



September 20, 2010

103-87513-2

Mr. Jonathan Holtom, P.E.
Florida Department of Environmental Protection
Title V Section
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

RECEIVED

SEP 22 2010

BUREAU OF
AIR REGULATION

RE: **PERMIT NO. 0112120-010-AV
TITLE V OPERATING PERMIT RENEWAL
REQUEST FOR ADDITIONAL INFORMATION**

Dear Mr. Holtom:

Wheelabrator North Broward, Inc. (Wheelabrator) received a request for additional information (RAI) from the Florida Department of Environmental Protection (FDEP) dated August 5, 2010, regarding the Title V Air Operating Permit Renewal Application for the North Broward Waste-to-Energy facility, which was submitted to FDEP in June 2010. FDEP has specifically requested if the facility has any internal combustion engines that are or may be subject to the following regulations:

- Title 40, Part 63 of the Code of Federal Regulations (40 CFR 63) Subpart ZZZZ – National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines (RICE)
- 40 CFR 60 Subpart IIII – New Source Performance Standards for Stationary Compression Ignition Internal Combustion Engines (CI ICE)
- 40 CFR 60 Subpart JJJJ – New Source Performance Standards for Stationary Spark Ignition Internal Combustion Engines (SI ICE)

As applicable, FDEP requested information about how the facility is complying with the applicable subpart(s) and asked for in-service date, cylinder displacement, and rule applicability for each emission unit subject to the subpart(s).

40 CFR 63 Subpart ZZZZ

The provisions of this subpart are applicable to owners or operators of a stationary RICE at a major or area source of hazardous air pollutant (HAP) emissions, except if the stationary RICE is being tested at a stationary RICE test cell/stand as specified in paragraphs (a) through (e) of 40 CFR 63.6585.

The Wheelabrator North Broward facility, which is a major source of HAPs has one emergency diesel fire water pump engine, which is subject to 40 CFR 63 Subpart ZZZZ. According to the definition in 40 CFR 63.6590(a)(1)(ii), the fire pump engine is an existing stationary RICE. Wheelabrator must comply with any applicable emissions limitations and operating limitations no later than May 3, 2013 [see 40 CFR 63.6595(a)].

The fire pump engine is not subject to any numerical emission limitations under the subpart. The only applicable requirements under the subpart are recordkeeping and management practice requirements, such as inspection of all hoses, belts, and air cleaner every 500 to 1,000 hours and oil and filter replacement every 500 hours or annually, whichever comes first. These are already part of Wheelabrator's routine maintenance practices at the North Broward facility.

An applicability analysis of the fire pump engine to Subpart ZZZZ is presented in Table 1.



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40 CFR 60 Subpart IIII

The provisions of this subpart are applicable to manufacturers, owners, and operators of stationary CI ICE as specified in paragraphs (a)(1) through (3) of 40 CFR 60.4200. For the purposes of this subpart, the date that construction commences is the date the engine is ordered by the owner or operator. Paragraphs (a)(1) through (a)(3) state the following are subject to Subpart IIII:

- (1) *Manufacturers of stationary CI ICE with a displacement of less than 30 liters per cylinder where the model year is:*
 - (i) *2007 or later, for engines that are not fire pump engines,*
 - (ii) *The model year listed in table 3 to this subpart or later model year, for fire pump engines.*
- (2) *Owners and operators of stationary CI ICE that commence construction after July 11, 2005 where the stationary CI ICE are:*
 - (i) *Manufactured after April 1, 2006 and are not fire pump engines, or*
 - (ii) *Manufactured as a certified National Fire Protection Association (NFPA) fire pump engine after July 1, 2006.*
- (3) *Owners and operators of stationary CI ICE that modify or reconstruct their stationary CI ICE after July 11, 2005.*

The emergency fire pump engine at the North Broward facility is a CI ICE manufactured before July 11, 2005, and therefore is not subject to 40 CFR 60 Subpart IIII.

40 CFR 60 Subpart JJJJ

The provisions of this subpart are applicable to manufacturers, owners, and operators of stationary SI ICE as specified in Paragraphs 60.4230(a)(1) through (5) of 40 CFR 60 Subpart JJJJ. There are no SI ICEs at the North Broward facility that are subject to the subpart.

