TO: Jason M. Gorrie, P.E., CDM, via e-mail
gorriejm@cdm.com

FROM: Scott M. Sheplak, P.E., Bureau of Air Regulation
Scott.Sheplak@dep.state.fl.us

DATE: March 30, 2006

SUBJECT: Hillsborough County Resource Recovery Facility
Hillsborough County
Unit #4
Project Number 0570261-007-AC; PSD-FL-369; PA82-19A
2nd Sufficiency Review

To summarize our telephone conversation of this afternoon, these are the items we discussed related to the insufficiency response dated 02/28/06 from CDM. I need the following additional information:

1. NOx SNCR Performance Information. No new or additional NOx BACT technologies or limitations were proposed in the response. Please provide performance reports and/or studies on SNCR units, preferably any actual studies completed on Units 1-3 at HCRRF. If not available from HCRRF, other units closely related, i.e., Lee, Pasco, etc. Please include details on ammonia injection rates, e.g., curves showing ammonia injection vs. NOx emissions. {This is more justification of the BACT for this project.}

2. Process/Operations and Air Pollution Control Device Equipment Layout. In response to the request for process/operations and air pollution control device equipment layout, only a list of drawings/specifications was provided. The process/operations and air pollution control device drawings and/or specs of interest appear to have been identified in the response in *Appendix C* specifically as Document Nos. 1v400v32, SM-105, SM-101, SM-107, SM-119 and M-310. {I found SC001 the site plan.}

3. EPA 12/19/05 proposed changes. Correspondence or comments from IWSA to EPA in response to EPA's proposed new MWC standards. You indicated that IWSA was commenting to EPA on the proposed changes.

In response to this item -- *"As part of this permit application for the proposed new Unit #4, you propose to lower the existing allowable air pollutants standards and limitations for Units #1, 2 and 3. The proposed reductions can not be considered as part of the application of BACT to Unit #4. Are these requested reductions used in the modeling analyses completed in this application?"* I misunderstood the reference to "expanded facility" in Volume I of the application as applying to all units, Units 1-4.

See you next Tuesday at HCRRF at 2 p.m. A follow up meeting on the drafting of the permit and what BACT will be would be good.

COVANTA ENERGY, Inc.

SPEC NO. Hills-SM-105A

DATE 10/22/04

TECHNICAL SPECIFICATION

FOR

AIR POLLUTION CONTROL SYSTEM

Facility Name: HILLSBOROUGH WTE FACILITY EXPANSION

Location: HILLSBOROUGH COUNTY, FLORIDA

****

****

Specification Prepared By:

A/E Name: Burns and Roe Enterprises, Inc.
800 Kinderkamack Road

Address: Oradell, New Jersey 07649

Telephone: (201) 986-4096

Approved for Release:

	Printed Name	Signature	Date
1.	S P Sturbrke	S P Sturbrke	10-22-04
2.	BOBBY ZUCHOWSKI		10-22-04
3.			
4.			
5.			

TECHNICAL SPECIFICATION
FOR
AIR POLLUTION CONTROL SYSTEM

TABLE OF CONTENTS

TABLE OF CONTENTS – (CONT"D)

TABLE OF CONTENTS – (CONT'D)

TABLE OF CONTENTS – (CONT'D)

TABLE OF CONTENTS – (CONT"D)

TABLE OF CONTENTS – (CONTD")

1.0 GENERAL

This Specification details the technical requirements for the design, fabrication, shop testing, delivery, erection, field testing, start-up (including bag precoat), and initial operation of the Air Pollution Control (APC) System for a municipal waste-to-energy facility. Where a conflict exists within this Document (this includes all the attachments listed in the Table of Contents), the more stringent requirement shall apply; if the conflict is not a case of more or less stringent, then the order of priority shall be 1) Air Permit (Attachment 9), 2) Service Agreement (Attachment 12), and 3) remainder of the Specification. All conflicts shall be brought to the attention of the Purchaser.

In general, the APC system shall include one or more trains of experience-proven equipment, complete with all ductwork and accessories. Each train shall be sized for the Design gas flow of one refuse fired boiler, reference Attachment 2. The equipment provided shall include a system complete in every detail except as specifically excluded herein.

System configuration shall be as indicated in Attachment 1. If multiple configurations are indicated in Attachment 1, separate proposals shall be provided for each required configuration.

It is the intent of this Specification that the Seller provide and install a complete "stand-alone" system. All Purchaser-supplied utilities, foundations, erection support, etc must be clearly defined by the Seller.

NOTE THAT PROJECT SPECIFIC REQUIREMENTS ARE INCLUDED IN ATTACHMENT 1.

1.1 Scope

The scope of Seller's supply for the Air Pollution Control equipment begins at the outlet flanges of the Purchaser's economizer and extends through the scrubber vessel (spray dryer), baghouse (or precipitator), and I.D. fans to the inlet flange at the stack. The scope of Seller's equipment supply for the reagent preparation system begins at the truck connection to the lime storage silo and extends to the dry scrubber. Lime will be delivered by trucks with pneumatic unloading systems.

1.2 Work to be Provided

The Seller shall furnish the following equipment, material, and services. The listing below is not intended to be complete. The Seller shall furnish all equipment, material, erection, and services required to provide a complete, readily maintained, and properly operating APC system, which satisfies the performance guarantees and requirements of this Specification.

1.2.1 Acid Gas Removal System

Scrubber complete with atomization equipment, gas distribution devices, external stiffeners, access door, and hopper.

Scrubber vessel atomizer/nozzle enclosure complete with heating and ventilation system, spare atomizer/motor assembly stand, an overhead monorail/trolley/hoist system for systems with removable

COVANTA ENERGY, Inc.

SPEC NO. Hills -SM-101A

DATE ~~10/22/04~~ 6/30/05

TECHNICAL SPECIFICATION

FOR

(MSW) MUNICIPAL SOLID WASTE STEAM GENERATORS

Facility Name: HILLSBOROUGH WTE FACILITY EXPANSION

Location: HILLSBOROUGH COUNTY, FLORIDA

****

This document and all information contained herein are the property of Covanta Hillsborough, Inc., and are not to be used except as expressly authorized in writing by said company.

****

Specification Prepared By:

A/E Name: Burns and Roe, Enterprises, Inc.
800 Kinderkamack Road

Address: Oradell, New Jersey 07649

Telephone: (201) 986-4096

A/E Approved for Release:

	Printed Name	Signature	Date
1.	S.P. Sturtzke	S.P. Sturtzke	10-22-04
2.	Leon Zuccotowski		10-22-04
3.	S.P. Sturtzke	S.P. Sturtzke	6-30-05
4.			
5.			

Load point			1=nom.	2	4	5	7	9
Fuel throughput		kg/h	22680	18900	13608	19440	24948	24948
		lb/hr	50000	41667	30000	42857	55000	55000
Low heating value	LHV	kJ/kg	10294	12626	10294	6781	6781	9231
High heating value	HHV	Btu/lb	5000	6000	5000	3500	3500	4545

Calculated flue gas composition in furnace, under normal conditions

wet:	CO_2	% by vol.	10,554	10,679	10,312	9,850	9,973	10,461
	O_2	% by vol.	5,857	6,244	5,723	5,042	5,105	5,660
	N_2 + Ar	% by vol.	64,875	66,822	63,384	58,980	59,712	63,762
	H_2O	% by vol.	18,649	16,190	20,518	26,066	25,148	20,053
	SO_2	% by vol.	0,014	0,014	0,014	0,013	0,013	0,014
	HCl	% by vol.	0,051	0,051	0,050	0,048	0,049	0,050
	HF	% by vol.	-	-	-	-	-	-
dry:	CO_2	% by vol.	12,974	12,741	12,974	13,323	13,323	13,085
	O_2	% by vol.	7,200	7,450	7,200	6,820	6,820	7,080
	N_2 + Ar	% by vol.	79,747	79,731	79,747	79,774	79,774	79,755
	SO_2	% by vol.	0,017	0,017	0,017	0,018	0,018	0,017
	HCl	% by vol.	0,062	0,061	0,062	0,065	0,065	0,063
	HF	% by vol.	-	-	-	-	-	-

