# I N T E R O F F I C E   M E M O R A N D U M

**Date:** 08-Feb-1993 06:30am EST
**From:** Bill Hinkley TAL
HINKLEY_B
**Dept:** Waste Management
**Tel No:** 904/488-0300
**SUNCOM:**

**TO:** Doug Beason TAL ( BEASON_D )

**CC:** Kathy Anderson TAL ( ANDERSON_K )

**Subject:** Gretna Incinerator

Doug: to follow up on our brief discussion Friday about the Gretna incinerator:

* Did they ever say where they intend to get enough waste to run the Plant?

* Did they ever mention taking out of state waste?

* We've issued an Intent to Deny; what is the applicant doing now? Gathering more info?

Thanks for a prompt response, wwh

# I N T E R O F F I C E   M E M O R A N D U M

**Date:** 08-Feb-1993 09:43am EST
**From:** Doug Beason TAL
BEASON_D
**Dept:** Office General Counsel
**Tel No:** 904/488-9730
**SUNCOM:**

**TO:** Preston Lewis TAL ( LEWIS_P )
**TO:** John Brown TAL ( BROWN_J )
**TO:** Jeff Braswell TAL ( BRASWELL_J )
**TO:** Jan Rae Clark TAL ( CLARK_JR )

**Subject:** city of gretna

attached is an e-mail from b. hinkley concerning the status of the city of gretna pemit applicaiton. i would appreciate your (lewis/brown) assistance in responding to the request for information.

thanks.

Jonathan Holtam for your files GR 2/16

# I N T E R O F F I C E   M E M O R A N D U M

**Date:** 09-Feb-1993 01:08pm EST
**From:** Preston Lewis TAL
LEWIS_P
**Dept:** Air Resources Management
**Tel No:** 904/488-1344
**SUNCOM:**

**TO:** Doug Beason TAL ( BEASON_D )

**CC:** John Brown TAL ( BROWN_J )
**CC:** Jeff Braswell TAL ( BRASWELL_J )
**CC:** Jan Rae Clark TAL ( CLARK_JR )

**Subject:** RE: city of gretna

Doug,

The status of the Intent to Deny (issued 9/11/92 **) is as follows:

1) City of Gretna, consultants and owner/operators met with DER's staff (Beason, Lewis, Baig, Glunn, Brown and Jan Rae Clark) 9/22/92 and 10/13/92 to discuss the reasons for the denial. At the 10/13/92 a response was submitted **** to satisfy our concerns.**

**2) DER reviewed the 10/13/92 response and issued a letter 11/10/92 **** which required that they either answer our solid waste concerns (source of waste, markets for recyclables, deposition plan for residuals, etc) or submit a solid waste permit application which could be processed simultaneously with the air permit.

3) Harry Meshaw (financing) and a colleague stopped by my office 2/5/93 **to say that responses to our solid waste** concerns were being prepared.

4) A conversation with O. C. Allen, City of Gretna, on 2/3/93 indicates that Gretna has given John Mathews a deadline for responding to our concerns. John Mathews has told the City of Gretna that he may change the plant to a waste pelltizing facility - in which case, the permitting process would have to start over. The City of Gretna is unclear as to future direction at this time but, will courtesy copy us on any correspondence.

KBN Engineering wanted to meet with us around Christmas to discuss our requirements (test our resolve) but we were too busy to accomodate them.

** Correspondence can be obtained from Jonathan (8-8163), who has assumed the permitting responsibilities from Mirza Baig (joined EPA in December 1992)

Presson —

KBN

March 29, 1993

RECEIVED

MAR 30 1993

Division of Air
Resources Management

Mr. John C. Brown, P.E.
Florida Department of Environmental Regulation
Bureau of Air Regulation
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Re: Gadsden County - A.P.
City of Gretna Resource Recovery Facility
AC 20-212334 (MSW Incinerator)

Dear Mr. Brown:

I am writing in response to your letter dated November 10, 1992, addressed to the Honorable Evelyn Rollins, Mayor of the City of Gretna, requesting additional information regarding the above-referenced source.

1. ***Provide either a copy of a solid waste permit application or a response to the solid waste concerns included in the Department's Intent to Deny a permit.***

   The solid waste permit application is being prepared and will be submitted to the Department in the near future.

2. ***When does the City of Gretna anticipate negotiating reciprocal agreements with all suppliers of municipal solid waste (MSW) allowing approximately 10 to 15 percent (by weight) of all MSW received by Gretna to be returned to the originating source? Provide a copy of proposed contract.***

   Florida Reduction Corporation (the Operator) is currently negotiating with several suppliers of MSW. Contracts will be finalized prior to commencing construction on the facility. A copy of the proposed contracts will be provided to the Department prior to commencing construction.

3. ***Please provide us with any additional information (letters of intent) you may have on the markets for (contaminated) recyclables.***

   The Operator (Florida Reduction Corporation) has contacted a number of potential buyers for the recovered glass product from the proposed facility. These potential buyers of the recovered glass materials are:

   (1) Owens Illinois with offices in Atlanta, Georgia; Lakeland and Jacksonville, Florida.
   (2) Bassicuss Company located in Atlanta, Georgia.
   (3) A.D. Losciato, Inc. located in Tallahassee, Florida.
   (4) Capital Recycling, Inc. located in Tallahassee, Florida.



KBN ENGINEERING AND APPLIED SCIENCES, INC.
1034 Northwest 57th Street Gainesville, Florida 32605 904/331-9000 FAX: 904/332-4189

FEDERAL EXPRESS

QUESTIONS? CALL 800-238-5355 TOLL FREE.

1196M 1028822723

**AIRBILL** PACKAGE TRACKING NUMBER **1028822723**

**RECIPIENT'S COPY**

**1** Date: 3/29/93

From (Your Name) Please Print: David A. Buff/VJP

Your Phone Number (Very Important): (904) 331-9000

Company: KBN ENG & APPLIED SCIENCES

Department/Floor No.

Street Address: 1034 NW 57TH ST

City: GAINESVILLE State: FL ZIP Required: 32605

**2** To (Recipient's Name) Please Print: John C. Brown

Recipient's Phone Number (Very Important): (904) 488-1344

Company: Florida Department of Environmental Reg.

Department/Floor No.

Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. Zip Codes.): 2600 Blair Stone Road

City: Tallahassee State: FL ZIP Required: 32399

*YOUR INTERNAL BILLING REFERENCE INFORMATION (First 24 characters will appear on invoice.)*: 12173-0200/BUFF/VJP

**H** *IF HOLD FOR PICK-UP, Print FEDEX Address Here*

Street Address

City State ZIP Required

**3** PAYMENT 1 [X] Bill Sender 2 [ ] Bill Recipient's FedEx Acct. No. 3 [ ] Bill 3rd Party FedEx Acct. No. 4 [ ] Bill Credit Card 5 [ ] Cash/Check

**4** SERVICES (Check only one box)

| Priority Overnight (Delivery by next business morning†) | Standard Overnight (Delivery by next business afternoon†) |
|---|---|
| 11 [ ] YOUR PACKAGING | 51 [ ] YOUR PACKAGING |
| 16 [ ] FEDEX LETTER * | 56 [ ] FEDEX LETTER * |
| 12 [X] FEDEX PAK * | 52 [ ] FEDEX PAK * |
| 13 [ ] FEDEX BOX | 53 [ ] FEDEX BOX |
| 14 [ ] FEDEX TUBE | 54 [ ] FEDEX TUBE |
| **Economy Two-Day** (Delivery by second business day†) | **Government Overnight** (Restricted for authorized users only) |
| 30 [ ] ECONOMY | 46 [ ] GOV'T LETTER |
| | 41 [ ] GOV'T PACKAGE |

Freight Service (for Extra Large or any package over 150 lbs.)

70 [ ] OVERNIGHT FREIGHT ** (Confirmed reservation required) 80 [ ] TWO-DAY FREIGHT **

† Delivery commitment may be later in some areas. *Declared Value Limit $100. **Call for delivery schedule.

**5** DELIVERY AND SPECIAL HANDLING (Check services required)

1 [ ] HOLD FOR PICK-UP (Fill in Box H)
2 [X] DELIVER WEEKDAY
3 [ ] DELIVER SATURDAY (Extra charge) (Not available to all locations)
4 [ ] DANGEROUS GOODS (Extra charge)
5 [ ]
6 [ ] DRY ICE ______ Lbs.
7 [ ] OTHER SPECIAL SERVICE
8 [ ]
9 [ ] SATURDAY PICK-UP (Extra charge)
10 [ ]
11 [ ] DESCRIPTION
12 [ ] HOLIDAY DELIVERY (If offered) (Extra charge)

**6** PACKAGES | WEIGHT In Pounds Only

Total 1 | Total 1

DIM SHIPMENT (Chargeable Weight) [ ] ______ lbs.

L x W x H =

Received At: 1 [ ] Regular Stop 2 [ ] On-Call Stop 3 [ ] Drop Box 4 [ ] B.S.C. 5 [ ] Station

Emp. No. Date

[ ] Cash Received
[ ] Return Shipment
[ ] Third Party [ ] Chg. To Del. [ ] Chg. To Hold

Street Address

City State Zip

Received By: X

Date/Time Received FedEx Employee Number

**7** Release Signature:

FedEx Emp. No. Date/Time

Federal Express Use

Base Charges

Declared Value Charge

Other 1

Other 2

Total Charges

REVISION DATE 4/91
PART #137204 FXEM 6/91
FORMAT #082

082

Based on the contacts with the above potential buyers, the City believes that all recovered glass materials from the proposed facility will be accepted by recyclable glass buyers.

4. ***Submit the revised emission estimates for all pollutants, including calculation sheets.***

Revised emission estimates for all pollutants, Tables 2-4 and 2-5, are attached. Backup calculations are presented in Attachment A.

5. ***The original permit application stated that the tire processing operation can handle up to 45 tons per day (TPD) of scrap tires of which approximately 60 percent by weight will become tire derived fuel (TDF). What is the maximum amount of tires in terms of number per hour, TPD and TPY?***

The amount of tires can be calculated from the proposed TDF feed rates ranging from 0.83 to 1.04 TPH for the proposed RDF to TDF fuel ratios of 80/20 to 75/25, respectively (see Table 2-2 on Page 9 of the original permit application). The average weight of a used tire is between 20 to 25 pounds depending on size. The calculations will assume an average weight of 22.5 pounds per tire.

0.83 ton/hr TDF x 2000 lb/ton x (100 lb of tire/60 lb of TDF) ÷ (22.5 lb/tire) = 123 tires/hr.
1.04 ton/hr TDF x 2000 lb/ton x (100 lb of tire/60 lb of TDF) ÷ (22.5 lb/tire) = 154 tires/hr.

Thus, between 123 to 154 tires per hour.

Maximum tons per day of tires:

154 tires/hr x 24 hour/day x 22.5 lb/tire ÷ 2000 lb/ton = 41.6 TPD
or 1.04 ton TDF/hr x 24 hr/day x (100 lb of tire/60 lb TDF) = 41.6 TPD

Thus, approximately a maximum of 41.6 tons per day of tires.

Maximum tons per year of tires:

154 tires/hr x 7,920 hr/yr x 22.5 lb/tire ÷ 2000 lb/ton = 13,721 TPY

Thus, approximately a maximum of 13,721 tons per year of tires.

***In the submittal dated October 12, 1992 why were the tires not included in the projected MSW composition analysis of TDF.***

Tires are considered to be a supplemental fuel of which the operator of the proposed auger combustor will utilize only on an "as needed" basis. Therefore, tires were not included in the projected MSW composition calculations.

*Submit a composition analysis of TDF.*

A composition analysis of TDF has been submitted as Table 2-1 on Page 7 of the original permit application and in Appendix B of the original permit application. Copies of Table 2-1 and an additional reference page are attached to this submittal.