The fire pump engine at the North Broward facility is a Peerless Model 8AEF17N that draws its power from a Caterpillar Model 3306 287-hp diesel engine. The engine was installed in January 1991. A 330-gallon diesel oil storage tank stores fuel for the pump engine. None of these are currently included in the Title V operating permit. The attached Table 2 shows potential emissions from the diesel engine for a maximum of 500 operating hours per year. As shown, except for nitrogen oxides (NO_x), all criteria pollutant emissions are less than 1 ton per year (TPY). The maximum potential NO_x emissions from the engine are 2.2 TPY. The U.S. Environmental Protection Agency's (EPA's) TANKS program was used to calculate volatile organic compound (VOC) emissions potential from the 330-gallon tank (see Attachment 1). As shown, the VOC emissions potential is only 0.6 pound per year (0.0003 TPY). The tank is not subject to any applicable requirement.

Since the fire pump engine and the 330-gallon diesel storage tank are not subject to any numerical emissions limitations and have the potential to emit less than 5 TPY of NO_x, carbon monoxide (CO), VOC, particulate matter (PM₁₀/PM_{2.5}) or sulfur dioxide (SO₂) emissions, based on Rule 62-210.300(3)(b), Florida Administrative Code (F.A.C.), Wheelabrator requests that this equipment be granted insignificant emission unit status and be included in the current insignificant emissions unit list (Appendix I-1).

Wheelabrator submitted a Site Certification modification petition to FDEP in January 2010 to add a metal recovery facility. The facility includes conveyors and mechanical devices to separate the ferrous and non-ferrous metals from the bottom ash, truck loading system, and a fly ash handling and processing system. The entire metal recovery facility including truck loading is inside an enclosed building. The only openings are doors for ash and recovered metal trucks and conveyors. Air emissions from the metal recovery facility are fugitive in nature. Bottom ash from the boiler is quenched with water after leaving each boiler. As a result, bottom ash has about 20 to 30 percent moisture, which controls fugitive dust emissions. Bottom ash is transported to the facility using a belt conveyor within a totally enclosed gallery, which controls fugitive emissions. Fly ash is transported to the facility in totally enclosed conveyors and

conditioned with water in a pug mill to control dust emissions. As a result of the dust control measures, total dust emissions from the metal recovery facility is well below 5 TPY. The fugitive emissions calculation is presented in Table 3.

Since there are no applicable requirements for the metal recovery facility and total emissions from the facility is less than 5 TPY, Wheelabrator requests that the metal recovery facility be added to the insignificant emission unit list (Appendix I-1).

Thank you for your consideration of this information. If you have any questions, please do not hesitate to call me at (352) 336-5600.

Sincerely,

GOLDER ASSOCIATES INC.



Kennard F. Kosky, P.E.
Principal Engineer



Salahuddin K. Mohammad
Senior Project Engineer

cc: C. Faller, Wheelabrator North Broward

Enclosures

SKM/edk

Table 1 – Applicability Table for 40 CFR 63, Subpart ZZZZ
Emergency Fire Pump Engine

Part 63 Subpart ZZZZ – National Emissions Standards for Hazardous Air Pollutants for Reciprocating Internal Combustion Engines	
Section	Applies Yes/No
§ 63.6585 Am I subject to this subpart?	
§ 63.6585 Do you own or operate a stationary reciprocating internal combustion engine (RICE) located at a major source or area source of HAP emissions?	Yes
§ 63.6585 Is the stationary RICE being tested at a stationary RICE test cell/stand?	No
§ 63.6585(b) Is the stationary RICE located at a major source of HAP emissions?	Yes
§ 63.6585(e) Is the stationary RICE used for national security purposes, and have you received approval to claim an exemption from the requirements of this subpart as described in 40 CFR Part 1068, Subpart C?	No
§ 63.6590 What parts of my plant does this subpart cover?	
§ 63.6590(a)(1) Affected Source – Existing stationary RICE?	Yes
§ 63.6590(a)(2) Affected Source – New stationary RICE?	No
§ 63.6590(a)(3) Affected Source – Reconstructed stationary RICE?	No
§ 63.6590(b) Stationary RICE subject to limited requirements	No
§ 63.6590(c) Stationary RICE subject to regulations under 40 CFR Part 60?	No
§ 63.6595 When do I have to comply with this subpart?	
§ 63.6595(a)(1) Affected Sources – Existing stationary CI RICE with a site rating of less than or equal to 500 brake HP located at a major source of HAP emissions must comply with the applicable emissions limitations and operating limitations no later than May 3, 2013.	Yes
§ 63.6595(b) Area sources that become major sources.	No
§ 63.6595(c) An affected source must comply with the applicable notification requirements in § 63.6645 and 40 CFR Part 63, Subpart A.	Yes
§ 63.6600 What emission limitations and operating limitations must I meet if I own or operate a stationary RICE with a site rating of more than 500 brake HP located at a major source of HAP emissions?	No
§ 63.6601 What emission limitations must I meet if I own or operate a 4SLB stationary RICE with a site rating of greater than or equal to 250 brake HP and less than 500 brake HP located at a major source of HAP emissions?	No
§ 63.6602 What emission limitations must I meet if I own or operate an existing stationary CI RICE with a site rating of equal to or less than 500 brake HP located at a major source of HAP emissions?	
§ 63.6602 Owners or operators of an existing stationary CI RICE with a site rating of equal to or less than 500 HP located at a major source of HAP emissions must comply with the requirements in Table 2c to this subpart.	Yes
§ 63.6603 What emission limitations and operating limitations must I meet if I own or operate an existing stationary RICE located at an area source of HAP emissions?	No
§ 63.6604 What fuel requirements must I meet if I own or operate an existing stationary CI RICE?	No
§ 63.6605 What are my general requirements for complying with this subpart?	Yes
§ 63.6610 By what date must I conduct the initial performance tests or other	No