Calculated noxious gas content in the wet flue gas in furnace (theoretical), under normal conditions, not referred to O_2

SO_2	mg/m³	405	409	397	384	389	404
	ppmv	142	143	139	134	136	141
HCl	mg/m³	834	840	815	788	798	829
	ppmv	513	516	501	484	490	510
HF	mg/m³	-	-	-	-	-	-
	ppmv	-	-	-	-	-	-

Load point			1=nom.	2	4	5	7	9
Fuel throughput		kg/h	22680	18900	13608	19440	24948	24948
		lb/hr	50000	41667	30000	42857	55000	55000
Low heating value	LHV	kJ/kg	10294	12626	10294	6781	6781	9231
High heating value	HHV	Btu/lb	5000	6000	5000	3500	3500	4545

Calculated flue gas composition at boiler outlet, under normal conditions

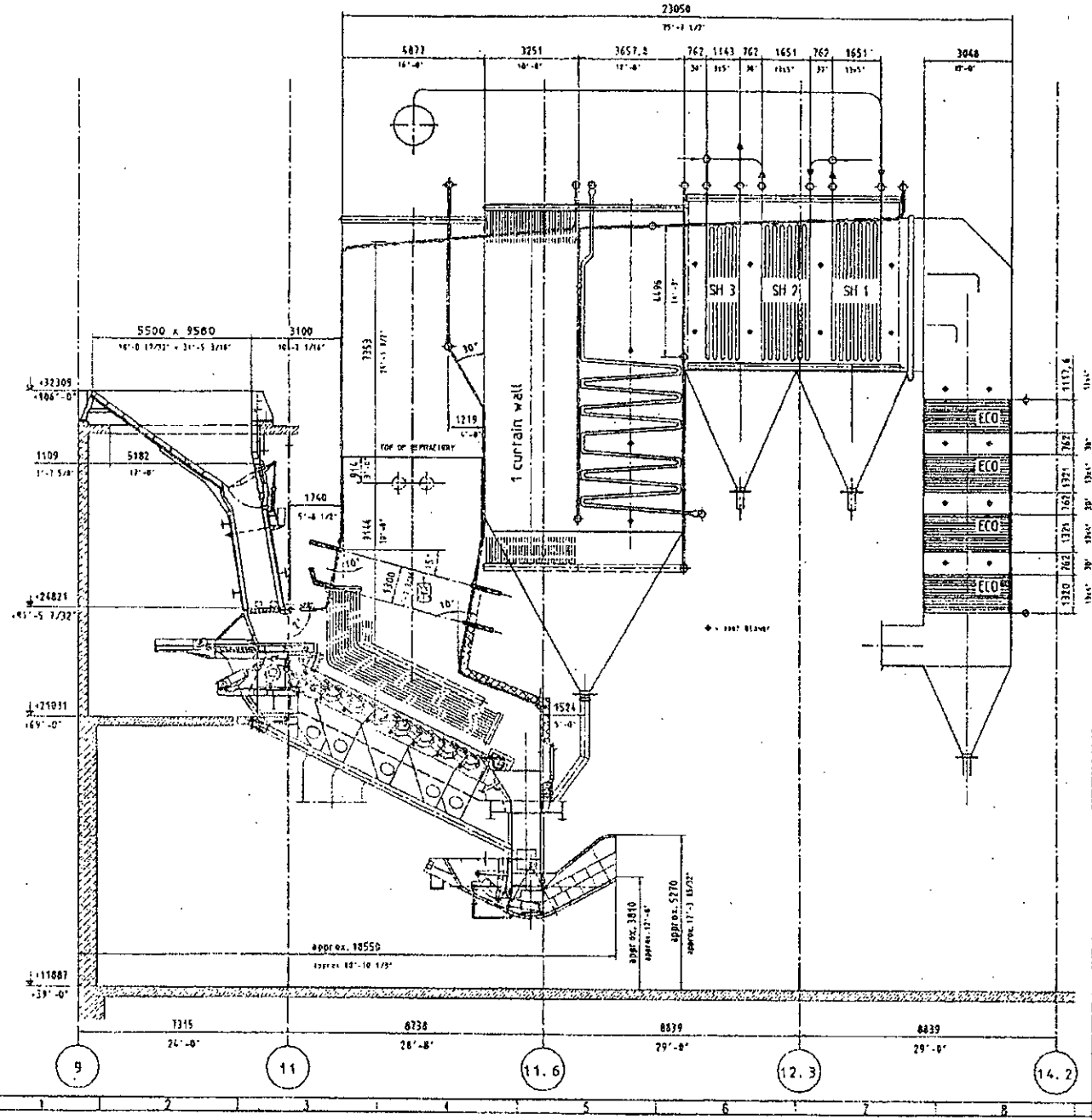
wet:	CO_2	% by vol.	10,473	10,597	10,183	9,728	9,874	10,380
	O_2	% by vol.	5,972	6,355	5,911	5,239	5,259	5,777
	N_2 + Ar	% by vol.	64,978	66,909	63,571	59,221	59,895	63,874
	H_2O	% by vol.	18,513	16,074	20,273	25,752	24,910	19,905
	SO_2	% by vol.	0,014	0,014	0,013	0,013	0,013	0,014
	HCl	% by vol.	0,050	0,051	0,049	0,047	0,048	0,050
	HF	% by vol.	-	-	-	-	-	-
dry:	CO_2	% by vol.	12,852	12,627	12,772	13,101	13,150	12,960
	O_2	% by vol.	7,329	7,572	7,414	7,056	7,004	7,213
	N_2 + Ar	% by vol.	79,740	79,724	79,735	79,762	79,764	79,748
	SO_2	% by vol.	0,017	0,017	0,017	0,017	0,017	0,017
	HCl	% by vol.	0,062	0,060	0,061	0,064	0,064	0,063
	HF	% by vol.	-	-	-	-	-	-

Calculated noxious gas content in the wet flue gas at boiler outlet (theoretical), under normal conditions, not referred to O_2

SO_2	mg/m³	402	406	392	379	385	401
	ppmv	141	142	137	133	135	140
HCl	mg/m³	828	834	805	778	790	823
	ppmv	509	513	495	478	486	506
HF	mg/m³	-	-	-	-	-	-
	ppmv	-	-	-	-	-	-

MARTIN GmbH für Umwelt- und Energietechnik	Date : 07-29-2005	Name : Koehler	Sheet : No. : 1	Doc. - No. : 8A 459 Q07
Project : Hillsborough - EXPANSION	80 % heat input with FGR			
Our No. : 050 459	480 tpd - 5,000 Btu/lb			
	(Underfire air temp. = 300 °F)			

