CITY OF TAMPA

Dick A. Greco, Mayor

Department of Solid Waste
Office of Environmental Coordination

October 26, 1998

Mr. Clair Fancy, Chief
Bureau of Air Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Fl 32399-2400

Re: DEP File No. 0570127-002-AC
PSD-FL-086 (A)

Dear Mr. Fancy:

Specific condition D.9 of the permit for the McKay Bay Refuse-to-Energy Facility requires the submittal of a final control plan by November 13,1998. The following actions are planned to bring the four municipal waste combustion units into compliance with the Clean Air Act Amendments:

New furnaces and combustion control systems will be installed.
New boilers, auxiliary burners and SNCR systems will be installed.
New carbon injection systems and spray dry scrubbers will be installed.
New fabric filters will be installed.
New continuous emissions monitoring systems will be installed.
A new ash handling system will be installed.
A new four flue stack will be installed.

The retrofit will be constructed in two stages. Units 3 and 4 will be retrofitted first while units 1 and 2 continue operating. Units 1 and 2 will be retrofitted after units 3 and 4 demonstrate compliance with the new standards. The vendor for the project has not been chosen. A report detailing the specific equipment to be installed will be forwarded to DEP and EPC in February 1999 under our current schedule.

Please call me at (813) 242-5408 if you have any questions or require additional information.

Sincerely,

Greig Grotecloss

cc Brian Beals, EPA
Mike Hewitt, FDEP
Bill Thomas SWFDEP
Jerry Campbell, EPC
David Dee, Landers and Parsons
Dan Strobridge, CDM
Dave Cerrato, MPI
Nancy McCann, COT

CITY OF TAMPA
MEMORANDUM

DATE: June 26, 1998

TO: BRIAN BEALS, EPA
CLAIR FANCY, DEP
MARY JEAN YON, DEP
BOB BUTERA, DEP
JERRY CAMPBELL, EPC
PAUL SCHIPFER, EPC
DAVID DEE, Landers and Parsons

FROM: GREIG GROTECLOSS, City of Tampa

SUBJECT: McKay Bay Refuse-to-Energy Facility

The quarterly progress report for the Clean Air Act retrofit of the McKay Bay Refuse-to-Energy Facility is attached. This is submitted in accordance with the dioxin agreement and the ash building variance.

Please call me at (813) 242-5408 if you have any questions or would like additional information.

McKay Bay Refuse-to-Energy Facility
Clean Air Act Retrofit Status Report

Actions Taken Last Quarter (2Q98)

1. Issued the Request For Proposals, the Operations and Maintenance Contract, the Interim Operations Contract and the Retrofit Construction Contract to prequalified vendors for bidding.

2. Received the Air Construction Permit for the retrofit.

3. Continued to work on resolving issues raised by the Directors Authorization Permit Application (EPC permit to develop old landfill).

4. Continued to work on resolving issues raised by the Solid Waste Construction Application.

5. Continue to work on the preliminary engineers feasibility report for project financing.

Actions Planned For Next Quarter (3Q98)

1. Receive technical proposals from bidders and signed contracts with requested changes.

2. Resolve all outstanding permit issues.

3. Continue working on the engineers feasibility report and related bond documents.

Note: The specifications for the construction of the ash building are included in the Request For Proposals.

ADMINISTRATIVE OFFICES, LEGAL & WATER MANAGEMENT DIVISION
1900 - 9TH AVENUE
TAMPA, FLORIDA 33605
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AIR MANAGEMENT DIVISION
TELEPHONE (813) 272-5530

WASTE MANAGEMENT DIVISION
TELEPHONE (813) 272-5788

WETLANDS MANAGEMENT DIVISION
TELEPHONE (813) 272-7104

MEMORANDUM

DATE: December 11, 1997

TO: Joe Kahn, P.E.

FROM: Alice H. Harman

THRU: Richard C. Kirby, IV, P.E.
Jerry R. Campbell, P.E.

SUBJECT: City of Tampa - McKay Bay Refuse-to-Energy Facility (MBREF)
0570127-002-AC

EPC hereby acknowledges receipt of the response to the incompletion letter of October 14, 1997 and additional notes concerning the meeting of November 5, 1997. MBREF has attempted to answer all questions or will provide supporting documentation as it becomes available (i.e. vendors, contractors).