Table 1 – Applicability Table for 40 CFR 63, Subpart ZZZZ
Emergency Fire Pump Engine

initial compliance demonstrations if I own or operate a stationary RICE with a site rating of more than 500 brake HP located at a major source of HAP emissions?	
§ 63.6611 By what date must I conduct the initial performance tests or other initial compliance demonstrations if I own or operate a 4SLB SI stationary RICE with a site rating of greater than or equal to 250 and less than or equal to 500 brake HP located at a major source of HAP emissions?	No
§ 63.6612 By what date must I conduct the initial performance tests or other initial compliance demonstrations if I own or operate an existing stationary RICE with a site rating of less than or equal to 500 brake HP located at a major source of HAP emissions or an existing stationary RICE located at an area source of HAP emissions?	
§ 63.6612(a) Initial performance test or other initial compliance demonstration must be conducted according to Tables 4 and 5 to this subpart that applies within 180 days after the compliance date specified in § 63.6595.	Yes (Maintenance requirement only, no initial performance test)
§ 63.6615 When must I conduct subsequent performance tests?	No
§ 63.6620 What performance tests and other procedures must I use?	No
§ 63.6625 What are my monitoring, installation, collection, operation, and maintenance requirements?	
§ 63.6625(a) If required to reduce CO emissions and using CEMS, the CEMS must be installed, operated, and maintained according to the requirements in § 63.6625(a)(1) through (4).	No
§ 63.6625(b) Each continuous parameter monitoring system (CPMS) must be installed, operated, and maintained according to the requirements in § 63.8.	No
§ 63.6625(c) New or reconstructed stationary RICE firing landfill gas or digester gas ?	No
§ 63.6625(d) New or reconstructed emergency 4SLB stationary RICE with a site rating of greater than or equal to 250 and less than or equal to 500 BHP?	No
§ 63.6625(e) An existing stationary emergency RICE not subject to any numerical emissions standards shown in Table 2d to this subpart must operate and maintain the stationary RICE and after-treatment control device (if any) according to the manufacturer's emission-related written instructions or develop own maintenance plan which must provide to the extent practicable for the maintenance and operation of the engine in a manner consistent with good air pollution control practice for minimizing emissions.	Yes
§ 63.6625(f) An existing emergency stationary RICE with a site rating of less than or equal to 500 brake HP located at a major source of HAP emissions must install a no-resettable hour meter if one is not already installed.	Yes
§ 63.6625(g) Owners or operators of existing non-emergency CI engine greater than or equal to 300 HP that is not equipped with a closed crankcase ventilation system must comply with either § 63.6625(g)(1) or § 63.6625(g)(2).	No
§ 63.6625(h) Operators of existing stationary RICE must minimize the engine's time spent at idle during startup and minimize the engine's startup time to a period needed for appropriate and safe loading of the engine, not to exceed 30 minutes.	Yes
§ 63.6625(i) An oil analysis program may be utilized in order to extend the	Yes