BOILER DESIGN DATA	Units of measurement			
	US- units	Metric- units	US- units	Metric- units
Refuse throughput per unit	%	%	80.00	80.00
Refuse quantity per unit	sht/h	kg/h	20.00	18,144
Calorific value of refuse	Btu/lb	kcal/kg	5,000	2,460
Ash	%	%	20.90	20.90
Moisture	%	%	20.80	20.80
Combustible matter	%	%	58.30	58.30
Design pressure (approx.)	psig	atü	698	49.1
Drum pressure (approx.)	psig	atü	649	45.6
Live steam pressure (approx.)	psig	atü	615	43.2
Live steam temperature	°F	°C	750	399
Saturated steam temperature	°F	°C	496	258
Feedwater temperature	°F	°C	250	121
Flue gas temperature at boiler outlet	°F	°C	405	207
Preheated air temperature	°F	°C	300	149
Ambient temperature	°F	°C	80	27
Boiler efficiency, calcul.	%	%	71.80	83.13
, guarant.	%	%	70.30	81.40
Steam output, calcul.	lb/h	kg/h	131,240	59,530
, guarant.	lb/h	kg/h	128,506	58,290
Considered blow down	%	%	2.0	2.0
Quantity of injected water (calcul.) :				
First stage : SH1 - SH2	lb/h	kg/h	-	-
Second stage : SH2 - SH3	lb/h	kg/h	4,189	1,900
Total (steam temp. control)	lb/h	kg/h	4,189	1,900
Part load (controlled steam temp.)	%	%	80	80
Gross heat release	10^6*Btu/h	Gcal/h	200.00	44.63
Heat input from preheated air	10^6*Btu/h	Gcal/h	9.37	2.36
Heat input from recirculated gas	10^6*Btu/h	Gcal/h	3.13	0.79
Total heat input	10^6*Btu/h	Gcal/h	212.50	47.78
Combustion air quantity	SCFM	Nm³/h	46,795	74,080
Recirculated gas quantity	SCFM	Nm³/h	14,296	22,632
Flue gas quantity, furnace	SCFM	Nm³/h	70,798	112,080
Flue gas quantity, system exit	SCFM	Nm³/h	71,349	112,952



MARTIN® Reverse-Acting Grate

Number of runs	:	4
Stoker width	:	29'-5 9/16"
Number of steps	:	13
Total grate area	:	693.2 sq.ft

steam rate	:	164,240 lb/hr
steam temperature	:	750 °F
steam pressure	:	615 psig
boiler feedwater temp.	:	250 °F
eco fluegas exit temp.	:	430 °F

boiler width	:	30'-8" = 92 x 4"
evaporator	:	45 sections
superheater #3	:	72 flows
superheater #2	:	72 flows
superheater #1	:	72 flows
economizer	:	23 flows

f			
e			
d			
c			
b			
a	"Roof choice: support design and relief section dimensions adjusted"	03.05.2024	fa

MARTIN GMBH für Umwelt- und Energietechnik
Leopoldstr. 248, D-80807 München

1:96 (1/8"=1'-0")	050459	HILLSBOROUGH Unit 4	CAD

BOILER SKETCH

2A459Q03 a

ATTACHMENT 7

TECHNICAL DATA SUPPLIED BY CONTRACTOR

PERFORMANCE GUARANTEES

1.	Steam output, based on firing the specified refuse fuel, 250 °F feed water, 300 °F under-fire and 80 °F overfire air, 56 % excess air	163,780 lb/hr
	Steam output, based on firing the specified auxiliary fuel with the burner at 100% burner load, 250 °F feed water	65,512 lb/hr
2.	Superheated steam pressure at the steam non-return valve outlet	615 psig
3.	Maximum steam impurity leaving the super-heater, based on appropriate ABMA boiler water concentrations for the normal operating pressure	0.5 ppm (TDS)
4.	Total boiler steam/water side pressure drop at MCR, from feed water terminal point to main steam terminal point	135 psi
5.	Maximum flue gas exit temperature rise from 430 °F to no more than 505 °F after 4000 hours accumulated operation and no manual cleaning of fireside surfaces	Yes yes/no
6.	Control range of 80% of steam flow as guaranteed in item 1 above, while maintaining the outlet steam temperature of 750 °F plus or minus 10°F	Yes yes/no
7.	Maximum total fan motor power consumption (kW) when operating at 100%, as per item 1 above	400 kW
8.	Economizer water flow mass rate (minimum water mass flow rate 400,000 lb/sq. ft-hr)	385,000 / 535,900 lb/sq. ft-hr

6-30-05
~~03/10/04~~
Conformed

COMBUSTION/STEAM GENERATION UNITS

1.	Number of Units	1
2.	Type	MSW Stoker Boiler
3.	Manufacturer	Riley Power Inc.
4.	Maximum Continuous Rating (MCR) Solid Waste Capacity	600 TPD
	Note: All data in Items 4 through 24 shall be per Steam Generation Unit	
5.	Design Data (MCR)	
	a) Continuous steam output	163,780 lb/hr
	b) Blowdown	3,275 lb/hr
	c) Steam pressure (at superheater non-return valve outlet)	615 psig
	d) Steam temperature (at superheater non-return valve outlet)	750 °F
	e) Feed water temperature	250 °F
6.	Boiler Design Pressure	800 psig
7.	Boiler Structural Design Pressure	35 "wg (plus or minus)
8.	Heat Loss Calculation Summary	

Item		Btu/hr	%
a.	Heat Input	266,912	---
b.	Heat Output	190,905	---
c.	Losses:		
	i Dry Gas:		8.94
	ii Moisture:		15.52
	iii Residue:		2.50*
	iv Convection & Radiation:		0.86
	v Manufacturer's Margin:		1.00
	Total Losses		28.82
d.	Boiler Efficiency		71.18

*Carbon loss is the responsibility of the Martin Combustion System.

6-30-06
~~03/10/04~~
Conformed

COVANTA ENERGY, Inc.

SPEC NO. Hills-SM-107A

DATE 06/24/05

TECHNICAL SPECIFICATION

FOR

STEAM TURBINE GENERATOR

Facility Name: HILLSBOROUGH WTE FACILITY EXPANSION

Location: HILLSBOROUGH COUNTY, FLORIDA

****

This document and all information contained herein are the property of Covanta Hillsborough, Inc., and are not to be used except as expressly authorized in writing by said company.

****

Specification Prepared By:

A/E Name: Burns and Roe Enterprises, Inc.
800 Kinderkamack Road
Address: Oradell, New Jersey 07649

Telephone: (201) 986-4096

A/E Approved for Release:

	Printed Name	Signature	Date
1.	S.P. Shukla	SP Shukla	10-18-04
2.	LEON ZUCHOWSKI		10/21/04
3.	ED TENGWALL		6/24/05 CONFORMED ISSUE
4.			
5.			

TECHNICAL SPECIFICATION
FOR
STEAM TURBINE GENERATOR

TABLE OF CONTENTS

1.0 GENERAL

1.1 Scope

This Specification details the technical and quality assurance requirements for furnishing and delivering single casing, single flow, condensing, non-reheat steam turbine generator(s). The steam turbine will be of the uncontrolled extraction type as specified herein. The generator will be ~~directly connected to the steam turbine or will be~~ of the geared type.

The existing and operating Hillsborough County WTE facility consists of three (3) stoker/boiler units rated each at 400 TPD fired by 4,500 Btu/lb municipal solid waste or refuse. Steam produced in these boilers drives a nominal 29 MW condensing steam turbine generator. The expansion will consist of a new independent combustion unit (stoker/boiler/APC train) rated at 600 TPD fired by 5,000 Btu/lb refuse, and a new steam turbine.

1.2 Work to be Provided

The Seller shall furnish all equipment, materials and services for one complete turbine-generator unit including all standard and special accessories as detailed below. The performance requirements and parameters of the turbine are defined in the technical requirements part of the specification. Attachment 1, Section 10 defines project specific modifications to this specification.

1.2.1 Turbine

Multi valve, single casing, single flow, condensing, non-reheat turbine designed in accordance with Design Data of Attachment 1 and consisting of the following major components:

1. Sole plates, jacking bolts and plates and shims
2. Uncontrolled eExtraction steam connections
   ~~a) Uncontrolled extractions.~~
   ~~b) Automatic controlled extraction (if required) turbine shall be provided with a multi-valve partial arc control stage system at the extraction opening through which steam must flow to the turbine stage below the controlled outlet.~~
3. Exhaust connection or flange. The Purchaser will furnish the expansion joint with the condenser. The expansion joint shall match Seller supplied exhaust flange bolt pattern.
4. Turbine drip, drain and vent connections and associated piping up to an including the first valve.
5. ~~Exhaust casing spray nozzles and associated controls and piping (if required).~~
6. Exhaust casing relief diaphragms, including one set of spare diaphragms.
7. Turbine rotor grounding devices.
8. Main steam stop valves.
9. Strainers and temporary screens for main stop valves.
10. Blowdown covers and internal blanking fixtures for main stop valves.
11. Turning gear.
12. Turbine and generator shaft couplings.