*What will be the maximum amount of tires (#/hr) in a ton of TDF?*

Pounds per hour of tires can be calculated as follows:

$$1 \text{ ton of TDF} \times \frac{2{,}000 \text{ lb}}{1 \text{ ton}} \times \frac{100 \text{ lb of tires}}{60 \text{ lb of TDF}} = 3{,}333 \text{ lb of tires}$$

Therefore, for every ton of TDF burned as fuel per hour, approximately 3,333 lb of waste (whole) tires (of which 60 percent by weight will be processed into TDF) will be required. The 3,333 lb of tires is about 148 tires, assuming an average 22.5 lb per tire.

*How can you assure the Department that the heat value of TDF and refuse derived fuel (RDF) fed to the combustor will not exceed 128.9 MMBtu/hr on a continuous basis.*

Please refer to Item No. 6 on Pages 4 and 5 of the August 5 submittal.

6. *The Thermo Flex baghouse is designed to handle a flow of 49,600 ACFM with a filtering area of 40,480 sq. feet while the United McGill baghouse is designed to handle a flow of 70,100 ACFM with a filtering area of 20,000 sq. ft. Which baghouse (or equivalent) do you propose to install? Submit a "D" size drawing of the process flow diagram showing all volumetric flow rates (ACFM or DSCFM) and material balance (not in a tabular form) including the wood chipping operation and all storage silos.*

The baghouse vendor has not been selected. However, either baghouse is capable of meeting the proposed emission limit of 0.02 gr/dscf. United McGill has guaranteed this emission rate with a baghouse having a cloth area of approximately 20,000 $ft^3$. It is noted that the 70,100 acfm stated in the United McGill proposal is the flow rate entering the spray dryer, and equates to the 49,600 acfm exiting the baghouse. Thus, the air-to-cloth ratio for this baghouse is approximately 2.5:1. The Thermo Flex baghouse is an oversize existing unit capable of holding up to 40,480 $ft^2$ of cloth area. Thus, this unit is more than capable of achieving the 0.02 gr/dscf outlet grain loading.

The different flow rates reflect the actual volumetric flow rate at two different locations in the exhaust stream of the auger combustor. The 49,600 acfm represents the stack outlet flow rate (or flow at baghouse exit) at 200°F and 12.9 percent moisture by volume. The 70,100 acfm represents the actual exhaust flow rate entering the spray dryer, as estimated by United McGill Corporation. Either baghouse will be able to provide a maximum outlet duct loading of 0.02 gr/dscf.

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The process flow diagrams with volumetric flow rates and material balance are attached. There is no wood chipping operation on site. Any wastewood used will be preprocessed or having sufficiently small dimensions such that it will be processed by the RDF shredders.

***Provide more details on the TDF/RDF storage/mixing/feeding operations.***

RDF resulting from the front end process and TDF resulting from the whole tire debeading operation will be fed to the shredder via two separate conveyor belts. In the shredders, the two fuels will be combined (when TDF is used as a supplement fuel) and then stored on the floor of the building until burned in the combustor. The stored fuel will be pushed into a recessed weigh hopper and then fed to the combustor.

7. ***Provided us with the names and phone numbers of sales persons at the Nalco Fuel Tech and the Merrick Corporation so that we may contact them for more information on the air pollution control equipment.***

| | | |
|---|---|---|
| For Nalco FuelTech: | Mr. Gene Capriotti | (813) 775-2249. |
| For Merrick Corporation: | Mr. Ron Selbe | (904) 265-3611. |

8. ***During the October 13, 1992 meeting it was agreed that an activated carbon injection system will be installed to control mercury emissions from this source. Provide us with the details including flow diagram, injection rates and location, etc.***

As explain in the October 13 meeting with the Department, the potential mercury emissions from the proposed facility have been estimated to be very minor. It was proposed that the mercury emissions from the proposed auger combustor would be 0.0035 $lb_m$/hr or about 27 $\mu$g/dscm (see calculations presented in Attachment G of the October 12 submittal). This proposed Hg emission level is very low compared to other resource recovery facilities in Florida. The lowest average mercury emissions reported to date from any facility in Florida are from the Palm Beach County Resource Recovery. The reported emissions are from 15 to 44 $\mu$g/dscm for this RDF facility. The low mercury emissions proposed for the auger combustor are based on RDF which would have been presorted to minimize mercury containing wastes such as batteries. In addition, the proposed spray dryer and baghouse will remove some mercury from the exhaust gas stream.

Therefore, the estimated maximum mercury emissions of 27 $\mu$g/dscm from the proposed auger combustor is below actual mercury emissions from similar facilities. It was further stated in the October 12 response (Item No. 8 on Pages 8 and 9) that for these reasons *"... no further control technology is considered necessary. If necessary, based on stack testing after the facility becomes operational, Gretna will install a mercury control system or under take other measures (i.e., battery recycling) necessary to meet the proposed emission limit."*

9. ***The Department needs assurance that all continuous emissions monitoring systems selected for this project will fully comply with all existing EPA and State of Florida rules and regulations including the locations for all continuous emission monitoring systems and source sampling locations. Since this is a "green-field" facility, the Department will not be inclined to waive sampling points, locations, or other requirements pursuant to the provisions for alternate sampling procedures and requirements.***

The City of Gretna assures the Department that the continuous emission monitoring systems selected for the project will fully comply with all EPA and Florida regulations. We acknowledge that the Department may not be inclined to wave these requirements.

Please give me a call if you have further questions on this matter.

Sincerely,

David A. Buff

David A. Buff, M.E., P.E.
Principle Engineer
Florida Registration No. 19011

DAB/TTT/dmpm

cc: James Carter, Gretna City Manager
John Matthews, Florida Reduction Corp.
P. Pennland, EIS
File (2)

Table 2–4. Estimated Maximum Emissions of Regulated Pollutants for the Proposed Auger Combustor (Revised 3/25/93).

| Regulated Pollutant | Basis for Predicting Controlled Emissions | Ref. | Controlled Emission Factors (lb/ton) 100% RDF | 100% TDF | Hourly Emission Rates Based on Fuel Input 100% RDF (9.37 TPH) | 80/20 Mixed of RDF/TDF (9.37/0.83 TPH) | 75/25 Mixed of RDF/TDF (8.79/1.04 TPH) | Maximum Hourly Emission Rates (lb/hr) | Maximum Annual Emissions (TPY) |
|---|---|---|---|---|---|---|---|---|---|
| Particulate (TSP) | Fabric Filter (0.02 gr/dscf) | 1 | 0.58 | 0.58 | 5.45 | 5.93 | 5.71 | 5.93 | 23.5 |
| Particulate (PM10) | Fabric Filter (0.02 gr/dscf) | 1 | 0.58 | 0.58 | 5.45 | 5.93 | 5.71 | 5.93 | 23.5 |
| Sulfur Dioxide | Spray Dryer & Fabric Filter | | | | | | | | |
| 1–Hour Maximum | | 2 | 2.02 | 11.81 | 18.89 | 28.69 | 30.00 | 30.0 | – |
| Annual | | 3 | 1.01 | 5.90 | 9.44 | 14.35 | 15.00 | 15.0 | 59.4 |
| Nitrogen Oxides | Controlled by SNCR | | | | | | | | |
| 1–Hour Maximum | – | 2 | 3.96 | 11.16 | 37.11 | 46.37 | 46.41 | 46.4 | – |
| Annual | (0.18 lb NOx/MMBtu) | 4 | 1.98 | 5.58 | 18.55 | 23.18 | 23.21 | 23.2 | 91.9 |
| Carbon Monoxide | Good Combustion Practice | | | | | | | | |
| 1–Hour/Annual | | 5 | 2.205 | 2.205 | 20.66 | 22.49 | 21.67 | 22.5 | 89.1 |
| Volatile Org. Compds. | Good Combustion Practice | | | | | | | | |
| 1–Hour/Annual | | 6 | 0.873 | 0.873 | 8.18 | 8.90 | 8.58 | 8.9 | 35.2 |
| Hydrogen Chloride | Spray Dryer & Fabric Filter | | | | | | | | |
| 1–Hour/Annual | | 7 | 2.14 | 1.15 | 20.0 | 21.0 | 20.0 | 21.0 | 83.2 |

Notes: Maximum heat input is 128.9 MMBtu/hr and 1.129x1E12 Btu/yr. Fuel heating values are: 5,500 Btu/lb for RDF and 15,500 Btu/lb for TDF.
Maximum annual operating hours for the proposed Auger combustor will be limitted to 7,920 hr/yr. All emission calculation sheets are shown in Attachment A.

**References:**

1. Based on 0.02 gr/dscf outlet particulate loading designed for the fabric filter system.
2. 1–hour maximum value was based on doubling the average hourly emission rate.
3. Based on sulfur content of RDF and TDF reported in fuel analysis and SD/FF emission control efficiency of 88% for SO2 removal.
4. SNCR Vendor's guaranteed of 0.18 lb NOx/MMBtu heat input.
5. Estimated CO concentration of 130 ppmv in the stack gas from good combustion practice based on a prototype Auger combustor unit (1979).
6. Estimated VOC concentration of 90 ppmv in the stack gas from good combustion practice based on a prototype Auger combustor unit (1979).
7. Emissions are based on chlorine content of RDF and TDF as reported in fuel analysis and SD/FF emission control efficiency of 80% for HCl gas removal. Maximum HCl emissions were assumed to be twice the average controlled emissions.

## Table 2-5. Estimated Maximum Emissions of HAPs for the Proposed Auger Combustor (Revised 3/25/93).

| Pollutants | Uncontrolled Referenced Conc. RDF (ug/dscm) | Ref. | Uncontrolled Referenced Conc. TDF (Wt. %) | Ref. | SD/FF Controlled Emission Factors (a) RDF (lb/ton) | SD/FF Controlled Emission Factors (b) RDF (lb/ton) | SD/FF Controlled Emission Factors (c) TDF (lb/ton) | Highest Controlled Emission Factors RDF (lb/ton) | Highest Controlled Emission Factors TDF (lb/ton) | Hourly Emission Rates (lb/hr) Based on Fuel Input: 9.37 TPH of 100% RDF | 10.2 TPH of 80/20 Mixed RDF/TDF | 9.83 TPH of 75/25 Mixed RDF/TDF | Maximum Hourly Emissions (lb/hr) | Annual Emissions (TPY) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Other Regulated Pollutants** | | | | | | | | | | | | | | |
| Beryllium | – | – | – | – | – | 1.89E−06 | – | 1.89E−06 | – | 0.000018 | 0.000018 | 0.000017 | 0.000018 | 0.00007 |
| Fluorides | – | – | 0.0010% | (4) | – | 0.036 | 0.001 | 0.036 | 0.001 | 0.337 | 0.338 | 0.317 | 0.338 | 1.3 |
| Lead | 31,000 | (1) | 0.0065% | (4) | 0.0214 | – | 0.0065 | 0.0214 | 0.0065 | 0.201 | 0.206 | 0.195 | 0.206 | 0.82 |
| Mercury | – | (2) | – | – | 3.85E−04 | – | – | 3.85E−04 | – | 0.0036 | 0.0036 | 0.0034 | 0.0036 | 0.014 |
| Sulfuric Acid Mist | – | – | – | – | – | 0.0826 | 0.484 | 0.0826 | 0.484 | 0.774 | 1.175 | 1.229 | 1.229 | 4.9 |
| **Air Toxic Pollutants** | | | | | | | | | | | | | | |
| Arsenic | 615 | (1) | – | – | 4.25E−04 | 9.32E−05 | – | 4.25E−04 | – | 0.0040 | 0.0040 | 0.0037 | 0.0040 | 0.016 |
| Cadmium | 1,050 | (1) | 0.0006% | (4) | 7.26E−04 | 1.65E−04 | 6.00E−04 | 7.26E−04 | 6.00E−04 | 0.0068 | 0.0073 | 0.0070 | 0.0073 | 0.029 |
| Calcium | – | – | 0.378% | (4) | – | – | 0.378 | – | 0.378 | – | 0.314 | 0.393 | 0.393 | 1.6 |
| Chromium, hexavalent | 436 | (3) | 0.0097% | (5) | 6.03E−05 | – | 0.00078 | 6.03E−05 | 0.00078 | 0.0006 | 0.00121 | 0.00134 | 0.00134 | 0.0053 |
| Iron | – | – | 0.321% | (4) | – | – | 0.321 | – | 0.321 | – | 0.27 | 0.33 | 0.33 | 1.3 |
| Nickel | 443 | (1) | – | – | 3.06E−04 | 5.90E−05 | – | 3.06E−04 | – | 0.0029 | 0.0029 | 0.0027 | 0.0029 | 0.011 |
| Zinc | – | – | 1.52% | (4) | – | – | 1.52 | – | 1.52 | – | 1.26 | 1.58 | 1.58 | 6.3 |
| Dioxins/Furans | | | | | | | | | | | | | | |
| Total | 0.03 | (6) | – | – | – | – | – | – | – | – | – | – | 3.56E−06 | 1.41E−05 |
| Toxicity Equiv. | 0.00098 | (6) | – | – | – | – | – | – | – | – | – | – | 1.16E−07 | 4.59E−07 |

**Notes:**

(a) Calculated from uncontrolled avg. conc. reported in Ref. (1) with maximum RDF charging rate of 9.37 TPH and a conservative 95% removal efficiency by SD/FF for lead, arsenic, cadmium, and nickel. SD/FF control efficiency for chromium is 99%.