One main issue, the definition of municipal solid waste, still remains unclarified and of significant concern to the EPC. As noted in the October 15, 1997 memo to John Reynolds, several of the waste listed in the application do not follow the definition as outlined in 40 CFR 60 Subpart Eb. As stated during the meeting of November 5, 1997, PSD-FL-086 clearly states that "Municipal waste only shall be burned in the facility". Based on changes of equipment to meet the new standards or costs of replacement equipment may not have triggered a modification. However, a modification also includes a change in the method of operation (i.e. alternative fuels) as defined in 40 CFR 60.2. If it is the intent of MBREF to burn these alternative fuels, the PSD permit and Site Certification permits will have to be modified. This may also trigger applicability under Subpart EB, which has more stringent standards for some pollutants. Again, EPC suggests that the permit be specific in defining what is allowed or not allowed to be burned and the origin of the waste.

Thank you for allowing EPC to comment on this permitting action.

CDM Camp Dresser & McKee Inc.

consulting engineering construction operations

1715 North Westshore Boulevard, Suite 875
Tampa, Florida 33607
Tel: 813 281-2900 Fax: 813 288-8787

November 12, 1997

Mr. Al Linero, P.E.
Administrator, New Source Review Section
Florida Department of Environmental Protection
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Subject: DEP File Number 0570127-002-AC, McKay Bay Retrofit Project

Dear Mr. Linero:

The following letter contains additional information from the City of Tampa concerning the issues that were discussed at the meeting held in the Department's offices on November 5, 1997. The Department's questions/issues are in italics and are followed by the City's responses.

1. *Is the City's proposed project a reconstruction or modification under 40 CFR 60, Subpart Cb, which is subject to the New Source Performance Standards (NSPS)?*

Response: The City and the U.S. EPA have investigated this issue thoroughly. The City's correspondence with EPA concerning this subject is provided as Exhibit 1 for your review.

The conclusion reached by EPA was that, with the exception of the improvements proposed for the refuse pit and the refuse feed cranes, all of the improvements to the City's Facility were being made primarily to meet the Emission Guidelines or were improvements to equipment/facilities not within the defined boundaries of a municipal waste combustor and, therefore, would not be included in the calculation to determine whether the Facility has been modified or reconstructed. Since the cost of the improvements to the refuse pit and cranes is far less than 50 percent of the cost of the Facility, the City's project does not constitute a reconstruction or modification under Subpart Cb.

At DEP's request on November 5, we recently asked EPA to reconfirm the conclusions EPA expressed in the above referenced correspondence. Although we were advised verbally that EPA's opinions have not changed, we do not anticipate receiving a written response from EPA until late December 1997, at the earliest.

2. *The Department would like to receive additional information to provide reasonable assurance that the retrofitted facility will meet the emissions limitations contained in the Emission Guidelines, Subpart Cb.*

Response: The City is currently in the process of selecting a full service vendor for the

retrofit of the McKay Bay Facility. The full service vendor will be responsible for the detailed design, construction and operation of the Facility. As part of its procurement process, the City pre-qualified six (6) vendors. Only the pre-qualified vendors will be allowed to submit proposals for the retrofit project.

Prospective vendors were required to submit Statements of Qualifications (SOQ) in response to the City of Tampa's Request for Qualifications (RFQ) issued May 1, 1997. The City evaluated the SOQ's based upon responsiveness to the RFQ, the technology proposed, operating and retrofit experience, and financial capability to complete the retrofit of the Facility. Tampa prequalified only those vendors which have demonstrated experience and expertise with the design, construction and operation of municipal waste combustors. These vendors include:

- ML Entsorgungs- und Energieanlagen GmbH
- ML Entsorgungs/STEAG AG
- Montenay International Corporation
- Ogden Waste to Energy, Inc.
- SMM McKay Bay, L.L.C.
- Wheelabrator McKay Bay, Inc.

The vendor's financial qualifications assures the City that the vendors possess the financial wherewithal to successfully complete the retrofit project in compliance with the City's contractual requirements. Successfully completing the project means that the retrofitted Facility has met all of the contractual performance guarantees. Included among the performance guarantees is the requirement to comply with **all applicable laws, rules, regulations and permit conditions, including the emissions limitations established by Subpart Cb**.

Although the retrofit construction agreement is still in draft form, the City anticipates that the contract will require the vendor to provide performance guarantees, warranties and suitable performance and payment bonds which will provide the City of Tampa with the assurance that the project will meet the emission limitation requirements contained in the EG Subpart Cb.