COVANTA ENERGY

SPEC. NO.	B&R M-310
ISSUE	001
DATE	09/03/04

TECHNICAL SPECIFICATION

FOR

SNCR SYSTEM

Facility Name: **HILLSBOROUGH WTE FACILITY EXPANSION**

Location: **HILLSBOROUGH COUNTY, FLORIDA**

****

****

Specification Prepared By:

A/E Name: **Burns and Roe, Enterprises, Inc.**
Address: **800 Kinderkamack Road**
Oradell, New Jersey 07649
Telephone: **201-986-4096**

A/E Approved for Release:

	Printed Name	Signature	Date
1.	S.P. Sturtzke	S.P. Sturtzke	9-7-04
2.	Leon Zuchowski		9-7-04
3.			
4.			
5.			

TECHNICAL SPECIFICATION M-310

SNCR SYSTEM

COVANTA ENERGY

HILLSBOROUGH COUNTY, FLORIDA
WTE PLANT EXPANSION

Prepared by
Burns and Roe Enterprises, Inc.
800 Kinderkamack Road
Oradell, NJ 07649

Hillsborough County WTE Plant Expansion
SNCR System Specification
Project Specific Requirements

The existing and operating Hillsborough County WTE facility consists of three (3) stoker/boiler units rated each at 400 TPD fired by 4,500 Btu/lb municipal solid waste or refuse. Steam produced in these boilers drives a nominal 29 MW condensing steam turbine generator. The expansion will consist of a new independent combustion unit (stoker/boiler/APC train) rated at 600 TPD fired by 5,000 Btu/lb refuse, and a new steam turbine. An SNCR System for the reduction of nitrogen oxides will be provided as part of the expansion for the new boiler. The specific requirements for the SNCR System are per this Specification and as follows.

Project Specific Requirements:

The SNCR System shall be designed to meet the required performance levels with the boiler operating at Maximum Continuous Rating (MCR). This will be based on the injection of a urea based reagent into multiple injection levels (temperature zones) in the furnace. The System will consist of an insulated 15,000 gallon fiberglass reinforced plastic (FRP) heated and insulated storage tank that will feed into the circulation module located near the tank. From the circulation module the urea will be pumped to a redundant metering module with independent level control that will automatically meter the reagent into a dilution water stream based on the demand of the system and control of the flow to the multiple levels of injection.

At each injection level distribution modules will control the flow of the diluted reagent and atomizing air to each injector. The flow to and the operation of each level of injectors will be automatically controlled based upon unit load with feed back from the CEM system. Atomizing and cooling air will be provided from two (2) dedicated SNCR compressors furnished by Purchaser. Each SNCR compressor will be sized to provide the maximum amount of air with all urea injection nozzles in-service. The new SNCR compressors will be tied into the existing plant air system for backup. Makeup water for the SNCR System will be from the Plant's Service Water System, which is treated, reclaimed water (sewage effluent).

The SNCR System shall include all on-skid piping, safety valves, and instrumentation necessary for a complete, safe, and operable system.

SNCR SYSTEM REQUIREMENTS

INTRODUCTION

Please provide a proposal for the engineering, equipment supply, start-up, and optimization of a Fuel Tech NOxOUT® SNCR NOx Reduction System to be installed at the Hillsborough WTE Plant for the proposed 600TPD Martin mass burn municipal waste combustor to be installed as part of the overall expansion of the facility. The System shall be based on the information provided herein for a 69% NOx reduction from a baseline of 350 ppmd @ 7% O_2 to 110ppmd @ 7% O_2 with 15ppm ammonia slip as measured at the stack.

The Fuel Tech NOxOUT Process is based on the injection of urea-based reagents into the upper furnace that will provide effective, safe, reliable and flexible NOx control.

The proposed system for this application should consist of a 15,000 gallon FRP heated and insulated Reagent Storage Tank that would feed into a Circulation Module that would be installed near the tank. This would provide reagent feed off a circulation loop to an Independent Level Control Metering Module that will automatically meter the reagent into a dilution water stream based on the demands of the system and control the flow to three (3) levels of injection. At each injection level, distribution modules will then control the flow of diluted reagent and atomizing air to seven (7) injectors installed in the furnace. The flow to the injectors is automatically controlled based on unit load and furnace gas temperature and with a feedback from the CEM system.

The systems shall be complete with a PLC based control system that will automatically control the system based on load, temperature, and targeted NOx levels. The control system will typically use both steam flow and furnace gas temperatures as a feed forward to determine the location and approximate reagent feed-rates per injection level. The NOx signal from the CEM would be used as a feed back to fine tune the system to automatically maintain the NOx set point.

Both the Circulation Module and the Metering Modules shall be supplied with redundancy for increased reliability and flexibility.

In addition, the proposal shall include Equipment Design, Engineering, Computer Modeling as required, Start-up and Optimization Services.

The equipment shall consist of self-contained modules that require a minimum of installation. The only outage that should be required will be for the installation of the injection ports. All other installation and hookups should occur external to the boiler.

The urea reagent would be supplied by tank truck from licensed suppliers.

TECHNOLOGY DESCRIPTION

Fuel Tech NOxOUT® SNCR Process

The NOxOUT® Process is a post-combustion NOx reduction method that reduces NOx through a controlled injection of NOxOUT® A or other NOxOUT® reagents into the combustion gas path of fossil-fired and waste-fired boilers, furnaces, incinerators, or heaters. NOxOUT® A is a 50% urea solution plus a small amount of additives for scale and corrosion control. This reagent is readily available and requires no special safety precautions for handling.

The use of urea for control of oxides of nitrogen was developed under the sponsorship of the Electric Power Research Institute (EPRI) between 1976 and 1981. Fuel Tech is EPRI's exclusive licensing agent for the urea-based technology. These early investigations provided fundamental thermodynamic and kinetic information of the NOx-urea reaction chemistry and identified some traces of by-products. The predominant overall reaction is described as:

$$CO(NH_2)_2 + 2NO + 1/2\ O_2 \rightarrow 2N_2 + CO_2 + 2H_2O$$

Urea + Nitrogen Oxide ® Nitrogen + Carbon Dioxide + Water

Through some trace quantities of ammonia and carbon monoxide may form, the quantities of these can often be controlled through application know-how.

The NOx removal efficiency and reagent utilization are related by a variable known as Normalized Stoichiometric Ration (NSR). This ratio is defined as shown below. NOxOUT® A utilization is equal to the NOx reduction divided by NSR.

$$NSR = \frac{\text{Actual Molar Ratio of Reagent to Inlet NOx}}{\text{Stoichiometric Molar Ratio of Reagent to Inlet NOx}}$$

Fuel Tech has expanded the technology by developing chemical injection hardware, widening the applicable temperature range, and process control expertise required for commercial applications. Fuel Tech's licensing agreement with EPRI, combined with its successful in-house developments, is marketed commercially under the trade name NOxOUT®.

Two key parameters that affect the process performance are flue gas temperature and the reagent distribution. The NOx reducing reaction is temperature sensitive; by-product emissions become significant at lower than the optimum temperature range while chemical utilization and NOx reduction decrease at higher than the optimum. This optimum temperature range is specific to each application. The reagent needs to be distributed within this optimum temperature zone to obtain the best performance. Typically, the distribution is more difficult for large units and for units with high flue gas velocity.

The NOxOUT® Process is designed with the aid of Computational Fluid Dynamics (CFD) and Chemical Kinetic Model (CKM) in addition to results from field tests. The CFD model simulates flue gas flows and temperature inside a unit while the CKM calculates the reaction between urea

and NOx based on temperature and flow information from CFD. A combination of these two models determines the optimum temperature region and the optimum injection strategy to distribute the reagent. With an ability to estimate NOx reduction, a model study can be performed to determine if an application is a right fit for the process.

