants Only)

Emissions Unit Information Section 2
Class III Landfill Gas Collection System Flare

H. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION
(Regulated Emissions Units Only - Emissions Limited Pollutants Only)

Emissions Unit Information Section 2
Class III Landfill Gas Collection System Flare

Pollutant Potential/Estimated Emissions : Pollutant 2

1. Pollutant Emitted : **SO2**
2. Total Percent Efficiency of Control : %
3. Potential Emissions : 4.7900000 lb/hour 20.9800000 tons/year
4. Synthetically Limited? [ ] Yes [X] No
5. Range of Estimated Fugitive/Other Emissions: to tons/year
6. Emissions Factor 400 Units ppmv Reference 1997 LFG measurement
7. Emissions Method Code : 1
8. Calculations of Emissions :

gas flow to flare: 1,200 scfm * 1/35.31 m3/cf = 33.98 std m3/min
33.98 m3/min * 60 min/hr = 2039.1 m3/hr

Conc. of sulfur in gas: 400 ppmv
MW of sulfur: 32.06 g/mol
MW of S02: 64.07

400 ppm * 41.57 mol/m3 (@ std. conditions) * 32.06 g/mol = 0.53 g/m3
Assume all sulfur oxidizes with O2 in flare.
0.53 g/m3 * 64.07/32.06 = 1.06 g/m3 SO2
1.06 g/m3 * 2039.1 m3/hr * 1/453.6 lb/g = 4.79 lb/hr SO2

4.79 lb/hr * 8760 hr/yr * 1/2000 ton/lb = 20.98 tons per year

H. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION
(Regulated Emissions Units Only - Emissions Limited Pollutants Only)

Emissions Unit Information Section 2
Class III Landfill Gas Collection System Flare

9. Pollutant Potential/Estimated Emissions Comment :

Calculation is based on the incremental increase of 1,200 scfm of landfill gas flow rate and projected sulfur concentration in landfill gas of 400 ppmv. See App. D.

H. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION
(Regulated Emissions Units Only - Emissions Limited Pollutants Only)

Emissions Unit Information Section 2
Class III Landfill Gas Collection System Flare

Pollutant Potential/Estimated Emissions : Pollutant 3

1. Pollutant Emitted : **VOC**
2. Total Percent Efficiency of Control : 98.00 %
3. Potential Emissions : 0.1900000 lb/hour 0.8400000 tons/year
4. Synthetically Limited? [ ] Yes [X] No
5. Range of Estimated Fugitive/Other Emissions: to tons/year
6. Emissions Factor 595 Units ppmv Reference AP-42, 11/97
7. Emissions Method Code :
8. Calculations of Emissions :

gas flow to flare: 1,200 scfm * 1/35.31 m3/cf = 33.98 std m3/min
33.98 m3/min * 60 min/hr = 2039.1 m3/hr

Conc. of NMOC in gas: 595 ppmv
MW of NMOC (as hexane): 86.18 g/mol

595 ppm * 41.57 mol/m3 (@ std. conditions) * 86.18 g/mol = 2.13 g/m3
2.13 g/m3 * 2039.1 m3/hr * 1/453.6 lb/g = 9.58 lb/hr uncontrolled NMOC

9.58 lb/hr * (1 - 0.98) = 0.19 lb/hr controlled NMOC

0.19 lb/hr * 8760 hr/yr * 1/2000 ton/lb = 0.84 tons per year

H. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION
(Regulated Emissions Units Only - Emissions Limited Pollutants Only)

Emissions Unit Information Section 2

Class III Landfill Gas Collection System Flare

9. Pollutant Potential/Estimated Emissions Comment :

Calculations are based on incremental increase of 1,200 scfm in landfill gas flow rate and AP-42 Section 2.4 (updated 11/97).

H. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION
(Regulated Emissions Units Only - Emissions Limited Pollutants Only)

Emissions Unit Information Section 2
Class III Landfill Gas Collection System Flare