(b) Permit limits for a RDF-fired boiler with similar SD/FF emission controls, from Energy Resources of Henrico, Virginia (1989).

(c) Calculated from typical TDF analysis shown in Ref. (4) and 95% removal efficiency for SD/FF.

**References:**


(1) Municipal Waste Combustors – Background Information for Proposed Standards on Post-Combustion Technology Performance (EPA-450/3-89-27c, 1989). Each uncontrolled concentration (μg/dscm) reported is the maximum of three different RDF sites. Uncontrolled emission rates (lb/hr) were based on 34,600 dscfm or 976.9 dscm.

(2) Based on average of two test values (3.50 E-5 lb of Hg/MMBtu) from Palm Beach County RDF facility controlled with SD/ESP (tested in October, 1989).

(3) See Ref. (1) -- Uncontrolled concentration (μg/dscm) reported is the maximum of three modular units (i.e., similar combustion principal as the Auger combustor). *Reported controlling efficiency for chromium by a SD/FF system is 99% or greater.*

(4) Characteristics of Tire-Derived Fuel, Bulletin 20.20.1C, 1986, Waste Recovery, Inc., Portland, Oregon. Elemental analysis for metals is given in weight percent. Uncontrolled emission rates (lb/hr) were based on maximum TDF requirement of 1.04 TPH (calculated from 25% of combustor heat input contributed by TDF).

(5) See Ref (4) -- Assumed that 40 percent of chromium is hexavalent.

(6) NSPS standard for MSW organics, 40 CFR 60 Subpart Ea.

Table 2-1. Analysis of RDF-3 and TDF Fuels

| Parameter | RDF-3[a] Percent by Weight | TDF[b] (%) |
|---|---|---|
| Approximate Analysis | | |
| Moisture | 29.84 | 0.62 |
| Ash | 12.48 | 4.78 |
| Volatile Matter | 48.37 | 66.64 |
| Fixed Carbon | 9.31 | 27.96 |
| Total | 100.00 | 100.00 |
| Ultimate Analysis | | |
| Moisture | 29.84 | 0.62 |
| Ash | 12.48 | 4.78 |
| Carbon | 29.41 | 83.87 |
| Hydrogen | 6.91 | 7.09 |
| Nitrogen | 0.46 | 0.24 |
| Sulfur | 0.21 | 1.23 |
| Oxygen (by difference) | 20.43 | 2.03 |
| Chlorine | 0.26 | 0.14 |
| Total | 100.00 | 100.00 |
| Heating Value (20% Water) | | |
| HHV | 6,000 BTU's ? | 16,250 |
| HHV (average) | 5,500 | 15,500 |

[a]Based on Dade County Resource Recovery Facility, Florida, data on RDF-3 fuel analysis.
[b]Based on Waste Recovery, Inc., Portland, Oregon, data on TDF fuel analysis.

Waste Recovery, Inc.
"Making Waste A Resource"©

# Characteristics Of TDF (Tire-Derived Fuel)

Bulletin 20.20.1C December, 1986

## Overview

Waste Recovery, Inc. (WRI) manufactures a uniform, high quality Tire-Derived Fuel (TDF) from scrap rubber tires.

TDF has been successfully used as a fuel supplement by major companies in a wide range of existing combustion equipment since 1974.

In its unique production process, WRI removes 99+% of the heavy bead wire and 96+% of all wire from tires to lower the residual ash content and improve handling characteristics.

## Benefits

WRI's TDF offers users the following specific benefits.

- **Efficient storage:** Clean, dust-free and non-absorbent for outdoor storage; 41° angle of repose with an average bulk density of 34-37 lb/ft$^3$ allows efficient stockpiling.
- **Easy handling:** Readily flowable with excellent pneumatic and mechanical handling characteristics.
- **Safety:** High ignition point; not subject to spontaneous combustion.
- **Combustion efficiency:** High heat content (15,500 BTU/lb) and high volatility (>66%) enhance combustion in a cost-effective manner.
- **Equipment compatibility:** Feasible for stoker-fired boilers, kilns, fluid beds and fuel cells.

**Representative Analysis of TDF Produced By WRI**
**(Source: TDF Produced From Scrap Tires with 96+% Wire Removed)**

| Description | % By Wt, As Received | % By Wt, Dry Basis |
|---|---|---|
| **Proximate Analysis** | | |
| Moisture | 0.62 | ---- |
| Ash | 4.78 | 4.81 |
| Volatile Matter | 66.64 | 67.06 |
| Fixed Carbon | 27.96 | 28.13 |
| Total | 100.00 | 100.00 |
| **Ultimate Analysis** | | |
| Moisture | 0.62 | ---- |
| Ash | 4.78 | 4.81 |
| Carbon | 83.87 | 84.39 |
| Hydrogen | 7.09 | 7.13 |
| Nitrogen | 0.24 | 0.24 |
| Sulfur | 1.23 | 1.24 |
| Oxygen (by difference) | 2.17 | 2.19 |
| Total | 100.00 | 100.00 |
| **Elemental Mineral Analysis (Oxide Form)** | | |
| Zinc | 1.52 | 1.53 |
| Calcium | 0.378 | 0.380 |
| Iron | 0.321 | 0.323 |
| Chlorine | 0.149 | 0.150 |
| Chromium | 0.0097 | 0.0098 |
| Fluoride | 0.0010 | 0.0010 |
| Cadmium | 0.0006 | 0.0006 |
| Lead | 0.0065 | 0.0065 |
| Others below detectable limits | | |
| **Heat Value** | BTU/lb | kj/kg |
| HHV | 16,250 | 37,798 |
| $HV_{ave}$ | 15,500 | 36,053 |
| **TDF Combustion Characteristics** | °F | °C |
| Tires ignite (flash point) | 550 - 650 | 288 - 343 |
| Carbon begins to burn | 842 | 450 |
| Carbon completely burnt | 1202 | 650 |

**Sieve Analysis, Random Sample Of WRI's Minus 2" TDF (Analysis Performed to TAPPI & ASTM Standards)**

| Sieve Opening | % Retained By Wt. |
|---|---|
| 3" | 0.0 |
| 2" | 0.2 |
| 1-1/2" | 5.8 |
| 1" | 36.2 |
| 5/8" | 47.6 |
| 1/2" | 5.4 |
| 3/8" | 2.4 |
| -3/8" | 2.4 |
| Total | 100 |

**Additional Properties**

| | |
|---|---|
| Angle of repose: | 41° |
| Particle specific gravity: | 1.05 - 1.15 |
| Bulk density, Loose: | 34 - 37 lbs/ft$^3$ |
| Settled: | 41 - 44 lbs/ft$^3$ |
| Typical wire content: | <0.4% by wt. |
| Volatile/fixed carbon ratio: | 2.4 : 1 |

# ATTACHMENT A

# REVISED EMISSION CALCULATION SHEETS

## 1.0 EMISSIONS OF REGULATED POLLUTANTS

Supportive calculations for the estimated emissions of PM, $SO_2$, $NO_x$, CO, VOC, and HCl are presented in Table 2-4 (revised 3/25/93). The maximum fuel input for the construction permit will include three scenarios:

(1) 100% of RDF at an hourly rate of 9.37 TPH;

(2) 80/20 mixed ratio of RDF and TDF fuels at the hourly rates of 9.37 TPH and 0.83 TPH, respectively; and

(3) 75/25 mixed ratio of RDF and TDF fuels at the hourly rates of 8.79 TPH and 1.04 TPH, respectively.

Therefore, the maximum daily fuel input rates are: (1) 224.99 TPD of 100% RDF, (2) 244.95 TPD of 80/20 mixed ratio of RDF and TDF fuels, and (3) 235.88 TPD of 75/25 mixed ratio of RDF and TDF fuels. The total annual operating hours will be limited to 7,920 hours per year.

For the emissions of regulated pollutants, the supportive calculations for each regulated pollutant are presented only for the fuel option that yields the highest emissions. (Supportive calculations for the other two fuel options with lower emission rates are similar.) However, hourly emission rates for all regulated pollutants are reported in Table 2-4.

## 1.1 PM(TSP) AND PM10 EMISSIONS

Emission Factor Calculations

Designed emission factor--0.02 gr/dscf. Basis--fabric filter system.

Stack gas flow rate for the 80/20 mixed ratio of 9.37 TPH of RDF and 0.83 TPH of TDF (i.e., total 10.20 TPH of 80/20 of RDF/TDF fuel mixture) is 34,600 dscfm. Assumed that firing of TDF requires the same volume of air as firing RDF, the partial air flow rates are:

34,600 dscfm x 9.37 ÷ 10.20 = 31,785 dscfm for 9.37 TPH of RDF, and

34,600 dscfm x 0.83 ÷ 10.20 = 2,815 dscfm for 0.83 TPH of TDF.

RDF and TDF emission factors are determined as follows:

31,785 dscfm x 0.02 gr/dscf x 60 min/hr ÷ 7,000 gr/lb ÷ 9.37 TPH = 0.58 lb/ton RDF

2,815 dscfm x 0.02 gr/dscf x 60 min/hr ÷ 7,000 gr/lb ÷ 0.83 TPH = 0.58 lb/ton TDF

Maximum Hourly and Annual Emission Calculations

Max. hourly: (0.58 lb/ton RDF x 9.37 TPH) + (0.58 lb/ton TDF x 0.83 TPH) = 5.93 lb/hr.

Max. annual: 5.93 lb/hr x 7,920 hr/yr ÷ 2,000 lb/ton = 23.5 TPY.

## 1.2 $SO_2$ EMISSIONS

Emission Factor Calculations

Sulfur content in RDF and TDF is 0.21% and 1.23%, respectively. Thus, more $SO_2$ emissions are produced by the 75/25 fuel mixture.

Maximum hourly charging rate for 75/25 RDF/TDF fuel mixture is:

8.79 TPH of RDF + 1.04 TPH of TDF = 9.83 TPH or

17,580 lb/hr of RDF + 2,080 lb/hr of TDF = 19,660 lb/hr.

Maximum sulfur present in fuel on an hourly basis is:

RDF: 17,580 lb/hr x 0.0021 = 36.918 lb/hr of S.