Table 1 – Applicability Table for 40 CFR 63, Subpart ZZZZ
Emergency Fire Pump Engine

specified oil change requirement in Tables 2c and 2d.	
§ 63.6630 How do I demonstrate initial compliance with the emission limitations and operating limitations ?	No
§ 63.6635 How do I monitor and collect data to demonstrate continuous compliance ?	
§ 63.6635(a) To comply with emission and operating limitations, must monitor and collect data according to this section.	Yes
§ 63.6635(b) Must monitor continuously at all times that the stationary RICE is operating.	Yes
§ 63.6635(c) Data recorded during malfunction/repairs may not be used in emission or operating level reports. All valid data collected during all other periods may be used.	Yes
§ 63.6640 How do I demonstrate continuous compliance with the emission limitations and operating limitations?	
§ 63.6640(a) Must demonstrate compliance with each emission limitation and operating limitation in Tables 1a and 1b, Tables 2a and 2b, Table 2c, and Table 2d that apply according to methods specified in Table 6.	Yes
§ 63.6640(b) Report each instance in which the stationary RICE did not meet each emission limitation or operating limitation.	Yes
§ 63.6640(d) Applies to new, reconstructed, and rebuilt stationary RICE.	No
§ 63.6640(e) Report each instance in which the stationary RICE did not meet the general requirements in Table 8 that applies.	No
§ 63.6640(f) Owners or operators of an existing emergency stationary RICE with a site rating of less than or equal to 500 brake HP located at a major source of HAP emissions must operate the engine according to conditions § 63.6640(f)(1) through § 63.6640(f)(4).	Yes
§ 63.6645 What notifications must I submit and when?	
§ 63.6645(a)(1) Initial notifications must be submitted by the specified dates.	No
§ 63.6645(b) and (c) Applies to stationary RICE with a site rating of more than 500 brake HP.	No
§ 63.6645(d) If the start up of the stationary RICE with a site rating of equal to or less than 500 brake HP located at a major source of HAP emissions before the effective date of this subpart, initial notification must be submitted not later than July 16, 2008.	Yes
§ 63.6645(e) Applies to new or reconstructed stationary RICE.	No
§ 63.6645(f) Information required for the initial notification.	Yes
§ 63.6645(g) Notification required before conducting a performance test.	No
§ 63.6645(h) Notification of Compliance Status must be submitted within specified days following completion of initial compliance demonstration.	No
§ 63.6650 What reports must I submit and when?	No
§ 63.6655 What records must I keep?	
§ 63.6655(a) Records of each compliance notification and compliance report, occurrence and duration of each malfunction of operation, performance evaluations, maintenance, etc. must be kept.	Yes
§ 63.6655(b) Record keeping requirement for CEMS or CPMS.	No
§ 63.6655(c) Applies to new or reconstructed stationary RICE firing landfill gas or digester gas.	No
§ 63.6655(d) Records required in Table 6 to show continuous compliance with each emission or operating limits must be kept.	Yes

Table 1 – Applicability Table for 40 CFR 63, Subpart ZZZZ
Emergency Fire Pump Engine

§ 63.6655(e) Records of the maintenance conducted on the stationary RICE must be kept.	Yes
§ 63.6655(f) Records of the operating hours of the engine must be kept.	Yes
§ 63.6660 In what form and how long must I keep the records?	Yes
§ 63.6665 What parts of the General Provisions apply to me?	Yes
§ 63.6670 Who implements and enforces this subpart?	Yes
§ 63.6675 What definitions apply to this subpart?	Yes
Table 1a to Subpart ZZZZ of Part 63—Emission Limitations for Existing, New, and Reconstructed Spark Ignition, 4SRB Stationary RICE >500 HP Located at a Major Source of HAP Emissions	No
Table 1b to Subpart ZZZZ of Part 63—Operating Limitations for Existing, New, and Reconstructed Spark Ignition, 4SRB Stationary RICE >500 HP Located at a Major Source of HAP Emissions	No
Table 2a to Subpart ZZZZ of Part 63—Emission Limitations for New and Reconstructed 2SLB and Compression Ignition Stationary RICE >500 HP and New and Reconstructed 4SLB Stationary RICE ≥250 HP Located at a Major Source of HAP Emissions	No
Table 2b to Subpart ZZZZ of Part 63—Operating Limitations for New and Reconstructed 2SLB and Compression Ignition Stationary RICE >500 HP Located at a Major Source of HAP Emissions, Existing Non-Emergency Compression Ignition Stationary RICE >500 HP, and New and Reconstructed 4SLB Burn Stationary RICE ≥250 HP Located at a Major Source of HAP Emissions	No
Table 2c to Subpart ZZZZ of Part 63—Requirements for Existing Compression Ignition Stationary Rice Located at Major Sources of HAP Emissions	No
1.a. Change oil and filter every 500 hours of operation or annually, whichever comes first	Yes
1.b. Inspect air cleaner every 1,000 hours of operation or annually, whichever comes first; and	Yes
1.c. Inspect all hoses and belts every 500 hours of operation or annually, whichever comes first, and replace as necessary	Yes
Table 2d to Subpart ZZZZ of Part 63 Requirements for existing compression ignition stationary RICE located at area sources of HAP emissions	No
Table 3 to Subpart ZZZZ of Part 63—Subsequent Performance Tests	No
Table 4 to Subpart ZZZZ of Part 63—Requirements for Performance Tests	No
Table 5 to Subpart ZZZZ of Part 63—Initial Compliance With Emission Limitations and Operating Limitations	No
Table 6 to Subpart ZZZZ of Part 63—Continuous Compliance With Emission Limitations and Operating Limitations	
9. Existing stationary CI RICE not subject to any numerical emission limitations ; a. Work or Management practices	Yes
Table 7 to Subpart ZZZZ of Part 63—Requirements for Reports	No
Table 8 to Subpart ZZZZ of Part 63—Applicability of General Provisions to Subpart ZZZZ	No