The reagent distribution is facilitated by chemical injectors developed by Fuel Tech. Utilizing pressurized air, these injectors atomize and direct the NOxOUT® reagents into the combustion gas path. The droplet size distribution and spray coverage developed by the injectors promote efficient contact between the NOxOUT® reagents and the NOx in the flue gas.

The NOxOUT® Process provides effective boiler load following capabilities. Through the computer modeling, an injection strategy is developed that makes use of multilevel injection, control of reagent concentration, droplet size and spray patterns, and the chemical enhancers.

Several years of field-testing indicate that the NOxOUT® Process is applicable on various types of units firing many different fuels. The process was successfully proven on units fired with coal, oil, gas, wood or municipal solid or hazardous waste. These units varied in size and type: package boilers, process heaters, incinerators, circulating or bubbling fluidized beds, waste heat boilers, utility boilers. By virtue of being a post-combustion process, unit size and type and fuel type have some, but not a major effect on the process.

There are substantial benefits gained from the application of the NOxOUT® Process compared to first generation NOx control technologies, such as ammonia injection. These benefits are briefly summarized below:

- Use of non-toxic, non-hazardous chemicals.
- Potentially lower capital cost due to the lack of large system compressors and elimination of anhydrous ammonia storage, handling, and safety equipment.
- Lower operating costs resulting primarily from minimization of gas (steam or compressed air) requirements.
- Inherently more effective control of spray patterns and chemical distribution for better mixing with the use of liquid rather than gas-based reagents, thereby resulting in better chemical utilization.
- Chemical enhancers that can be used to improve control of potential by-product generation while reducing NOx over an expanded temperature range.

STANDARD NOxOUT® SYSTEM DESCRIPTION

The NOxOUT® Process incorporates a reagent storage and delivery system to inject the NOxOUT®A solution into the combustion gases of the boiler. Concentrated NOxOUT®A solution (50%) urea is delivered by truck and transferred into the Chemical Storage Tank.

The Chemical Storage Tank is typically a closed top vertical tank, fabricated of fiberglass reinforced polyester and premium grade vinyl ester resin. It is designed per ASTM D3299-88. The tank is

supplied with level indicator, manway, vent, internal down pipe, external fill pipe, ladder, hold down and lifting lugs, and necessary connections and isolation valves. Site conditions will determine the connections and isolating valves. Site conditions will also determine the need for heat trace, insulation, and seismic qualifications.

The Circulation Module serves the NOxOUT® process in a dual role. While its primary purpose is to supply the chemical NOxOUT®A to the Metering Modules, it has a secondary purpose of keeping the chemical at a temperature above 80°F, through constant circulation and, if necessary, a circulation heater. The Module is skid mounted and fully shop tested. It consists of redundant centrifugal pumps, an electric in-line heater, a duplex strainer, one self-contained control panel, and all associated stainless steel pipe, tubing, valves and instrumentation.

The control panel consists of local controls for the Circulation Module. The heater is controlled by a thermostat and is preset to a temperature of 80°F. When the pump is running, and the temperature falls below the set point, the heater will automatically activate. The circulation pump should run at all times. The pressure indicators will show if the system is not running properly. There are temperature and pressure indicators, and a flow meter/switch for monitoring the correct system operation. The local control panel will also digitally show the tank level and temperature.

The Metering Module is a skid-mounted unit used to supply mixed NOxOUT®A to each Distribution Module. The unit is prepackaged and shop tested and includes a chemical metering pump, turbine pump to supply water pressure boost, an inline mixer, and a local control panel. At the discharge of the boost pump is a recirculation loop with a manual regulating valve to properly control the flow and pressures to the injectors. In addition, the module contains all necessary valves, check valves, water strainer, flow transmitter, pressure and flow switches and stainless steel piping/tubing to make it a self-contained metering and pumping system. At a minimum, redundant pumps with motors is suggested. In some cases, a completely redundant Metering Module is preferred. For situations where chemical biasing/Independent chemical injection to each level of operation NOx reduction is a function of the chemical feed rate, which is controlled by varying the speed of the metering pump through a 4-20mAmp signal. Control for the Metering Module is provided at the Local Control Panel or the Plant DCS (or Fuel Tech supplied Master Control Module - PLC). The system will operate in local or remote mode. In the local mode, instrumentation and electrical control is performed at the module. In the remote mode, control is performed from the Plant DCS. The module also has a hand/auto mode associated with the metering pump and the water boost pump. When the system is in auto and is turned off, the chemical pump will stop, the chemical valve closes and an automatic water flush occurs.

In any mode, the pumps will shut down for low air pressure, low chemical flow, or low water flow. A low tank level alarm will shut the Metering Module down in the Auto Mode. The flow control for the metering pump also has a local and remote mode. In the remote mode, the metering pump receives a 4-20ma signal from the Plant DCS, which controls the pump motor speed. This controls the chemical feed rate. In the local mode, metering pump control is performed at the local control panel using the digital flow controller. The Plant Control signal is disabled. Chemical totalization is provided on the flow indicator.

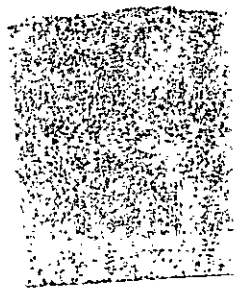
Mixed NOxOUT®A is transported from the Metering Module to the Distribution Modules, which channel the NOxOUT®A mixture to each injector. Each Module consists of flow meters, balancing valves and regulators, which accurately control and display the chemical and atomizing air to each injector. Also contained on these modules are the necessary manual ball valves, gauges and stainless steel tubing required to adequately control the NOxOUT®A injection process.

The injectors consist of an atomizing chamber in which the air and NOxOUT®A mixture first meet. The mixed chemical deflects off an internal orifice plate while being continuously atomized in the chamber by the addition of plant air (up to 80 psig may be necessary), which is the atomizing medium. The atomized chemical then flows through the injector tube to the nozzle. The nozzle is specially designed and characterized to meet the appropriate plant conditions. This is done by detailed computer analysis of the temperature, combustion and gas velocity profiles in the boiler. The atomized NOxOUT®A reagent then enters the boiler and mixes with the boiler flue gas to form nitrogen, carbon dioxide and water. Air is required for cooling at any time the injectors are in operation and not retracted from the boiler. The injectors are equipped with quick disconnects and hydraulic hoses for flexibility and ease of maintenance.

The final addition to the injector is an outer cooling air jacket. This shield is ceramic coated and is attached to the atomizing chamber. Plant air is fed into the coolant air jacket at low volume and pressure. The air acts as a coolant for the nozzle and the jacket minimizes direct contact between the corrosive flue gas and the injector. This maximizes the useful life of the nozzle in a hostile environment.

PROCESS DESIGN TABLE

Type of Furnace		Martin MSW Combustor	
Fuel Fired		MSW	
Maximum Heat Input mmBTU/hr		260	195
Uncontrolled NOx:	ppmd @7% O_2	350	350
	#/hr	141	106
Percent NOx Reduction		69%	69%
Controlled NOx:	ppmd @7% O_2	110	110
	#/hr	44	33
NOx Removed	#/hr	109	73
Expected NOxOUT® A Flow, gph		54	41
Furnace CO, ppm		<100	<100
Ammonia Slip (ppm as measured)	15	10	
Injectors		3 Levels of 7 injectors	
Flue Gas Temp		1750 to 1950°F	



SCOPE OF SUPPLY

1 15,000 Gallon NOxOUT® A REAGENT STORAGE TANK

Fiberglass Reinforced Plastic (FRP) with Premium Grade Vinylester Resin. Fabricated per ASTM D3299-88 where applicable, 1.5 specific gravity, heating package to maintain 80°F, site specific variables include: seismic zone, wind load, snow load, and temperature variance.