TDF: 2,080 lb/hr x 0.0123 = 25.584 lb/hr of S.

Uncontrolled $SO_2$ emissions (assuming that all sulfur present in the fuel is converted into $SO_2$):

RDF: 36.918 lb/hr S x 2 lb $SO_2$/lb S = 73.836 lb/hr

TDF: 25.584 lb/hr S x 2 lb $SO_2$/lb S = 51.168 lb/hr

Controlled $SO_2$ emissions:

Basis--Average 88% $SO_2$ removal efficiency by the combination of inherent removal within the auger combustor, the spray dryer and the fabric filter.

73.836 lb/hr x (1 - 0.88) for Control Eff. = 8.86 lb/hr

51.168 lb/hr x (1 - 0.88) for Control Eff. = 6.14 lb/hr

RDF and TDF emission factors are determined as follows:

8.86 lb/hr ÷ 8.79 TPH = 1.01 lb/ton RDF

6.14 lb/hr ÷ 1.04 TPH = 5.90 lb/ton TDF

Maximum Annual Emission Calculations

(1.01 lb/ton RDF x 8.79 TPH) + (5.90 lb/ton TDF x 1.04 TPH) = 15.0 lb/hr

15.0 lb/hr x 7,920 hr/yr ÷ 2,000 lb/ton = 59.4 TPY.

Calculate ppmv in gas stream:

$$PV = nRT \ ; \ V = \frac{nRT}{P}$$

$$\text{Volume of } SO_2 = \frac{15.0 \ lb_m}{hr} \times \frac{1{,}545 \ ft\text{-}lb_f \cdot (200+460)°R}{64 \ lb_m \cdot °R} \times \frac{ft^2}{2{,}116.8 \ lb_f}$$

$$= 112.90 \ ft^3/hr = 1.88 \ ft^3/min$$

$$\text{ppmv } SO_2 = \frac{1.88 \ ft^3/min}{49{,}600 \ acfm} \times 10^6 = 37.9 \ \text{ppmv}$$

Maximum Hourly Emission Calculations

Maximum short-term $SO_2$ emissions:

Basis--Assume maximum hourly $SO_2$ emission factors are twice the normal values

1.01 lb/ton RDF x 2 = 2.02 lb/ton of RDF

5.90 lb/ton TDF x 2 = 11.80 lb/ton of TDF

(2.02 lb/ton x 8.79 TPH) + (11.80 lb/ton x 1.04 TPH) = 30.0 lb/hr of $SO_2$

## 1.3 $NO_x$ EMISSIONS

Emission Factor Calculations

Controlled $NO_x$ Emissions Basis--Proposed selective noncatalytic reduction (SNCR) process to control $NO_x$ emissions from the Auger combustor. Vendor's guaranteed of 0.18 lb of $NO_x$/MMBtu heat input.

Maximum heat input to the proposed Auger Combustor is 128.9 MMBtu/hr for both options of 80/20 fuel mixture or 75/25 fuel mixture of RDF/TDF. For the 75/25 fuel mixture of RDF/TDF, the average $NO_x$ emission factors are calculated as follows:

$EF\text{-}RDF_{NOx,\ Avg.}$ = 0.18 lb/MMBtu x 96.675 MMBtu/hr ÷ 8.79 TPH = 1.98 lb/ton

$EF\text{-}TDF_{NOx,\ Avg.}$ = 0.18 lb/MMBtu x 32.225 MMBtu/hr ÷ 1.04 TPH = 5.58 lb/ton

Annual Emission Calculations

Maximum $NO_x$ emissions are produced by firing of 75/25 fuel mixture of RDF/TDF or equivalent to firing of 8.79 TPH of RDF and 1.04 TPH of TDF:

(1.98 lb/ton x 8.79 TPH RDF) + (5.59 lb/ton x 1.04 TPH TDF) = 23.2 lb/hr

23.2 lb/hr x 7,920 hr/yr ÷ 2,000 = 91.9 TPY.

Calculate ppmv of the controlled $NO_x$ emissions in exhaust flue gas stream:

$$PV = nRT \; ; \; V = \frac{nRT}{P}$$

$$\text{Volume of } NO_x = \frac{23.2 \text{ lb}_m}{\text{hr}} \times \frac{1{,}545 \text{ ft-lb}_f \cdot (200{+}460)°R}{46 \text{ lb}_m \cdot °R} \times \frac{\text{ft}^2}{2{,}116.8 \text{ lb}_f}$$

$$= 242.95 \text{ ft}^3/\text{hr} = 4.05 \text{ ft}^3/\text{min}$$

$$\text{ppmv } NO_x = \frac{4.05 \text{ ft}^3/\text{min}}{49{,}600 \text{ acfm}} \times 10^6 = 81.7 \text{ ppmv}$$

Maximum Short-term Emission Calculations

The maximum hourly $NO_x$ emissions are assumed to be twice the normal average

$EF\text{-}RDF_{NOx,\ Avg.}$ = 2 x 1.98 lb/ton = 3.96 lb/ton for RDF

$EF\text{-}TDF_{NOx,\ Avg.}$ = 2 x 5.58 lb/ton = 11.16 lb/ton for TDF

Also based on the firing of 75/25 fuel mixture of RDF/TDF

(3.96 lb/ton x 8.79 TPH RDF) + (11.16 lb/ton x 1.04 TPH TDF) = 46.4 lb/hr

## 1.4 CO EMISSIONS

Emission Factor Calculations

Maximum 130 ppmv at the combustor stack. Basis--Good combustion practice.

$$PV = nRT \; ; \; n = \frac{PV}{RT}$$

$$\text{CO Emissions} = \frac{(2{,}116.8 \text{ lb}_f/\text{ft}^2)\ (49{,}600 \text{ ft}^3/\text{min})}{\frac{1{,}545 \text{ ft-lb}_f}{\text{lb-mole}\cdot°R} \times (200{+}460)°R} \times \frac{60\text{min}}{\text{hr}} \times \frac{28 \text{ lb}_m}{\text{lb-mole}} \times \frac{130}{10^6} = 22.49 \text{ lb/hr}$$

RDF and TDF emission factors are determined based on respective fuel input rates as follows:

$$RDF_{CO,\ Avg.} = 22.49\ \text{lb/hr} \times \frac{9.37}{10.20} = 20.66\ \text{lb/hr}$$

$$EF\text{-}RDF_{CO,\ Avg.} = 20.66\ \text{lb/hr} \div 9.37\ \text{TPH} = 2.205\ \text{lb/ton RDF}$$

$$TDF_{CO,\ Avg.} = 22.49\ \text{lb/hr} \times \frac{0.83}{10.20} = 1.83\ \text{lb/hr RDF}$$

$$EF\text{-}TDF_{CO,\ Avg.} = 1.83\ \text{lb/hr} \div 0.83 = 2.205\ \text{lb/ton of TDF}$$

Maximum and Annual Emission Calculations

Maximum and annual CO emissions are produced by firing of 80/20 mixture of RDF/TDF fuel or equivalent to firing of 9.37 TPH of RDF and 0.83 TPH of TDF.

(2.205 lb/ton x 9.37 TPH) + (2.205 lb/ton x 0.83 TPH) = 22.49 lb/hr

22.49 lb/hr x 7,920 hr/yr ÷ 2,000 = 89.1 TPY.

## 1.5 VOC EMISSIONS

Emissions Factor Calculations

Maximum 90 ppmv at the combustor stack (as $CH_4$). Basis--Good combustion practice.

$$PV = nRT\ ;\ n = \frac{PV}{RT}$$

$$\text{VOC Emissions} = \frac{2{,}116.8\ \text{lb}_f\ /\text{ft}^2)\ (49{,}600\ \text{ft}^3/\text{min})}{\frac{1{,}545\ \text{ft-lb}_f}{\text{lb-mole}\cdot{}^\circ\text{R}} \times (200+460)^\circ\text{R}} \times \frac{60\text{min}}{\text{hr}} \times \frac{16\ \text{lb}_m}{\text{lb-mole}} \times \frac{90}{10^6} = 8.90\ \text{lb/hr}$$

RDF and TDF emission factors are determined based on heat input rates as follows:

$$RDF_{VOC,\ Avg.} = 8.90\ \text{lb/hr} \times \frac{9.37}{10.20} = 8.18\ \text{lb/hr}$$

$$EF\text{-}RDF_{VOC,\ Avg.} = 8.18\ \text{lb/hr} \div 9.37\ \text{TPH} = 0.873\ \text{lb/ton of RDF}$$

$$TDF_{VOC,\ Avg.} = 8.90\ \text{lb/hr} \times \frac{0.83}{10.20} = 0.72\ \text{lb/hr}$$

$$EF\text{-}TDF_{VOC,\ Avg.} = 0.72\ \text{lb/hr} \div 0.83\ \text{TPH} = 0.873\ \text{lb/ton of TDF}$$

Maximum and Annual Emission Calculations

Maximum and annual VOC emissions are produced by firing of 80/20 mixture of RDF/TDF fuel or equivalent to firing of 9.37 TPH of RDF and 0.83 TPH of TDF.

(0.873 lb/ton x 9.37 TPH) + (0.873 lb/ton x 0.83 TPH) = 8.90 lb/hr

8.90 lb/hr x 7,920 hr/yr ÷ 2,000 = 35.24 TPY.

## 1.6 HCl EMISSIONS

Emission Factor Calculations

Chlorine (Cl) content in RDF and TDF is 0.26% and 0.14%, respectively. Thus, more HCl emissions are produced by the 80/20 fuel mixture.

Maximum hourly charging rate for 80/20 RDF/TDF fuel mixture is:

9.37 TPH of RDF + 0.83 TPH of TDF = 10.02 TPH or

18,740 lb/hr of RDF + 1,660 lb/hr of TDF = 20,400 lb/hr.

Maximum Cl present in fuel on an hourly basis is:

RDF: 18,740 lb/hr x 0.0026 = 48.724 lb/hr of Cl.

TDF: 1,660 lb/hr x 0.0014 = 2.324 lb/hr of Cl.

Uncontrolled HCl emissions (assuming that all Cl present in the fuel is converted into HCl):

RDF: 48.724 lb/hr Cl x 36.5 lb HCl/35.5 lb Cl = 50.097 lb/hr

TDF: 2.324 lb/hr Cl x 36.5 lb HCl/35.5 lb Cl = 2.389 lb/hr

Controlled HCl emissions:

Basis--Spray dryer and fabric filter are designed for 80% removal of HCl.

RDF: 50.097 lb/hr x (1-0.80) for Control Eff.) = 10.019 lb/hr

TDF: 2.389 lb/hr x (1-0.80) for Control Eff.) = 0.478 lb/hr

Assume maximum HCl emissions are twice typical level, thus the RDF and TDF emission factors are determined as follows:

$EF\text{-}RDF_{HCl,\ Max.}$ = 10.019 lb/hr x 2 ÷ 9.37 TPH = 2.14 lb/ton

$EF\text{-}TDF_{HCl,\ Max.}$ = 0.478 lb/hr x 2 ÷ 0.83 TPH = 1.15 lb/ton

Maximum and Annual Emission Calculations

(2.14 lb/ton RDF x 9.37 TPH) + (1.15 lb/ton TDF x 0.83 TPH) = 21.0 lb/hr

21.0 lb/hr x 7,920 ÷ 2,000 = 83.16 TPY

Calculate HCl ppmv in stack gas:

$$PV = nRT \; ; \; V = \frac{nRT}{P}$$

$$\text{Volume of HCl} = \frac{21.0 \ lb_m}{hr} \times \frac{1{,}545 \ ft\text{-}lb_f \cdot (200+460)°R}{36.5 \ lb_m \cdot °R} \times \frac{ft^2}{2{,}116.8 \ lb_f}$$

$$= 277.15 \ ft^3/hr = 4.62 \ ft^3/min$$

$$\text{ppmv HCl} = \frac{4.62 \ ft^3/min}{49{,}600 \ acfm} \times 10^6 = 93.2 \ ppmv$$

## 2.0 EMISSIONS OF OTHER REGULATED POLLUTANTS

Supportive calculations for the estimated emissions of beryllium, fluorides, lead, mercury, and sulfuric acid mist as presented in Table 2-5 (revised 2/25/93).