Pollutant Potential/Estimated Emissions : Pollutant 4

1. Pollutant Emitted : **NOX**
2. Total Percent Efficiency of Control : %
3. Potential Emissions : 2.4000000 lb/hour 10.5100000 tons/year
4. Synthetically Limited? [ ] Yes [X] No
5. Range of Estimated Fugitive/Other Emissions: to tons/year
6. Emissions Factor 0 Units lb/MMBtu Reference AP-42, 11/97
7. Emissions Method Code : 3
8. Calculations of Emissions : 1,200 scfm increase in landfill gas flow 50% of gas by volume is methane: 600 scfm increase in flow Energy content of methane: 980 Btu/scf 600 scfm * 60 min/hr * 980 Btu/scf = 35.28 MMBtu/hr 35.28 MMBtu/hr * 0.068 lb NOx / MMBtu = 2.4 lb/hr 2.4 lb/hr * 8760 hr/yr * 1/2000 ton/lb = 10.51 tons per year
9. Pollutant Potential/Estimated Emissions Comment : Based on the incremental increase of 1,200 scfm of landfill gas flow rate and the NOx emission factor referenced in AP-42 Section 13 Industrial Flares, 11/97, confirmed by vendor. See App. D.

SWA of PBC Class I and III Landfills Emission Rates and Gas Flow Rates

Landfill Air Emissions Estimation Model (LAEEM) Parameters for AP-42 defaults:

Lo : 100.00 m^3 / Mg
k : 0.0400 1/yr
NMOC : 595.00 ppmv
Methane : 50.0000 % volume (MW = 16.04)
Carbon Dioxide : 50.0000 % volume

Landfill Gas Flow Rate Conversions

Emission Type/Case	Potential - Actual Gas Flow Increase scfm	Std. m3/yr	Std. m3/min	Mg/yr	Comments
Class I Blower					
Landfill gas: 1,800 (fut) - 1,000 (exist) =	800	11,907,994	22.66		Single flare. All gas goes to flare.
Methane	400	5,953,997	11.33	3969.7	Gas = 50% methane by volume.
Class III Blower					
Landfill gas: 1,800 (fut) - 660 (exist) =	1,200	17,861,990	33.98		Single flare. All gas goes to flare.
Methane	600	8,930,995	16.99	5954.6	Gas = 50% methane by volume.

41.57 Conversion from std. m3/yr to Mg/yr

SWA of PBC Class I & III Landfill Total HAPs and NMOC Emissions

Input Information:

Methane concentration in landfill gas:	500000	ppmdv with MW of:		16.04
Equivalent mass/volume conc. is:	333368009	ug/m3	[ug/m3 = (ppm)41.57(MW)] @ 20° C	
Methane emission rate:	9924.3603	Mg/yr	314.70	g/s

HAP	Molecular Weight	Default Conc. (ppmv)	Mass Conc. (ug/m3)	Uncontrolled Emissions (Mg/yr)	Uncontrolled Emissions (tons/yr)	Controlled Emissions (tons/yr)
1,1,1-Trichlorethane (methyl chloroform)	133.42	0.480	2662.02	7.92E-02	8.03E-02	1.61E-03
1,1,2,2-Tetrachloroethane	167.85	1.11	7744.51	2.31E-01	2.34E-01	4.67E-03
1,1-Dichloroethane (ethylidene dichloride)	98.95	2.35	9665.70	2.88E-01	2.92E-01	5.83E-03
1,1-Dichloroethene (vinylidene chloride)	96.94	0.20	809.93	2.41E-02	2.44E-02	4.89E-04
1,2-Dichloroethane (ethylene dichloride)	98.96	0.41	1674.19	4.98E-02	5.05E-02	1.01E-03
1,2-Dichloropropane (propylene dichloride)	112.98	0.18	845.32	2.52E-02	2.55E-02	5.10E-04
Acrylonitrile	53.06	6.33	13961.13	4.16E-01	4.21E-01	8.42E-03
Benzene	78.11	1.91	6201.40	1.85E-01	1.87E-01	3.74E-03
Carbon disulfide	76.13	0.58	1844.90	5.49E-02	5.56E-02	1.11E-03
Carbon tetrachloride	153.84	0.004	25.58	7.61E-04	7.72E-04	1.54E-05
Carbonyl sulfide	60.07	0.49	1223.50	3.64E-02	3.69E-02	7.38E-04
Chlorbenzene	112.56	0.25	1188.41	3.54E-02	3.58E-02	7.17E-04
Chloroethane (ethyl chloride)	64.52	1.25	3352.39	9.98E-02	1.01E-01	2.02E-03
Chlorform	119.39	0.03	148.88	4.43E-03	4.49E-03	8.98E-05
Dichlorobenzene	147.00	0.21	1301.51	3.87E-02	3.93E-02	7.85E-04
Dichloromethane (methylene chloride)	84.94	14.3	50489.13	1.50E+00	1.52E+00	3.05E-02
Ethylbenzene	106.16	4.61	20342.83	6.06E-01	6.14E-01	1.23E-02
Hexane	86.18	6.57	23535.39	7.01E-01	7.10E-01	1.42E-02
Mercury	200.61	2.92E-04	2.43	7.25E-05	7.34E-05	1.47E-06
Methyl ethyl ketone (2-butanone)	72.10	7.09	21248.64	6.33E-01	6.41E-01	1.28E-02
Methyl isobutyl ketone (hexone)	100.16	1.87	7785.48	2.32E-01	2.35E-01	4.70E-03
NMOCs (as hexane)	86.18	595	2131439	6.35E+01	6.43E+01	1.29E+00
Perchloroethylene (tetrachloroethylene)	165.83	3.73	25711.15	7.65E-01	7.76E-01	1.55E-02
Toluene	92.13	39.3	150502.31	4.48E+00	4.54E+00	9.08E-02
Trichloroethylene	131.38	2.82	15400.26	4.58E-01	4.65E-01	9.29E-03
Vinyl chloride	62.50	7.34	19068.90	5.68E-01	5.75E-01	1.15E-02
Xylenes	106.16	12.1	53394.42	1.59E+00	1.61E+00	3.22E-02
Total HAPs				**76.56**	**77.57**	**1.55**
Total NMOC	86.18	595	2131439.49	6.35E+01	6.43E+01	1.29E+00