Includes heat trace and insulation with thermostat control, level transmitter, manway, vent, internal downpipe, external fill pipe, ladder, hold down and lifting lugs, FRP flanges for inlet, outlet, and fill, and circulation line valves for suction isolation, drain, and return control.

Typical Size: 12' OD x 17.8' SS x 19.3' OAH; 5,250 lbs.

Reference FTI Drawing C-1

1 CIRCULATION MODULE (SLP3-C)

Designed for continuous circulation and heating of the NOxOUT® A chemical and to supply feed of the reagent into the Metering Module. The NOxOUT® tank level indication and alarms will be mounted on this module adjacent to the local control panel.

Module includes complete assembly and testing, local control panel (NEMA 4X), redundant SS centrifugal pumps with TEFC motors and motor starters, stainless steel skid with basin, 3 kw electric heater, duplex strainer for chemical, flow sensor and indicator for NOxOUT® A, reagent temperature indicator, tank level indication, and all necessary SS components, piping (Sch. 40, socket-welded), and fittings.

Typical size: 4'W X 7'L X 6'H; 1,500 lbs.
Reference FTI Drawing D-1

1 REDUNDANT METERING MODULE (SLP3-MS-ILC)
WITH INDEPENDENT LEVEL CONTOL

This module is designed for Independent Level Control, which permits a biasing of the chemical to each injection level that is in use. It has a completely common back-up system (placed in the center of the skid) that can act as a fully redundant system for either level of control. Provides flow and pressure control of the fluids used in the NOxOUT® Process, NOxOUT® A and Dilution Water. The water supply will be adjusted, via a pressure control valve, to a set pressure that will allow for proper flow to each Distribution Module. The proper amount of NOxOUT® A is then fed, by use of a metering pump and an AC drive controller, into the dilution water discharge line and through a static mixer. The water/boost pump is supplied to power the mixed chemical up to each injector level at the proper pressures and flow rates. The local control panel on this module can operate in local or remote. In the remote mode the plant control room DCS or supplied PLC can automatically feed the optimized amount of NOxOUT® A reagent water pressure through the use of a 4-

20ma signal. Automatic flush of the system is also provided to clear chemical from the lines prior to shut down.

Also includes complete assembly and testing, (1) local control panel with PLC (NEMA 4X), (3) SS metering pumps with AC motors and drive controllers, (3) turbine/boost pumps with TEFC motors and motor starters, stainless steel skid with basin, (3) static mixers, (3) magnetic flowmeters with digital indicators for controlling chemical flow, (3) magnetic flowmeters, pressure control valves, pressure transmitters and indicator for controlling water flows, duplex strainer for water, air pressure switch, regulator for water inlet, (3) chemical calibration columns, and all necessary components, piping (SS Sch. 40 socket-welded), and fittings.
Typical Size: 4'W x 12'L x 6'H
Approximate weight 3,200 lbs.
Reference FTI Drawing E-4

3 **DISTRIBUTION MODULES (SLP3-D-7)**

These Modules are placed at each level just prior to the injectors and are used as a guide and check for proper injector performance. Air for atomization and cooling is introduced through this Module. One panel is supplied for each injector. They are grouped and pip-manifolded together for ease of installation.

This Module includes the necessary panels per module. Complete assembly and testing, flow and pressure indication with regulators for chemical and atomizing air. Each panel will be mounted to a free-standing stainless steel base and a pipe-manifold assembled for easy flow accessibility.

Typical Size 2'W x 7.7'L x 6'H, 700 lbs
Reference FTI Drawing F- 2

21 **WALL INJECTOR ASSEMBLIES (SLP3-I-NFTL-A)**

Each FT injector will be appropriately sized and characterized for proper flows and pressures that are required to achieve the necessary NOx reductions. The injectors are made completely of 316L stainless steel and the nozzle tip and cooling shield will be supplied with a ceramic coating. The cooling shield is typically 3/4" tubing (.750" O.D. & 0.83" wall thickness). The inner atomizing tube is typically 3/8" tubing, standard length is 2.5'.

Each Injector Assembly includes Fuel Tech air atomized injector, adapter for insertion adjustment, coupler to attach to boiler support, quick-connects and 6' long steel-braided flex hoses for both the chemical and atomizing air connections.
Reference FTI Drawing G-1

1 FURNACE TEMPERATURE MONITOR

The optical pyrometer will be used to provide continuous furnace temperature monitoring. They will be mounted on the side of each furnace near the furnace exit and will be used as a control input to the system monitoring changes in gas temperatures due to variations in load, burner tilt position or soot blowing.

The optical pyrometer detects radiation primarily at visible wavelengths where its accuracy is maximized while minimizing errors resulting from the relatively cool walls that surround the gas. This visible radiation is emitted by the ash particles transported by the exhaust gases, and not by the gases themselves. Since the ash particles are typically smaller than 30μm in diameter and thermally equilibrate with the surrounding gas in a few tens of microseconds, their temperature accurately reflects the local gas temperature. The instrument is pre-programmed to calculate the temperature of the ash cloud. It will measure the average temperature of the gas in the line of site across the width of the boiler with a slight bias to the side from which the measurements are taken.
Reference FTI Drawings G-11, G-15

1 CONTROL ROOM INTERFACE

Control of the NOxOUT Modules is facilitated by a PLC based control system utilizing an Allen-Bradley SLC 5/04 processor on each Circulation and Metering Modules. These PLC's control the local operation of each module. In addition to local control, the Metering Module PLC is responsible for control of the overall SNCR NOx reduction process. This is accomplished by routing to the PLC the required boiler parameters such as NOx, operating O2, and boiler load. The PLCs are programmed during the initial phases of the equipment construction and then fine-tuned during the start-up testing to respond to specific unit and emissions conditions.

A-B PanelView 550's provide a human-machine interface for local operation at each of the various modules. Each unit has a digital display that acts as the window to module and/or unit operation. From the 550, the operator can monitor all of the system performance as well as control the system and adjust the automatic operation at the various load conditions. This is accomplished through the use of the display screen and the attached keypad.

Additional monitoring and control can be provided for both the control room operator and the operator working on the side of the boiler via DH+ communication and the use of a customer-supplied interface to the plant's Distributed Control System (DCS).

ENGINEERING:

Fuel Tech will provide project and process engineering and the following drawings and information:

- P&ID
- Skid Arrangements
- Foundation Loads
- Tank Arrangement
- Interface Drawings
- Injector Locations
- Electrical Drawings and Bill of Materials
- Pump Performance Curves
- O&M Manuals
- Computer Model Output as required

The Circulation, Metering and Distribution Modules will be skid mounted with all equipment, piping, instruments, electrical and controls shop assembled. Installation will require interconnecting mechanical and electrical. Size, weight and electrical requirements are specified on the Equipment Specification sheets.

All control devices require field installation.

ENGINEERING SERVICES:

- Computational Fluid Dynamics and Kinetic Modeling as required
- Project Engineering
- On site installation assistance (x mandays)
- Training, Startup and Optimization Service (x mandays)
- Operation and Maintenance Manuals (5 Copies)

SCOPE OF SUPPLY BY OTHERS

1. Installation of Fuel Tech Supplied Equipment
2. Control Power Supply
3. Implement Control Logic Schemes into plant control system
4. DCS Interface for Allen Bradley DH+
5. NOx, Ammonia and CO Monitoring Equipment
6. Auxiliary Power: 20 to 25kw, 480volt, 3 ∅ (Connected Load).
7. Compressed Air: Maximum: 290 SCFM @ 60 to 80psig
8. Make-up Water: 11 to 21 gpm (Expected 14gpm)
9. Chemical Supply*
10. Testing

*** NOxOUT® A Reagent prices should be obtained from a licensed NOxOUT® A Reagent Supplier List (Appendix G), along with Reagent Specifications and Material Safety Data Sheets.**

Lee County Board Of County Commissioners
Agenda Item Summary — **Blue Sheet No. 2005**

1. ACTION REQUESTED/PURPOSE:

Approve award of formal quotation (RFP B&R 2661-M-310) and issuance of a purchase order to Fuel Tech, Inc. the sole-source provider / proposer, meeting all specification requirements for a proprietary Nitrogen Oxide Select Non Catalytic Reduction system including engineering, modeling, and all equipment, in the not to exceed amount of $1,081,000.00 that includes an allowance of $11,000.00 for a performance bond and $67,700.00 for installation, start-up, and training service.