## 2.1 BERYLLIUM EMISSIONS

RDF: $1.89 \times 10^{-6}$ lb/ton, permit limit for a RDF-fired boiler equipped with spray dryer/fabric filter (SD/FF) for Energy Resource of Henrico, Virginia (1989), from BLIS Clearinghouse. This reference will be referred to as Henrico from this point forward.

$EF_{Be}$: $1.89 \times 10^{-6}$ lb/ton of RDF

TDF: Beryllium not present in TDF.

Maximum hourly Be emissions are produced from firing of 9.37 TPH of RDF:

$1.89 \times 10^{-6}$ lb/ton x 9.37 TPH RDF = 0.000018 lb/hr

Maximum annual emissions:

0.000018 lb/hr x 7,920 hr/yr ÷ 2,000 = 0.00007 TPY

## 2.2 FLUORIDE EMISSIONS

RDF: 0.036 lb/ton, permit limit for a RDF-fired boiler equipped with SD/FF (Henrico, 1989).

TDF: 0.0010% by weight for a typical analysis of TDF, from Characteristics of TDF, Waste Recovery, Inc., Bulletin 20.20.1C (see attached table in Appendix B-References of the original permit application).

$$\text{F in TDF} = \frac{2{,}000 \text{ lb}}{\text{ton}} \times \frac{0.0010 \text{ lb F}}{100 \text{ lb}} = 0.02 \text{ lb/ton}$$

Assume 95% removal by SD/FF.

$EF\text{-}TDF_{F,\ Max.}$ = 0.02 lb/ton x (1-0.95) = 0.001 lb/ton.

Maximum hourly F emissions are produced from firing the 80/20 fuel mixture of RDF/TDF or equivalent to the firing of 9.37 TPH of RDF and 0.83 TPH of TDF:

(0.036 lb/ton x 9.37 TPH RDF) + (0.001 lb/ton x 0.83 TPH TDF) = 0.338 lb/hr

Maximum annual emissions:

0.338 lb/hr x 7,920 hr/yr ÷ 2,000 = 1.3 TPY

## 2.3 LEAD EMISSIONS

RDF: 31,000 μg/dscm, average uncontrolled lead (Pb) concentration for RDF-fired sources, from Municipal Waste combustors- Background Information for Proposed Standards: Post-Combustion Technology Performance. (EPA-450/3-89-27c). This reference will be referred to as MSW Background Information from this point on.

$$\text{Pb in RDF} = \frac{31{,}000\ \mu g}{\text{dscm}} \times \frac{34{,}600 \text{ dscfm}}{35.3145\ \frac{ft^3}{m^3}} \times \frac{1 \text{ g}}{10^6\ \mu g} \times \frac{\text{lb}}{453.593 \text{ g}} \times \frac{60 \text{ min}}{\text{hr}} \div 9.37\ \frac{\text{ton}}{\text{hr}}$$

$$= 0.4288 \text{ lb/ton}$$

Assume 95% removal by SD/FF system.

$EF\text{-}RDF_{Pb,\ Max.}$ : 0.4288 lb/ton x (1-0.95) = 0.0214 lb/ton

TDF : 0.0065% by weight for a typical analysis of TDF.

$$\text{Pb in TDF} = \frac{2{,}000 \text{ lb}}{\text{ton}} \times \frac{0.0065 \text{ lb Pb}}{100 \text{ lb}} = 0.13 \text{ lb/ton}$$

Assume 95% removal by SD/FF system.

$EF\text{-}TDF_{TDF,\ Max.}$ : 0.13 lb/ton x (1-0.95) = 0.0065 lb/ton.

Maximum hourly Pb emissions are produced from firing of 80/20 fuel mixture of RDF/TDF:

(0.0214 lb/ton x 9.37 TPH RDF) + (0.0065 lb/ton x 0.83 TPH TDF) = 0.206 lb/hr

Maximum annual emissions:

0.206 lb/hr x 7,920 hr/yr ÷ 2,000 = 0.82 TPY

## 2.4 MERCURY EMISSIONS

RDF: $3.50 \times 10^{-5}$ lb Hg/MMBtu, approximate average of three test values from Palm Beach Resource Recovery Facility (tested in October, 1989, March, 1992, and September 1992), the only operating RDF-fired waste-to-energy facility in Florida with spray dryer/ESP controls.

$$\text{Hg in RDF} = \frac{0.000035 \text{ lb Hg}}{\text{MMBtu}} \times \frac{103.12 \text{ MMBtu}}{9.37 \text{ ton RDF}}$$

$$= 3.85 \times 10^{-4} \text{ lb/ton RDF}$$

TDF: No Hg detected in TDF

Maximum hourly Hg emissions are produced from firing 9.37 TPH of RDF:

$3.85 \times 10^{-4}$ lb/ton x 9.37 TPH RDF = 0.0036 lb/hr

Maximum annual emissions:

0.0036 lb/hr x 7,920 hr/yr ÷ 2,000 = 0.014 TPY

## 2.5 SULFURIC ACID MIST EMISSIONS

RDF: 0.0826 lb/ton, permit limit for a RDF-fired boiler equipped with SD/FF (Henrico, 1989).

TDF: The mass ratio of sulfur content in TDF to RDF is 1.23/0.21. Assuming that the same ratio applied for estimating sulfuric acid mist emissions from TDF-firing.

$\text{EF-TDF}_{\text{Sulfuric Acid Mist}}$ = 0.0826 lb/ton x (1.23/0.21) = 0.484 lb/ton

Maximum hourly sulfuric acid mist emissions are produced from firing of 75/25 fuel mixture of RDF/TDF:

(0.0826 lb/ton x 8.79 TPH RDF) + (0.434 lb/ton x 1.04 TPH TDF) = 1.229 lb/hr

Maximum annual emissions:

1.229 lb/hr x 7,920 hr/yr ÷ 2,000 = 4.9 TPY

## 3.0 EMISSIONS OF AIR TOXIC POLLUTANTS

Backup calculations for the estimated emissions of arsenic, cadmium, calcium, hexavalent chromium, iron, nickel, zinc, and dioxins/furans as presented in Table 2-5 (revised 03/25/93).

## 3.1 ARSENIC EMISSIONS

RDF : 615 μg/dscm, average uncontrolled arsenic (As) concentration for RDF-fired sources, from MSW Background Information.

$$\text{As in RDF} = \frac{615\ \mu g}{dscm} \times \frac{34{,}600\ dscfm}{35.3145\ \frac{ft^3}{m^3}} \times \frac{1\ g}{10^6\ \mu g} \times \frac{lb}{453.593\ g} \times \frac{60\ min}{hr} \div 9.37\ \frac{ton}{hr}$$

= 0.0085 lb/ton

Assume 95% removal by SD/FF system.

$EF\text{-}RDF_{As,\ Max.}$ = 0.0085 lb/ton x (1-0.95) = $4.25 \times 10^{-4}$ lb/ton

TDF: As not reported in TDF.

Maximum hourly As emissions are produced from firing of 9.37 TPH of RDF:

$4.25 \times 10^{-4}$ lb/ton x 9.37 TPH RDF = 0.0040 lb/hr

Maximum annual emissions:

0.0039 lb/hr x 7,920 hr/yr ÷ 2,000 = 0.016 TPY

## 3.2 CADMIUM EMISSIONS

RDF: 1,050 μg/dscm, average uncontrolled cadmium (Cd) concentration for RDF-fired sources, from MSW Background Information.

$$\text{Cd in RDF} = \frac{1{,}050\ \mu g}{dscm} \times \frac{34{,}600\ dscfm}{35.3145\ \frac{ft^3}{m^3}} \times \frac{1\ g}{10^6\ \mu g} \times \frac{lb}{453.593\ g} \times \frac{60\ min}{hr} \div 9.37\ \frac{ton}{hr}$$

= 0.01451 lb/ton

Assume 95% removal by SD/FF system.

$EF\text{-}RDF_{Cd, Max.}$ = 0.01451 lb/ton x (1-0.95) = 7.26x10$^{-4}$ lb/ton

TDF: 0.0006% by weight for a typical analysis of TDF.

$$\text{Cd in TDF} = \frac{2{,}000 \text{ lb}}{\text{ton}} \times \frac{0.0006 \text{ lb Cd}}{100 \text{ lb TDF}} = 0.012 \text{ lb/ton TDF}$$

Assume 95% removal by SD/FF system.

$EF\text{-}TDF_{Cd, Max.}$ = 0.012 lb/ton x (1-0.95) = 0.0006 lb/ton.

Maximum hourly Cd emissions are produced from firing of 80/20 fuel mixture of RDF/TDF or equivalent to firing of 9.37 TPH of RDF and 0.83 TPH of TDF:

(7.26x10$^{-4}$ lb/ton x 9.37 TPH RDF) + (6.0x10$^{-4}$ x 0.83 TPH TDF) = 0.0073 lb/hr

Maximum annual emissions:

0.0073 lb/hr x 7,920 hr/yr ÷ 2,000 = 0.029 TPY

## 3.3 CALCIUM EMISSIONS

TDF : 0.0010% by weight for a typical analysis of TDF.

$$\text{Ca in TDF} = \frac{2{,}000 \text{ lb}}{\text{ton}} \times \frac{0.378 \text{ lb Ca}}{100 \text{ lb TDF}} = 7.56 \text{ lb Ca/ton TDF}$$

Assume 95% removal by SD/FF.

$EF\text{-}TDF_{Ca, Max.}$ = 7.56 lb/ton x (1-0.95) = 0.378 lb/ton.

RDF: Calcium (Ca) not reported in RDF

Maximum hourly Ca emissions are produced from firing of 75/25 fuel mixture of RDF/TDF or equivalent to 8.79 TPH of RDF and 1.04 TPH of TDF:

(0 lb/ton x 8.79 TPH RDF) + (0.0378 lb/ton x 1.04 TPH TDF) = 0.393 lb/hr

Maximum annual emissions:

0.393 lb/hr x 7,920 hr/yr ÷ 2,000 = 1.6 TPY

### 3.4 HEXAVALENT CHROMIUM EMISSIONS

RDF: 436 μg/dscm, average uncontrolled hexavalent chromium ($Cr^{+6}$) concentration for RDF-fired sources, from MSW Background Information.

$$Cr^{+6} \text{ in RDF} = \frac{436\ \mu g}{dscm} \times \frac{34{,}600\ dscfm}{35.3145\ \frac{ft^3}{m^3}} \times \frac{1\ g}{10^6\ \mu g} \times \frac{lb}{453.593\ g} \times \frac{60\ min}{hr} \div 9.37\ \frac{ton}{hr}$$

$$= 6.03\times10^{-3}\ lb/ton$$

Assume 99% removal by SD/FF system, based on MSW Background Information.

$EF\text{-}RDF_{Cr+6,\ Max.} = 6.03\times10^{-3}\ lb/ton \times (1-0.99) = 6.03\times10^{-5}\ lb/ton$

TDF : 0.0097% by weight for a typical analysis of TDF.

$$Cr^{+6} \text{ in TDF} = \frac{2{,}000\ lb}{ton} \times \frac{0.0097\ lb\ Cr}{100\ lb\ TDF} \times 40\%\ Cr^{+6} = 0.078\ lb/ton$$

Assume 99% removal by SD/FF system, based on MSW Background Information.