TABLE 2
POTENTIAL EMISSIONS FOR THE EMERGENCY GENERATOR
WHEELABRATOR NORTH BROWARD

Emergency Generator	
<u>Performance</u>	
Diesel Engine Model	Caterpillar 3306
Fuel	Diesel
Diesel Engine Rating (kW)	214
Diesel Engine Rating (HP)	287
Maximum Operation (hours) ^a	500
Number of Units	1
<u>Emissions</u>	
SO ₂ ^b (lb/hp-hr)	0.00205
(lb/hr)	0.59
(TPY)	0.15
NO _x ^b (lb/hp-hr)	0.031
(lb/hr)	8.90
(TPY)	2.22
CO ^b (lb/hp-hr)	0.00668
(lb/hr)	1.9
(TPY)	0.48
VOC ^b - (lb/MMBtu)	0.00251
(lb/hr)	0.72
(TPY)	0.18
PM ₁₀ /PM _{2.5} ^b (lb/hp-hr)	0.0022
(lb/hr)	0.63
(TPY)	0.16

^a Maximum expected operating hours.

^b Based on Section 3.3, Table 3.3-1, AP-42.

**TABLE 3
ESTIMATION OF FUGITIVE PM EMISSION FACTORS AND RATES FOR THE METAL RECOVERY SYSTEM
WHEELABRATOR NORTH BROWARD WASTE-TO-ENERGY FACILITY**

Parameters		Bottom Ash Handling	Untreated Fly Ash Handling	Treated Fly Ash Handling
Emission Point Type		Batch or Conveyor Drop	Batch or Conveyor Drop	Batch or Conveyor Drop
Material Handling Data				
Material throughput, ton/hr		34 ^a	6 ^a	6 ^a
ton/day		816 ^a	144 ^a	144 ^a
Material throughput, ton/yr		297,840 ^a	52,560 ^a	52,560 ^a
Moisture content (M), %		20 ^a	10 ^f	28 ^f
Number of transfers		8 ^b	4 ^b	3 ^b
General/ Site Characteristics				
Mean wind speed, mph		3.6 ^c	3.6 ^c	3.6 ^c
Particle size multiplier, PM (k)		0.74 ^d	0.74 ^d	0.74 ^d
Particle size multiplier, PM ₁₀ (k)		0.35 ^d	0.35 ^d	0.35 ^d
Particle size multiplier, PM _{2.5} (k)		0.053 ^d	0.053 ^d	0.053 ^d
Emission Control Data				
Emission control method		Enclosed building	Enclosed building	Enclosed building
Emission control removal efficiency, % (c)		95 ^e	95 ^e	95 ^e
Emission Factor (EF) Equations^d				
Uncontrolled EF (UEF) Equation		$UEF \text{ (lb/ton)} = k \times (0.0032) \times (U / 5)^{1.3} [(M / 2)^{1.4}]$		
Controlled EF (CEF) Equation		$CEF \text{ (lb/ton)} = UEF \text{ (lb/ton)} \times [100\% - \text{Removal efficiency} (\%)]$		
Calculated PM Emission Factor (EF)				
Uncontrolled EF, lb/ton	Annual	0.000062	0.000162	0.000038
Controlled EF, lb/ton	Annual	0.000003	0.000008	0.000002
Calculated PM₁₀ Emission Factor (EF)				
Uncontrolled EF, lb/ton	Annual	0.000029	0.000077	0.000018
Controlled EF, lb/ton	Annual	0.000001	0.000004	0.000001
Calculated PM_{2.5} Emission Factor (EF)				
Uncontrolled EF, lb/ton	Annual	0.000004	0.000012	0.000003
Controlled EF, lb/ton	Annual	0.000000	0.000001	0.000000
Estimated Emission Rate (ER)				
PM ER ton/yr		0.004	0.0009	0.0002
PM ₁₀ ER ton/yr		0.002	0.0004	0.0001
PM _{2.5} ER ton/yr		0.0003	0.0001	0.00001