2. WHAT ACTION ACCOMPLISHES:

Provides the necessary SNCR De-NOx equipment/system for the Waste To Energy Expansion Project.

3. MANAGEMENT RECOMMENDATION: Staff recommends approval of this request.

4. Departmental Category: 8 C8D		5. Meeting Date: 09-20-2005
6. Agenda:	7. Requirement/Purpose: *(specify)*	8. Request Initiated:
X Consent	Statute	Commissioner
Administrative	Ordinance	Department: Public Works
Appeals	X Admin. Code 4-1	Division: Solid Waste
Public	Other	By: Lindsey J. Sampson
Walk-On		

9. Background:

Sealed quotes were received by the County's design engineer, Burns & Roe, on behalf of the Solid Waste Division on June 15, 2005. On that date one response was received from the sole-source provider meeting all technical requirements for this system and equipment. After review and conformance for technical and commercial requirements recommendation was made to award to Fuel Tech, Inc. offering a patented, proprietary system. Additionally, Covanta Lee, Inc., the County's WTE Operator requires that the Fuel Tech equipment be utilized for the expansion project in order for Covanta to provide a guarantee related to NOx emissions from the combustion unit.

Funds are available in account string: 200923 40102.506540

Attachments: Burns & Roe bid evaluation dated 8/2/05
Covanta comments and recommendation dated 9/2/05

10. Review for Scheduling:

Department Director	Purchasing or Contracts	Human Resources	Other	County Attorney	Budget Services				County Manager/P.W. Director
					Analyst	Risk	Grants	Mgr.	
9.6.05	NA per JS	NA					RK 9/1	9/5	9-6-05

11. Commission Action:

_____Approved
_____Deferred
_____Denied
_____Other

RECEIVED BY COUNTY ADMIN: 9/6/05
COUNTY ADMIN FORWARDED TO:

CO. ATTY. FORWARDED TO: 9-6-05

August 2, 2005

LEE COUNTY
WTE EXPANSION PROJECT
FORT MYERS, FLORIDA
RFP 2661-M 310
SELECTIVE NON-CATALYTIC REDUCTION (SNCR)

BID EVALUATION

Burns and Roe Enterprises, acting on behalf of Lee County, issued Request for Proposal No. 2661-M 310 "SNCR" on May 30, 2005 to Fuel Tech, Inc. Fuel Tech is a sole source supplier of this equipment. It is a patented process for the reduction of Nitrogen Oxides (NOx). The system is based upon the injection of urea-reagents into the combustion path of the boiler that provides NOx reduction and control. Fuel Tech is a licensed agent for the urea-based technology.

Fuel Tech bid was received June 15, 2005.

RECOMMENDATION:

The recommended award of the contract is to Fuel Tech, Inc. Recommended award price is **$1,070,000,** which includes a complete system, freight costs FOB Jobsite. It does not include cost for Performance Bond or Sales/Use Tax. A breakdown of pricing is as follows:

Engineering	$ 208,300.
Modeling	50,000.
15,000g Reagent Tank	112,700.
Circulation Module w/enclosure	145,300.
ILC Metering Module	228,500.
(3) Distribution Modules	84,700.
(21) Wall Injectors	46,600.
Furnace Temperature Monitor	39,800.
Control Room Interface	61,300.
Freight	23,100.
Installation Support (5 mandays)	9,700.
Training/Start-up (30 mandays)	58,000.
TOTAL	**$1,070,000.**

Breakdown prices were provided for information purposes. Performance Bond cost (not included above) is $11,000.

Bid Evaluation 2661-M310 "SNCR" (cont'd)

Fuel Tech's payment terms are:

10% with Order
10% Submittal of approval drawings
30% Release for Construction
40% Date of Shipment
10% Acceptance or (6) months after delivery

Fuel Tech took exceptions to the Services/Goods Purchase Conditions as included in the RFP. Discussions with Fuel Tech deleted certain exceptions. A mark-up of Fuel Tech's requested changes in attached. Also attached is Fuel Tech's Confidentiality Agreement, which they request execution.

Once terms are resolved and acceptable to the County, price and payment terms are negotiable with Fuel Tech.

Fuel Tech's price is valid through August 31, 2005 and June 15, 2006 delivery is confirmed.

COVANTA LEE COUNTY
LEE COUNTY RESOURCE RECOVERY FACILITY
WASTE TO ENERGY EXPANSION PROJECT

Date: June 22, 2005
By: T. Kutylowski

TECHNICAL BID EVALUATION
REQUEST FOR PROPOSAL No. 2661-M-310
SNCR SYSTEM

SUMMARY

Request for proposal was sent to Fuel Tech, Inc. Fuel Tech proposed their NOxOUT SNCR NOx Reduction System. The proposal was received and evaluated.

A preliminary evaluation was performed. This evaluation revealed that some of the data supplied by the Seller was incorrectly stated. The Seller was asked to correct this data, and promptly responded with the corrections.

TECHNICAL DISCUSSION

The proposal submitted by Fuel Tech Inc. is for a complete package. It is to contain one (1) each of the following:

- 15,000 Gallon Reagent Tank
- Circulation Module (SLP3-C)
- Circulation Enclosure
- Redundant Metering Module (SLP3-MS-ILC)
- Furnace Temperature Monitor
- Control Room Interface

Also included are three (3) Distribution Modules (SLP3-D-7) and twenty-one (21) Wall Injector Assemblies. Engineering and Engineering services, i.e. computer modeling, are also included in the proposal.

PERFORMANCE EVALUATION

Fuel Tech has offered the following:

Twenty-four averaging period reveals a 10 ppmdv NH_3 slip at the stack. Urea consumption during the twenty-four hour period is 50 gallons per hour. The NH_3 Slip guarantee is at a heat input of 265 mmBTU/hr.

At 195 mmBTU/hr heat input, NH_3 Slip measure at the stack is guaranteed to be 10 ppmdv over a twenty-four (24) hour averaging period. The urea consumption during that 24 hour period is 37 gallons per hour.

For a one-hour period, NH_3 slip measured at the stack is guaranteed at 20 ppmdv. This is double the amount specified in the specification (10 ppmdv). However, this is the least amount of slip possible at the conditions stated; 265-

However, this is the least amount of slip possible at the conditions stated; 265-mmBTU/hr heat input, an uncontrolled NOx of 350 ppmdv, and a stack NOx of 110 ppmdv. These conditions also use the most amount of urea, 71 gallons per hour.

During all of the above-mentioned periods, the NO_x concentration as measured at the stack is guaranteed to be 110 ppmdv @7% O_2. The one (1) hour sampling time did have an ammonia slip of 20 ppmdv, which is double that stated in the specification.

Technical exceptions and clarifications are listed in Attachment 1. Fuel Tech, Inc has requested that the ammonia slip's measurement location be clarified. Therefore the Ammonia Slip Guarantee will be "as measured at the stack". The acceptance of the proposed submittal of ladder and PLC program files instead of the requested logic control diagrams is acceptable.