$EF\text{-}TDF_{Cr+6,\ Max.} = 0.078\ lb/ton \times (1-0.99) = 0.00078\ lb/ton.$

Maximum hourly Cr+6 emissions are produced from firing of 75/25 fuel mixture of RDF/TDF or equivalent to the firing of 8.79 TPH of RDF and 1.04 TPH of TDF:

$(6.03\times10^{-5}\ lb/ton \times 8.79\ TPH\ RDF) + (0.00078 \times 1.04\ TPH\ TDF) = 0.00134\ lb/hr$

Maximum annual emissions:

$0.00134\ lb/hr \times 7{,}920\ hr/yr \div 2{,}000 = 0.0053\ TPY$

### 3.5 IRON EMISSIONS

RDF: Iron (Fe) is removed from RDF preprocessing step by magnetic separator, thus Fe is not detectable in RDF-firing.

TDF: 0.321% by weight for a typical analysis of TDF.

$$Fe \text{ in TDF} = \frac{2{,}000\ lb}{ton} \times \frac{0.321\ lb\ Fe}{100\ lb\ TDF} = 6.42\ lb\ Fe/ton\ TDF$$

Assume 95% removal by SD/FF.

$EF\text{-}TDF_{Fe,\ Max.} = 6.42\ lb/ton \times (1 - 0.95) = 0.321\ lb/ton.$

Maximum hourly Fe emissions are produced from firing of 1.04 TPH of TDF:

0.321 lb/ton x 1.04 TPH TDF = 0.33 lb/hr

Maximum annual emissions:

0.33 lb/hr x 7,920 hr/yr ÷ 2,000 = 1.3 TPY

## 3.6 NICKEL EMISSIONS

RDF: 443 $\mu$g/dscm, average uncontrolled nickel (Ni) concentration for RDF-fired sources, from MSW Background Information.

$$\text{Ni in RDF} = \frac{443\ \mu g}{\text{dscm}} \times \frac{34{,}600\ \text{dscfm}}{35.3145\ \frac{\text{ft}^3}{\text{m}^3}} \times \frac{1\ \text{g}}{10^6\ \mu g} \times \frac{\text{lb}}{453.593\ \text{g}} \times \frac{60\ \text{min}}{\text{hr}} \div 9.37\ \frac{\text{ton}}{\text{hr}}$$

$$= 0.00613\ \text{lb/ton}$$

Assume 95% removal by SD/FF system.

$\text{EF-RDF}_{\text{Ni, Max.}}$ = 0.00613 lb/ton x (1-0.95) = $3.06\text{x}10^{-4}$ lb/ton

TDF: Ni not reported in TDF.

Maximum hourly Ni emissions are produced from firing 80/20 fuel mixture of RDF/TDF or equivalent to firing of 9.37 TPH of RDF and 0.83 TPH of TDF:

($3.06\text{x}10^{-4}$ lb/ton x 9.37 TPH RDF) + (0 lb/ton x 0.83 TPH TDF) = 0.0029 lb/hr

Maximum annual emissions:

0.0029 lb/hr x 7,920 hr/yr ÷ 2,000 = 0.011 TPY

## 3.7 ZINC EMISSIONS

RDF: Zinc (Zn) not reported in RDF.

TDF: 1.52% by weight for a typical analysis of TDF.

$$\text{Zn in TDF} = \frac{2{,}000\ \text{lb}}{\text{ton}} \times \frac{1.52\ \text{lb Zn}}{100\ \text{lb TDF}} = 30.4\ \text{lb Zn/ton TDF}$$

Assume 95% removal by SD/FF.

$\text{EF-TDF}_{\text{Zn, Max.}}$ = 30.4 lb/ton x (1-0.95) = 1.52 lb/ton.

Maximum hourly Zn emissions are produced from firing 1.04 TPH of TDF:

(0 lb/ton x 8.79 TPH RDF) + (1.52 lb/ton x 1.04 TPH TDF) = 1.58 lb/hr

Maximum annual emissions:

1.58 lb/hr x 7,920 hr/yr ÷ 2,000 = 6.3 TPY

## 3.8 DIOXIN/FURAN EMISSIONS

Emission factor--30 ng/dscm or 12 gr/ billion dscf. Basis--Spray dryer, fabric filter, and good combustion based on NSPS Subpart Ea.

Stack flow rate is 34,600 dscfm.

$$34{,}600 \text{ dscfm} \times \frac{12 \text{ gr}}{10^9 \text{ dscf}} \times \frac{60 \text{ min}}{\text{hr}} \times \frac{\text{lb}}{7{,}000 \text{ gr}} = 3.56 \times 10^{-6} \text{ lb/hr}$$

Emission factor = $3.56 \times 10^{-6}$ lb/hr / 10.2 TPH = $3.49 \times 10^{-7}$ lb/ton of RDF or TDF

Annual dioxins/furans (total) emissions:

$3.56 \times 10^{-6}$ lb/hr x 7,920 hr/yr ÷ 2,000 lb/ton = $1.41 \times 10^{-5}$ TPY

Toxicity Equivalence (TEQ) of the total dioxins/furans--Based on the international toxicity equivalent factor (I-TEF) conversion of total dioxins/furans to TEQ's of 2,3,7,8-tetrachlorobenzo-p-dioxin, the 30 ng/dscm (12 gr/billion dscf) total furans/dioxins is equivalent to a TEQ of approximately 0.98 ng/dscm (0.39 gr/billion dscf). Both the emission rate (12 gr/billion dscf) and the TEQ (0.39 gr/billion dscf) are based on NSPS Subpart Ea for MSW organics. Therefore, the potential hourly emissions of total dioxins/furans in terms of TEQ is:

$3.56 \times 10^{-6}$ lb/hr x 0.98/30 = $1.16 \times 10^{-7}$ lb/ton.

Annual TEQ emissions:

$1.16 \times 10^{-7}$ lb/hr x 7,920 hr/yr ÷ 2,000 lb/ton = $4.59 \times 10^{-7}$ TPY

The TEQ emission rate will be used to compute the potential impact predicted by modeling analysis and to compare with the annual no-threat level for tetrachlorobenzo-p-dioxin ($2.2 \times 10^{-8}$ $\mu g/m^3$).

## 4.0 LIME REQUIREMENTS FOR ACID GAS SCRUBBING

The acid gas reacts with lime based on the following reactions:

For HCl acid gas:

$2\ HCl + Ca(OH)_2$ ---> $CaCl_2 + 2\ H_2O$, (a lime/HCl stoichiometric mass ratio of 74/73)

For $SO_2$ gas:

$SO_2 + Ca(OH)_2$ ---> $CaSO_3 + H_2O$

$CaSO_3 + 1/2\ O_2$ --> $CaSO_4$, (a lime/$SO_2$ stoichiometric mass ratio of 74/64)

Theoretical amount of lime required for 100% HCl removal:

104.97 lb/hr of $HCl_{Uncontrolled}$ x (74/72) = 107.90 lb/hr of lime.

Theoretical amount of lime required for 100% SO2 removal:

125.0 lb/hr of $SO_{2,Uncontrolled}$ x (74/64) = 144.53 lb/hr of lime.

Total theoretical amount of lime required:

107.90 lb/hr + 144.53 lb/hr = 252.43 lb/hr or

252.43 lb/hr x 24 hr/day = 6,058.32 lb/day or

6,058.32 lb/day x (1 $ft^3$ of lime/140 lb) = 43.27 $ft^3$/day.

By design, the amount of lime requirement will be 1.2 times the theoretical requirement:

6,058.32 lb/day x 1.2 = 7,269.98 lb/day or 3.64 TPD of lime or

43.27 $ft^3$/day x 1.2 = 51.92 $ft^3$/day.

## 5.0 SOLIDS PRODUCED FROM ACID GAS REMOVAL PROCESSES

Based on a design of using a lime spray dryer for acid gas removal, typical solids produced by this process include the byproducts and the unreacted lime. As a design parameter, the amount of lime feed to the spray dryer will equal to 1.2 times the theoretical lime requirement.

Amount of HCl removed by design:

104.98 lb/hr $HCl_{Uncontrolled}$ (from 1.6) x 80% = 83.98 lb/hr HCl removed.

Amount of SO2 removed by design:

125.0 lb/hr $SO_{2,Uncontrolled}$ (from 1.2) x 88% = 110.0 lb/hr $SO_2$ removed.

For HCl removal:

2 HCl + $Ca(OH)_2$ ---> $CaCl_2$ + 2 $H_2O$

73 lb + 74 lb 111 lb 36 lb

$Ca(OH)_2$ consumed = 83.98 lb/hr x (74/73) = 85.13 lb/hr lime.

$Ca(OH)_2$ unconsumed = (107.09 lb/hr x 1.2) - 85.13 = 44.35 lb/hr.

$CaCl_2$ produced = 83.98 lb/hr x (111/74) = 125.97 lb/hr.

$H_2O$ produced = 83.98 lb/hr x (36/74) = 40.86 lb/hr.

Total solid produced = 44.35 + 125.97 + 40.86 = 211.18 lb/hr.

For $SO_2$ gas removal:

$SO_2$ + $Ca(OH)_2$ ---> $CaSO_3$ + $H_2O$ + 1/2 $O_2$ --> $CaSO_4$ + $H_20$

64lb 74lb 136lb 18lb

$Ca(OH)_2$ consumed = 110.0 lb/hr x (74/64) = 127.19 lb/hr lime.

$Ca(OH)_2$ unconsumed = (144.53 lb/hr x 1.2) - 127.19 = 46.25 lb/hr.

$CaSO_4$ produced = 110.0 lb/hr x (136/74) = 202.16 lb/hr.

$H_2O$ produced = 110.0 lb/hr x (18/74) = 26.76 lb/hr.

Total solid produced = 46.25 + 202163 + 26.76 = 275.17 lb/hr.

Total solid produced by the acid removal processes are:

211.18 lb/hr from HCl removal + 275.17 lb/hr from $SO_2$ removal

= 486.35 lb/hr x 24 hr/day = 11,672.4 lb/day or 5.84 TPD.

Annual amount = 486.35 lb/hr x 7,920 hr/yr ÷ 2000 = 1,925.95 TPY

These solids produced in the spray dryer are mixed with the fly ash and collectively removed at the fabric filter down stream. Solids collected by the fabric filter are initially captured in large bin, then transferred to the ash stage area, and finally hauled away by outside vendors. The vendors will use these ashes to produce aggregate for cement products or the encapsulated the ash with recycled plastics and extrude the mixture into construction materials. During the first two years of the operations, the solid ash will be disposed off in a double-lined landfill.

## 6.0 PROPOSED LIME SILO DESIGN AND ASSOCIATED FUGITIVE EMISSIONS

Based on preliminary design, the lime silo will have a capacity of 2,000 cubic feet of storage capacity for lime or approximately 1 1/5 standard truck loads of lime. The silo dimension is approximately 10 ft in diameter and 25 ft high. The silo is equipped with pneumatic truck loading spout and a bin vent filter for fugitive dust control.

Fugitive dust emissions from the lime silo will mainly occur when the silo is being loaded pneumatically with forced air dispensing the lime from the truck to the silo. Estimate emissions are based on the output loading of 0.02 grains/acfm for the bin vent filter; an average of 1,200 acfm of force air during the loading operation, and a total of 1,000 hours per year.

Hourly emissions: 0.02 gr/acfm x 1,200 acfm ÷ 7,000 gr/lb x 60 min/hr
= 0.21 lb/hr (when loading takes place).

Annual emissions: 0.21 lb/hr x 1,000 hr/yr = 210 lb/yr or 0.11 TPY.

## 7.0 FUGITIVE EMISSIONS FROM ASH STORAGE AREA AND ASH HANDLING PROCESS

The ash storage area is also controlled by a bin vent filter with a maximum outlet dust loading of 0.02 gr/acfm. Assumed a volume of disturbance to be 200 acfm (i.e., the assumption is made because no mechanical convective force is applied in the ash storage area to generate any air movement) and a maximum activity factor of 1,000 hr/yr, the fugitive emissions from the ash storage area are estimated as follows:

Hourly emissions: 0.02 gr/acfm x 200 acfm ÷ 7,000 gr/lb x 60 min/hr
= 0.034 lb/hr.