^a Based on Site certification modification petition submitted to FDEP in January, 2010.

^b Number of transfer points based on process flow diagram in the Site Certification modification application submitted in January, 2010.

^c Based on 5-year average wind speed from Miami International Airport surface observations for 2001 - 2005.

^d USEPA, 1995; AP-42, Section 13.2.4 for Aggregate Handling and Storage Piles.

^e The metal recovery operation is inside an enclosed building. Control efficiency based on Fugitive Dust Background Document and Technical Information Document for Best Available Control Measures, EPA 1992.

^f Moisture content of 10% assumed for fly ash.

ATTACHMENT 1

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Identification and Physical Characteristics

Identification

User Identification:	330 gal tank
City:	Miami
State:	Florida
Company:	Wheelabrator South
Type of Tank:	Horizontal Tank
Description:	330 gallon diesel tank

Tank Dimensions

Shell Length (ft):	5.50
Diameter (ft):	3.20
Volume (gallons):	330.00
Turnovers:	30.00
Net Throughput(gal/yr):	9,900.00
Is Tank Heated (y/n):	N
Is Tank Underground (y/n):	N

Paint Characteristics

Shell Color/Shade:	Gray/Light
Shell Condition	Good

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meteorological Data used in Emissions Calculations: Miami, Florida (Avg Atmospheric Pressure = 14.75 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

330 gal tank - Horizontal Tank
Miami, Florida

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Distillate fuel oil no. 2	All	83.70	75.41	92.00	78.13	0.0135	0.0106	0.0172	130.0000			188.00	Option 1: VP70 = .009 VP80 = .012

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

330 gal tank - Horizontal Tank
Miami, Florida

Annual Emission Calculations

Standing Losses (lb):	0.1773
Vapor Space Volume (cu ft):	28.1743
Vapor Density (lb/cu ft):	0.0003
Vapor Space Expansion Factor:	0.0574
Vented Vapor Saturation Factor:	0.9989
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	28.1743
Tank Diameter (ft):	3.2000
Effective Diameter (ft):	4.7350
Vapor Space Outage (ft):	1.6000
Tank Shell Length (ft):	5.5000
Vapor Density	
Vapor Density (lb/cu ft):	0.0003
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0135
Daily Avg. Liquid Surface Temp. (deg. R):	543.3743
Daily Average Ambient Temp. (deg. F):	75.8917
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	537.8017
Tank Paint Solar Absorptance (Shell):	0.5400
Daily Total Solar Insulation Factor (Btu/sqft day):	1,537.3318
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0574
Daily Vapor Temperature Range (deg. R):	33.1805
Daily Vapor Pressure Range (psia):	0.0066
Breather Vent Press. Setting Range (psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0135
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0106
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0172
Daily Avg. Liquid Surface Temp. (deg R):	543.3743
Daily Min. Liquid Surface Temp. (deg R):	535.0792
Daily Max. Liquid Surface Temp. (deg R):	551.6694
Daily Ambient Temp. Range (deg. R):	13.8000
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9989
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0135
Vapor Space Outage (ft):	1.6000
Working Losses (lb):	
Vapor Molecular Weight (lb/lb-mole):	0.4131
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	130.0000
Annual Net Throughput (gal/yr.):	0.0135
	9,900.0000

Annual Turnovers:	30.0000
Turnover Factor:	1.0000
Tank Diameter (ft):	3.2000
Working Loss Product Factor:	1.0000
Total Losses (lb):	0.5905

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

330 gal tank - Horizontal Tank
Miami, Florida

Components	Losses(lbs)		
	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	0.41	0.18	0.59