PRICING EVALUATION

The base price of the proposal is $1,070,000.00 (one million seventy thousand) dollars. This price is FOB to the jobsite. This price includes:

- Engineering
- Modeling
- (1) 15,000 Reagent Tank
- (1) Circulation Module
- (1) Redundant Metering Module
- (3) Distribution Modules
- (21) Wall Injector Assemblies
- (1) Furnace Temperature Monitor
- (1) Control Room Interface
- Freight to Jobsite
- On Site Field Technical Assistance during Installation
- On Site Training and Start-up Assistance.

Also included in the proposal is a list of recommended spare parts. It is separated into Electrical and Mechanical Spare Parts. Some items on the Mechanical Spare Parts list are flagged for possible 6-month replacement frequency.

Items flagged for 6-month replacement frequency total a cost of $16,519.00 dollars.

RECOMMENDATION

The proposal has been deemed technically acceptable.

ATTACHMENT 1

Technical Comments and Clairificaitons

Technical Comment, Clairificaiton, or Exception	BRE Response
Page 1, Para 1.2.1 Engineering: Ladder and PLC Program File will be provided instead of Logic Control Diagrams.	Acceptable
Pages 9, 10 & 11: Ammonia Slip Guarantee is: "as measured at the stack"	Acceptable

From: Alexander Dainoff <ADainoff@fueltechnv.com>
To: "Steve Stuhrke (sstuhrke@roe.com)" <sstuhrke@roe.com>
Date: 6/20/2005 1:10:33 PM
Subject: Covanta Lee County Proposal, Ref 2661-M-310

Steve,

As you requested, I have modified the following Technical data in Table 3:

Service air required: 60 to 80 psi

Instrument air required: 80 to 105 psi

Required Carrier Water: 1260 gph, max

840 gph expected

Sorry for the confusion. Let me know if you need additional information.

Thanks,

Alexander S. Dainoff

Regional Manager

Fuel Tech, Inc.

Financial Centre

695 East Main Street

Stamford, CT 06901

Phone: 203-323-8401, Ext 151

FAX: 203-967-2366

Mobile: 201-970-4044

E-Mail: ADainoff@fueltechnv.com

CC: Erik Parks <EParks@fueltechnv.com>, William Cummings <WCummings@fueltechnv.com>

Sampson, Lindsey J.

From: Peter Young [pyoung@CovantaEnergy.com]
Sent: Friday, September 02, 2005 10:24 AM
To: Sampson, Lindsey J.; Don D'Amico; Dennis Iavarone
Cc: Dennis Anacker; Glenn Fontana; Steve Stuhrke
Subject: SNCR - Selection & Recommendation

Attachments: T-M-096.TIF; TC's & Guarantees.doc; Nondisclosure Agreement.pdf


T-M-096.TIF (45 KB)


TC's & rantees.doc (115 K


Nondisclosure Agreement.pdf (5...

Based on B&R's SNCR Bid Evaluation, dated August 4, 2005, Covanta concurs with B&R's selection and recommendation to purchase the subject package from Fuel-Tech. The following comments are for your consideration and guidance:

1. Commercial Terms & Conditions - Vendor has several exception/changes to the RFP Services/Goods Purchase Conditions as reflected in the attached "TC's..." document. The attached document also reflects Covanta's suggested changes to the terms & conditions and included are our recommended Performance Guarantees for the County's consideration.

The most significant change Covanta made to the Performance Guarantees is the addition of a carrier water guarantee of 14 gpm or a maximum of two rows of nozzles in operation required to meet the guarantees. In the evaluation correspondence Fuel Tech quoted an expected carrier water requirement of 840 gph (14 gpm) and maximum requirement of 1260 gph (21 gpm). Should the SNCR system require more than 14 gpm (7,000 lb/hr) carrier water, more heat input will be required to make MCR steam flow negatively affecting the Project's energy output.

In parallel with this email, Covanta will forward the attached Word document for Fuel-Tech's acceptance (but with the understanding that the County may have additional comments and all subject to the County's final negotiations with Fuel-Tech.

Also attached is Appendix A which is Fuel-Tech's requested Nondisclosure Agreement. Covanta already has a similar agreement with Fuel-Tech, therefore the County will need to agree on its own with Fuel-Tech subject to the County's applicable conditions.

2. Price: Covanta concurs with B&R's recommended award Price of $1,070,000, except Covanta suggests that the County include the cost of a bond as discussed in Item 4 below.

3. Project Estimate: $1,168,258.

4. Bond: Bond cost of $11,000 is excluded from the above price. County has not require a bond for an equipment delivery only order. Since it is critical that Fuel-Tech performs to achieve its environmental guarantees, before and after its final payments, it is suggested that the County exercise the offered performance bond.

5. Payment Terms: Progress payments up to 90% upon delivery to site. Last 10% upon successful initial acceptance testing. See attached Appendix B for details. Net 30 days.

6. Schedule: The proposed delivery date of June 15, 2006 is not consistent with our June 5, 2006 delivery we had scheduled. B&R should request a June 5, 2006 delivery. If Fuel-Tech objects, a June 15, 2006 date may be accepted.

B&R should proceed immediately with the following:
1) confirm the Price validity for an award by September 23, 2006.

2) confirm a delivery date of June 5, 2006 is acceptable to Fuel-Tech.

3) confirm clarification of the controls scope per Covanta's questions that we had previously forwarded to Burns and Roe. At present we do not expect any scope changes which will result in additional costs beyond those identified in the bid evaluation, but this requires confirmation.

4) issue the County a purchase order term sheet that reflects the final agreements and understandings to be incorporated into the purchase order, and

5) issue the conformed specification, with all data sheet data filled-in, for inclusion in the purchase order.

County should proceed immediately with finalizing commercial terms with the vendor.

B&R's original and current schedule for issuing this PO was May 9, 2005 and August 16, 2005, respectively. Covanta recommends that the County have this award approved by the BOCC by the September 20, 2005 BOCC Meeting. Note that this order release is very critical relative to provide nozzle locations to Riley to minimize impacts to Riley's progress.

Peter

-----Original Message-----
From: Serrette,Pat
Sent: Thursday, August 04, 2005 4:55 PM
To: ekhalikar@aaesengineering.com; Sagar,Amrit; Anacker,Dennis; Gounaris,Demetrios; Holmes,Jack; Howard,Jody; Duff,Michael; Fulco,Nilma; Young,Peter; Harbison,Russell; Libertell,Trish; don.castro@hdrinc.com; AvogliMS@leegov.com; sampsolj@leegov.com; Andrew Preisler; D'Amico,Don; Dennis Iavarone; Rubin,Ira; Joseph Craven; John Ferrari; Justin Mathew; Cole,Kevin; Patel,Manu; Stuhrke,Steve; jkelly1119@verizon.net
Subject: Transmittal T-M-096 Bid Evaluation - SNCR System

A notification for transmittal T-M-096 entitled SC-319 Water and Steam Sampling Panel was forwarded to the Lee County Distribution team on Friday, July 29, 2005. Please note that the transmittal was incorrectly categorized (i.e. discipline type) and the above subject transmittal number is being reused to represent the appropriate discipline grouping (T-M-096 Bid Evaluation - SNCR System). Please discard the previous T-M-096 transmittal and replace with the attached.

On a further note, I&C Document SC-319 Water and Steam Sampling Panel will now appear as Transmittal T-I&C-012 (to follow).

Additionally, please note the following:
Transmittal T-M-098 - SC-302 (forwarded 8-2-05) will now appear as Transmittal T-I&C-013 (to follow) Transmittal T-M-099 - SC-322 (forwarded 8-2-05) will now appear as Transmittal T-I&C-014 (to follow)

T-M-098 and T-M-099 will be reused accordingly.

Please accept my apologies for any inconvenience.

The document(s) list in the attached transmittal has/have been issued and posted to the project website. You will find them under webprojects\vaults\02661-001-Lee County WTE Expansion\BREI Released Documents\Bid Evaluations\and then the applicable sub-vault.

Patricia F. Serrette
Burns & Roe Enterprises
800 Kinderkamack Road
Oradell, NJ 07649
(201) 986-4098