Annual emissions: 0.034 lb/hr x 1,000 hr/yr = 34 lb/yr or 0.017 TPY.

Ash handling by hauling the ash bins from the collection points at the combustor and the fabric filter outlets to the ash storage area will generate small amount of fugitive emissions. The predicted amount is based on emission factor of 0.0035 lb/ton of ash derived from AP-42.

Hourly emissions: 0.0035 lb/ton x 35.41 TPD ÷ 24 hr/day = 0.005 lb/hr

Annual emissions: 0.005 lb/hr x 1,000 hr/yr = 5 lb/yr or 0.003 TPY.

Preston —

KBN

March 29, 1993

RECEIVED

MAR 30 1993

Division of Air
Resources Management

Mr. John C. Brown, P.E.
Florida Department of Environmental Regulation
Bureau of Air Regulation
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Re: Gadsden County - A.P.
City of Gretna Resource Recovery Facility
AC 20-212334 (MSW Incinerator)

Dear Mr. Brown:

I am writing in response to your letter dated November 10, 1992, addressed to the Honorable Evelyn Rollins, Mayor of the City of Gretna, requesting additional information regarding the above-referenced source.

1. *Provide either a copy of a solid waste permit application or a response to the solid waste concerns included in the Department's Intent to Deny a permit.*

The solid waste permit application is being prepared and will be submitted to the Department in the near future. Provide copy of permit or respond to dept. concerns.

2. *When does the City of Gretna anticipate negotiating reciprocal agreements with all suppliers of municipal solid waste (MSW) allowing approximately 10 to 15 percent (by weight) of all MSW received by Gretna to be returned to the originating source? Provide a copy of proposed contract.*

Florida Reduction Corporation (the Operator) is currently negotiating with several suppliers of MSW. Contracts will be finalized prior to commencing construction on the facility. A copy of the proposed contracts will be provided to the Department prior to commencing construction.

3. *Please provide us with any additional information (letters of intent) you may have on the markets for (contaminated) recyclables.*

The Operator (Florida Reduction Corporation) has contacted a number of potential buyers for the recovered glass product from the proposed facility. These potential buyers of the recovered glass materials are:

(1) Owens Illinois with offices in Atlanta, Georgia; Lakeland and Jacksonville, Florida.
(2) Bassicuss Company located in Atlanta, Georgia.
(3) A.D. Losciato, Inc. located in Tallahassee, Florida.
(4) Capital Recycling, Inc. located in Tallahassee, Florida.

12173A1/5

KBN ENGINEERING AND APPLIED SCIENCES, INC.
1034 Northwest 57th Street Gainesville, Florida 32605 904/331-9000 FAX: 904/332-4189

KBN

Not good enough

Based on the contacts with the above potential buyers, the City believes that all recovered glass materials from the proposed facility will be accepted by recyclable glass buyers.

4. ***Submit the revised emission estimates for all pollutants, including calculation sheets.***

✓ Revised emission estimates for all pollutants, Tables 2-4 and 2-5, are attached. Backup calculations are presented in Attachment A.

5. ***The original permit application stated that the tire processing operation can handle up to 45 tons per day (TPD) of scrap tires of which approximately 60 percent by weight will become tire derived fuel (TDF). What is the maximum amount of tires in terms of number per hour, TPD and TPY?***

The amount of tires can be calculated from the proposed TDF feed rates ranging from 0.83 to 1.04 TPH for the proposed RDF to TDF fuel ratios of 80/20 to 75/25, respectively (see Table 2-2 on Page 9 of the original permit application). The average weight of a used tire is between 20 to 25 pounds depending on size. The calculations will assume an average weight of 22.5 pounds per tire.

0.83 ton/hr TDF x 2000 lb/ton x (100 lb of tire/60 lb of TDF) ÷ (22.5 lb/tire) = 123 tires/hr.
1.04 ton/hr TDF x 2000 lb/ton x (100 lb of tire/60 lb of TDF) ÷ (22.5 lb/tire) = 154 tires/hr.

Thus, between 123 to 154 tires per hour.

Maximum tons per day of tires:

154 tires/hr x 24 hour/day x 22.5 lb/tire ÷ 2000 lb/ton = 41.6 TPD
or 1.04 ton TDF/hr x 24 hr/day x (100 lb of tire/60 lb TDF) = 41.6 TPD

WHOLE TIRES NOT TDF

Thus, approximately a maximum of 41.6 tons per day of tires.

Maximum tons per year of tires:

154 tires/hr x 7,920 hr/yr x 22.5 lb/tire ÷ 2000 lb/ton = 13,721 TPY

Thus, approximately a maximum of 13,721 tons per year of tires.

***In the submittal dated October 12, 1992 why were the tires not included in the projected MSW composition analysis of TDF.***

Tires are considered to be a supplemental fuel of which the operator of the proposed auger combustor will utilize only on an "as needed" basis. Therefore, tires were not included in the projected MSW composition calculations.

but, they will still be used? so shouldn't they be included?

KBN

*Submit a composition analysis of TDF.*

A composition analysis of TDF has been submitted as Table 2-1 on Page 7 of the original permit application and in Appendix B of the original permit application. Copies of Table 2-1 and an additional reference page are attached to this submittal.

*What will be the maximum amount of tires (#/hr) in a ton of TDF?*

Pounds per hour of tires can be calculated as follows:

$$1 \text{ ton of TDF} \times \frac{2{,}000 \text{ lb}}{1 \text{ ton}} \times \frac{100 \text{ lb of tires}}{60 \text{ lb of TDF}} = 3{,}333 \text{ lb of tires}$$

Therefore, for every ton of TDF burned as fuel per hour, approximately 3,333 lb of waste (whole) tires (of which 60 percent by weight will be processed into TDF) will be required. The 3,333 lb of tires is about 148 tires, assuming an average 22.5 lb per tire.

*How can you assure the Department that the heat value of TDF and refuse derived fuel (RDF) fed to the combustor will not exceed 128.9 MMBtu/hr on a continuous basis.*

Please refer to Item No. 6 on Pages 4 and 5 of the August 5 submittal.

Calculation appears to use Average value. Should use Max Value ∴ Composition analysis is in error. Pls revise To reflect Max not Avg.

6. ***The Thermo Flex baghouse is designed to handle a flow of 49,600 ACFM with a filtering area of 40,480 sq. feet while the United McGill baghouse is designed to handle a flow of 70,100 ACFM with a filtering area of 20,000 sq. ft. Which baghouse (or equivalent) do you propose to install? Submit a "D" size drawing of the process flow diagram showing all volumetric flow rates (ACFM or DSCFM) and material balance (not in a tabular form) including the wood chipping operation and all storage silos.***

The baghouse vendor has not been selected. However, either baghouse is capable of meeting the proposed emission limit of 0.02 gr/dscf. United McGill has guaranteed this emission rate with a baghouse having a cloth area of approximately 20,000 $ft^3$. It is noted that the 70,100 acfm stated in the United McGill proposal is the flow rate entering the spray dryer, and equates to the 49,600 acfm exiting the baghouse. Thus, the air-to-cloth ratio for this baghouse is approximately 2.5:1. The Thermo Flex baghouse is an oversize existing unit capable of holding up to 40,480 $ft^2$ of cloth area. Thus, this unit is more than capable of achieving the 0.02 gr/dscf outlet grain loading.

The different flow rates reflect the actual volumetric flow rate at two different locations in the exhaust stream of the auger combustor. The 49,600 acfm represents the stack outlet flow rate (or flow at baghouse exit) at 200°F and 12.9 percent moisture by volume. The 70,100 acfm represents the actual exhaust flow rate entering the spray dryer, as estimated by United McGill Corporation. Either baghouse will be able to provide a maximum outlet duct loading of 0.02 gr/dscf.

KBN

The process flow diagrams with volumetric flow rates and material balance are attached. There is no wood chipping operation on site. Any wastewood used will be preprocessed or having sufficiently small dimensions such that it will be processed by the RDF shredders.

*Provide more details on the TDF/RDF storage/mixing/feeding operations.*

RDF resulting from the front end process and TDF resulting from the whole tire debeading operation will be fed to the shredder via two separate conveyor belts. In the shredders, the two fuels will be combined (when TDF is used as a supplement fuel) and then stored on the floor of the building until burned in the combustor. The stored fuel will be pushed into a recessed weigh hopper and then fed to the combustor.

Is this sufficient? to continuous to analyze

7. ***Provided us with the names and phone numbers of sales persons at the Nalco Fuel Tech and the Merrick Corporation so that we may contact them for more information on the air pollution control equipment.***

| | | |
|---|---|---|
| For Nalco FuelTech: | Mr. Gene Capriotti | (813) 775-2249. |
| For Merrick Corporation: | Mr. Ron Selbe | (904) 265-3611. |

8. ***During the October 13, 1992 meeting it was agreed that an activated carbon injection system will be installed to control mercury emissions from this source. Provide us with the details including flow diagram, injection rates and location, etc.***

As explain in the October 13 meeting with the Department, the potential mercury emissions from the proposed facility have been estimated to be very minor. It was proposed that the mercury emissions from the proposed auger combustor would be 0.0035 $lb_m$/hr or about 27 $\mu$g/dscm (see calculations presented in Attachment G of the October 12 submittal). This proposed Hg emission level is very low compared to other resource recovery facilities in Florida. The lowest average mercury emissions reported to date from any facility in Florida are from the Palm Beach County Resource Recovery. The reported emissions are from 15 to 44 $\mu$g/dscm for this RDF facility. The low mercury emissions proposed for the auger combustor are based on RDF which would have been presorted to minimize mercury containing wastes such as batteries. In addition, the proposed spray dryer and baghouse will remove some mercury from the exhaust gas stream.

Therefore, the estimated maximum mercury emissions of 27 $\mu$g/dscm from the proposed auger combustor is below actual mercury emissions from similar facilities. It was further stated in the October 12 response (Item No. 8 on Pages 8 and 9) that for these reasons *"... no further control technology is considered necessary. If necessary, based on stack testing after the facility becomes operational, Gretna will install a mercury control system or under take other measures (i.e., battery recycling) necessary to meet the proposed emission limit."*

KBN

9. *The Department needs assurance that all continuous emissions monitoring systems selected for this project will fully comply with all existing EPA and State of Florida rules and regulations including the locations for all continuous emission monitoring systems and source sampling locations. Since this is a "green-field" facility, the Department will not be inclined to waive sampling points, locations, or other requirements pursuant to the provisions for alternate sampling procedures and requirements.*

Sufficient? yes

The City of Gretna assures the Department that the continuous emission monitoring systems selected for the project will fully comply with all EPA and Florida regulations. We acknowledge that the Department may not be inclined to wave these requirements.

Please give me a call if you have further questions on this matter.

Sincerely,

David A. Buff

David A. Buff, M.E., P.E.
Principle Engineer
Florida Registration No. 19011

SEAL

DAB/TTT/dmpm

cc: James Carter, Gretna City Manager
John Matthews, Florida Reduction Corp.
P. Pennland, EIS
File (2)

May 4, 1993

To: FDER File

By: Jonathan Holtom

Re: Gadsden County - A.P.
City of Gretna Resource Recovery Facility
AC 20-212334 (MSW Incinerator)

On March 30, 1993, BAR received a response from David Buff of KBN Engineering to our letter dated November 10, 1992 requesting additional information with regards to our September 11, 1992 Intent to Deny their permit. Although they attempted to answer all of our concerns, their responses were not totally satisfactory. The following items still remain a concern of the Department:

1. Provide either a copy of a solid waste permit application or a response to the solid waste concerns included in the department's Intent to Deny a Permit.