These calculations are for emissions of hazardous air pollutants (HAPs), as listed in Title III of the 1990 Clean Air Act Amendments.

SWA of PBC Class I & III Landfills Secondary Pollutant Emission Rates from Flare

Energy content of methane: 980 Btu/cf 34603.8 Btu/m3

CO and NOx Emission Rates Based on Vendor Emission Factors

Pollutant	Change in Methane Flow Rate to Flare (std. m^3/yr)	Energy input to flare (MMBtu/yr)	Emission Factor (lb/MMBtu)	Emissions from Flare (lb/yr)	Emissions from Flare (ton/yr)
Class I Landfill					
Carbon Monoxide	5.95E+06	206030.9	0.37	76231.4	38.12
Nitrogen Oxides	5.95E+06	206030.9	0.068	14010.1	7.01
Class III Landfill					
Carbon Monoxide	8.93E+06	309046.4	0.37	114347.2	57.17
Nitrogen Oxides	8.93E+06	309046.4	0.068	21015.2	10.51

SO2 and HCl Emission Rates Based on Mass Balance

Pollutant	Total Landfill Gas Flow Rate to Flare (Std. m^3/yr)	Concentration of S or Cl in Landfill Gas (ppmV)	Emission rate of S or Cl (m^3/yr)	Molecular Weight of S or Cl (g/gmol)	Temperature at Standard Conditions (°C)	Uncontrolled Mass Emissions of S or Cl (kg/yr)	Control Efficiency (%)	Ratio of Molecular Weights SO_2/S or HCl/Cl	Controlled Mass Emissions of Pollutant (kg/yr)	Controlled Mass Emissions of Pollutant (lb/hr)	Controlled Mass Emissions of Pollutant (ton/yr)
Class I Landfill											
Sulfur - Sulfur Dioxide	1.19E+07	20	238.16	32.06	20	317.42	0	2.00	634.27	0.160	0.70
Chlorine - Hydrogen Chloride	1.19E+07	42.0	500.14	35.45	20	736.98	91	1.03	68.24	0.017	0.08
Class III Landfill											
Sulfur - Sulfur Dioxide	1.79E+07	400	7144.80	32.06	20	9522.63	0	2.00	19028.0	4.79	20.98
Chlorine - Hydrogen Chloride	1.79E+07	42.0	750.20	35.45	20	1105.46	91	1.03	102.35	0.026	0.11

The calculation methodology for CO and NOx is provided by the vendor, attached. The calculation of SO2 and HCl is from: U.S. EPA, *Compilation of Air Pollutant Emission Factors*, Report No. AP-42, Fifth Edition, Supplement C, Section 2.4, updated November, 1997.

SWA of PBC Class I & III Landfills
Comparison of Incremental Emissions from Two Flares with PSD Thresholds

Pollutant	Emission Rate (tons/yr)	PSD Significant Increase (tons/yr)
Carbon Monoxide	95.3	100
Nitrogen Oxides	17.5	40
Sulfur Dioxide	21.7	40
Hydrogen Chloride	0.19	40
Vinyl Chloride	0.012	1
NMOC	1.29	50