2. Provide a copy of the proposed contract that outlines the reciprocal agreements with the suppliers of municipal solid waste (MSW) that will allow approximately 10 to 15 percent (by weight) of all MSW received by Gretna to be returned to the originating source.

3. Provide us with letters of intent from potential buyers of all (contaminated) recyclables, not just a list of potential buyers of recovered glass materials.

4. Since the maximum 41.6 TPD of tires is not considered to be part of the MSW composition, where will all of these tires come from? Will all of the tires be whole and de-beaded on-site, or will some tires arrive already shredded? If they are whole, what assurance does the Department have that the tires will not be transporting contaminated water? If they are already shredded, what assurance does the Department have that there will be no toxic waste mixed in?

5. If only 60 percent (by weight) of the tire becomes tire derived fuel (TDF), what becomes of the other 40 percent? Of the tires that are de-beaded on-site, is the resulting scrap metal clean or is it encapsulated in waste rubber? Do you have commitments from buyers for this scrap metal? Please provide copies of the proposed contracts and letters of intent from these potential buyers.

6. Upon referral to item number 6 on pages 4 and 5 of the August 5 submittal, an apparent conflict of units was discovered. The heat input from TDF was stated as 15,500 Btu/hr. Is this correct or should it be Btu/lb?

7. Item 6 on pages 4 and 5 of the August 5 submittal showed heat input ratios for a) all RDF (80.2% of maximum) and b) RDF/TDF at a 78%/22% mixture (98.4% of maximum). Both of these mixtures appear to have used average heat input values instead of maximum values.

   If the maximum values for the heat input and the higher 75%/25% RDF/TDF mixture were used, it appears that the maximum hourly heat input rate will be exceeded. If the maximum heat input rate is exceeded, it follows that the stated emission rates will be lower than actual. Any increase in emission rates (especially NOx and CO) will likely push them over the 100 TPY limit, which would trigger the PSD analysis that Gretna is trying to avoid.

   Using the maximum values, which makes sense being this close to the threshold limits, indicates that the amount of whole tires combusted daily must be reduced from 41.6 TPD to 39.7 TPD in order to remain below the maximum heat input rate of 128.9 MMBTU/hr.

8. Since the stated 41.6 TPD of tires is considered to be a supplemental fuel, a composition analysis of TDF is needed.

9. "D" size process flow diagrams showing flow rates was received as requested, however, the legibility is rather poor. Re-submission of these documents with larger and clearer lettering will be required.

10. Process flow diagrams indicate a bypass around the baghouse. How often will this bypass be used? When the bypass is used, what are the pollutant emission concentrations out of the stack? Will they be within the allowable limits?

11. Per Scott Davis, EPA: New NSPS regulations governing incinerators between 40 and 250 TPD are in the works and should be finalized around January 1994. These new regulations will be applicable to all new **and** existing incinerators. For now, use 40 CFR 60, Subpart E - PM not to exceed 0.08 gr/dscfm.

    Although Gretna has not decided which baghouse they will use, they have assured us that either one will be capable of achieving 0.02 gr/dscfm, which is acceptable for now.

12. The process flow diagrams do not indicate the existence of the proposed generator. Where does it fit in to the flow process? Where is the steam generated and what happens to it after it passes through the generator?

13. During the October 13, 1992 meeting it was **agreed** that an activated carbon injection system will be installed to control mercury emissions. KBN has now re-stated their opinion that no further control technology is considered necessary and that if, after stack testing is done and shows that mercury levels are too high, then they will install a control device or take other measures (i.e., battery recycling) as necessary.

    It is the department's understanding that battery recycling is already expected to be done, regardless. The comments in item number 8 of KBN's March 30, 1993 response are indicative of the uncooperative attitude that has prevailed throughout this project.

    The department should require that front end battery recycling be done, as originally stated by the applicant, and that the agreement made on October 13 for activated carbon injection to control mercury emissions be upheld. Waiting until after stack testing is done to implement some sort of mercury control is not acceptable due to the current concerns of the Department about unacceptably high levels of mercury contamination throughout the state.

City of Gretna

Brian Beals 404-347-5014

David Buff
KBN Engineering

Dear Mr. Buff,

Thankyou for your response to our letter dated Nov. 10, 1992 requesting additional information. While some of your responses do satisfy our concerns, there are still some areas ~~that~~ where we would like a more complete response.

1. We still need a copy of the solid waste permit application or a response ~~the~~ Department concerns as listed in the intent to Deny.

Doug, Lee Co. stnd for MSW combustor on PM

2. We would like to ~~see~~ provided with a copy of the proposed contract and have assurance that one or more will be signed prior to construction.

3. Potential buyers are great but we need to see the letters of intent.

40% Residual what are you going to do with it Composition? BTUs Based on

5. "as needed" : Preston? If 42 TPD > Normal waste stream Where do they come from

6. Letters of Guaranty? .01-.008 gr/dscf

Preston, Look at Flow charts and see if you are happy.

8. 10/13/92 meeting "it was agreed that an A. Carbon Inj. system will be installed" Concerned about Here. Provide Info & cost for Control System

Not - "added after testing if necessary."

Provide details incl. Flow diag., inj. rates, Location, etc

How often Bypass Baghouse, in terms of emissions concentrations for pollutants

Schematic neglects generator. what happens to steam.

9. Preston?

Lettering illegible. please re-submit drawings.

Source of water? revise to include Steam Cycle + Electrical generating cycle. Steam Condensation? waste water?

~~We~~ We will continue to analyze the provided info but further progress toward issuing a permit will not proceed until all requested info is supplied.

cc: Jan Rae Clark
Brinkley
Matthews
James Carter
O.C. Allen
others on 11/10/92 Letter

Sincerely

Max heat input

| | | |
|---|---|---|
| 80/20 | 20,400 lb/hr | 128.9 MMBTU/hr |
| 75/25 | 19,660 lb/hr | 128.9 |

$.8\,RDF + .2\,TDF = 20,400$

$.75\,RDF + .25\,TDF = 19,660$

$.8\,RDF = 20\,400 - .2\,TDF$

$RDF = \frac{20\,400 - .2\,TDF}{.8}$

$.75\left(\frac{20,400}{.8} - \frac{.2\,TDF}{.8}\right) + .25\,TDF = 19660$

$19\,125 - 0.1875\,TDF + .25\,TDF = 19660$

$0.0625\,TDF = 535$

$TDF = 8560$

$RDF = 23,360$

RDF only: $\frac{128.9\text{ MMBTU/hr}}{5,500\ \frac{\text{MMBTU}}{\text{lb}}} = 23,436$ lb/hr

.2 (15,500)

at 20% TDF: $.2(128.9\text{ MMBTU/hr}) = \frac{25.78\text{ MMBTU/hr}}{15,500\ \frac{\text{BTU}}{\text{lb}}}$

$= 1663$ lb/hr TDF

at 25% TDF: $.25(128.9\text{ MMBTU/hr}) = \frac{32.225\text{ MMBTU/hr}}{15,500\ \frac{\text{BTU}}{\text{lb}}} = 2079$ lb/hr

at 22%

$$128.9 \text{ MMBTU} \times .75 = 96.675 \text{ MMBTU/hr}$$
$$96.675 \div 5500 \text{ BTU/lb} = \underline{17,577 \text{ lb/hr RDF}}$$
$$\frac{41.6 \text{ TPD} \times 2000 \text{ lb/ton}}{24 \frac{hr}{Day}} = 3467 \text{ lb/hr of Tires}$$

$$3467 \text{ lb/hr Tires} \times .60 = \underline{2080 \text{ lb/hr TDF}}$$

$$2080 \text{ lb/hr} \times 15,500 \text{ BTU/lb} = 32.24 \text{ MMBTU/hr}$$
$$+ \ 96.675 \text{ MMBTU/hr}$$
$$128.915 \text{ MMBTU/hr}$$

⇒ 15,000 BTU/hr over maximum heat input of 128.9 MMBTU/hr at average heat input of TDF

If using maximum heat inputs of TDF & RDF:

RDF = 6000 BTU/lb    TDF = 16,250 BTU/lb

$$17,577 \frac{lb}{hr} \text{ RDF} \times 6000 \frac{BTU}{lb} = 105.462 \text{ MMBTU/hr}$$
$$2,080 \frac{lb}{hr} \text{ TDF} \times 16,250 \frac{BTU}{lb} = 33.8 \text{ MMBTU/hr}$$
$$139.262 \text{ MMBTU/hr}$$

∴ Charging rates must be reduced from proposed amounts to avoid exceeding max heat input.

$$128.9 \frac{MMBTU}{hr} \times .25 = 32.225 \frac{MMBTU}{hr} \div 16,250 \frac{BTU}{lb} = 1983 \frac{lb}{hr} \text{ TDF}$$
$$128.9 - 32.225 = 96.675 \frac{MMBTU}{hr} \text{ RDF} \div 6,000 \frac{BTU}{lb} = 16,112.5 \frac{lb}{hr} \text{ RDF}$$

at 25%

$$1983 \frac{lb}{hr} \times 24 \frac{hr}{Day} \div 2000 \frac{lb}{Ton} = 23.8 \text{ TPD TDF}$$
$$23.8 \div .6 = 39.7 \text{ TPD of Tires}$$
$$39.7 \text{ TPD} \div 22.5 \text{ lb/Tire} \times 2000 \text{ lb/Ton} = 3525 \text{ Tires/Day} = 147 \frac{Tires}{hr}$$

*Florida Department of Environmental Regulation*

Twin Towers Office Bldg. • 2600 Blair Stone Road • Tallahassee, Florida 32399-2400

Lawton Chiles, Governor

Virginia B. Wetherell, Secretary

May 5, 1993

Mr. David Buff
KBN Engineering and Applied Sciences, Inc.
1034 Northwest 57th Street
Gainesville, Florida 32605

Re: Gadsden County - A.P.
City of Gretna Resource Recovery Facility
AC 20-212334 (MSW Incinerator)

Dear Mr. Buff:

Thank you for your letter dated March 29, 1993 regarding the above project. We are presently reviewing it and find it to be only a partial response to the concerns that were expressed in the September 11, 1992 Intent to Deny.

We will be happy to continue our review as more information arrives.

Sincerely,

John C. Brown, Jr., P.E.
Administrator
Air Permitting and Standards

JCB/PL/jh

**Memorandum**

**Florida Department of**
# Environmental Protection

7-9-93

To: Preston Lewis

From: Jonathan Holtom

Re: City of Gretna - Municipal Waste Incinerator Permit

I have been notified by Tom Moody of NWD that the City of Gretna has submitted their application for a Solid Waste permit for a facility which will convert municipal waste into refuse derived fuel pellets. There is no mention in the application of an adjoining municipal waste incinerator.

A check with Jeff Braswell at OGC revealed that the last request for a time extension in which to respond to our "Intent to Deny" expired on June 30, 1993. Therefore, their application for an air pollution permit is no longer valid.

O. C. Allen, Financial Advisor for the City of Gretna, was under the impression that the attorney for the City of Gretna (Harold Knowles) was going to keep filing extensions until a decision was made whether or not to pursue the incinerator. He was not aware that the last extension had expired but said that was alright. The City has given John Mathews (Florida Reduction Corp.) until September (?) to obtain a solid waste permit for the pelletizing plant. Mr. Allen mentioned that the City is considering a gas powered Co-Generation facility instead and may not have any need for a solid waste permit. If they decide on the Co-Gen facility, Mr. Allen would like to bring the City officials by our office to pick up all the necessary paper-work needed in order to file a new application for a construction permit.

CC: Howard Rhodes, DARM
Clair Fancy, BAR
John Brown, BAR
Ed Middleswart, NWD
Jan Rae Clark, BS&HW
File