Exhibit 2 contains the City's draft technical requirements and specifications for the proposed project. It should be noted that these technical requirements are subject to change based upon input from the prequalified vendors and members of the City's Project Team. The City's draft specifications require the use of mass burn, stoker/grate-fired furnaces. The walls adjacent to the grate may be either refractory lined or waterwall design. From an air emissions perspective, there is little difference between refractory lined and waterwall furnaces, especially when a spray dryer is employed to cool flue gases. The vast majority of MWCs in the United States today employ mass burn, stoker/grate technology with waterwall boilers. As a practical matter, waterwall furnaces contain refractory lined water tubes in the

area of the furnace subject to flame impingement. Waterwall furnaces are simply more efficient steam generators, which is why the waste-to-energy industry often employs this technology in new installations. At the McKay Bay Facility, however, steam generation is not of paramount importance. Allowing refractory furnaces at the City's Facility may provide some economic benefit to the City by reducing capital costs for the retrofit. In any case, regardless of whether the Facility uses refractory or waterwall furnaces, the City will use an air pollution control train with SDA/FF, ACI and SNCR. All of this equipment has been successfully demonstrated in applications at municipal waste combustors located throughout the United States and elsewhere worldwide. It should also be noted that this APC equipment train is the basis used by EPA for establishing the emissions limitations contained in the Emission Guidelines. Given this APC equipment and the other improvements planned for the City's Facility, CDM believes the Facility will be able to comply with the emissions limitations in Subpart Cb after the retrofit is completed, regardless of whether a refractory or waterwall furnace is used.

Of course , the City is willing to provide DEP with copies of the vendor's specific plans and specifications, together with the vendor's performance guarantee, when they become available.

If you have any questions or comments, do not hesitate to contact us.

Sincerely,

CAMP DRESSER & McKEE INC.

Daniel E. Strobridge
Associate

Douglas W. Fredericks
Vice President

c: Joseph Kahn, DEP w/ attachments
Clair Fancy, DEP
Mike Salmon, City of Tampa
Nancy McCann, City of Tampa
David Dee, Landers & Parsons w/ attachments
Don Elias, RTP
Cynthia Hibbard, CDM
Jerry Campbell, HCEPC w/ attachments

EXHIBIT 1

LANDERS & PARSONS
ATTORNEYS AT LAW

CINDY L. BARTIN
DAVID S. DEE
JOSEPH W. LANDERS, JR.
JOHN T. LAVIA, III
RICHARD A. LOTSPEICH
FRED A. McCORMACK
PHILIP S. PARSONS
ROBERT SCHEFFEL WRIGHT

HOWELL L. FERGUSON
OF COUNSEL

VICTORIA J. TSCHINKEL
SENIOR CONSULTANT
(NOT A MEMBER OF THE FLORIDA BAR)

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TELEPHONE (904) 681-0311
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Original Fed Ex

April 2, 1996

Winston Smith
Director
Division of Air, Pesticides and
Toxic Management
United States Environmental
Protection Agency
345 Courtland Avenue, NE
Atlanta, Georgia 30365

Re: Tampa's McKay Bay Refuse-To-Energy Facility

Dear Mr. Smith:

This law firm assists the City of Tampa, Florida, with environmental law issues affecting the City's McKay Bay Refuse-to-Energy Facility (Facility). On behalf of the City, we are sending you this letter to formally request a written determination by the U. S. Environmental Protection Agency (EPA), pursuant to 40 CFR Section 60.5, that the installation of new air pollution control equipment and other improvements to the City's Facility will not constitute "reconstruction," as that term is defined in EPA's regulations, and will not subject the City's Facility to the requirements contained in EPA's New Source Performance Standards for Municipal Waste Combustors (40 CFR 60, Subpart Eb).[1]

[1] We previously discussed these issues with Mr. Fred Porter, Mr. Walt Stevenson, and Mr. George Smith at EPA's offices in Research Triangle Park, North Carolina. Mr. Brian Beals and Mr. Scott Davis from EPA-Region IV participated in the meeting via telephonic conference call. In compliance with the suggestions we received from EPA at that meeting, we are now submitting these issues to EPA for a written determination pursuant to 40 CFR Section 60.5. The City would like to receive a prompt response to this letter, but the City recognizes that EPA may not be able to respond within 30 days, as required by 40 CFR Section 60.5(b).

The issues presented in this letter are extremely important to the City of Tampa. The City is trying to determine whether it should (a) install new air pollution control systems in the existing Facility or (b) construct a new municipal waste combustor. EPA's response to this letter will help the City determine whether its Facility will be subject to the requirements in EPA's Emissions Guidelines (EG) or, instead, the New Source Performance Standards (NSPS) for Municipal Waste Combustors (MWC), which are codified at 40 CFR Part 60, Subparts Cb and Eb, respectively. With EPA's response, the City will be able to evaluate more precisely the advantages and disadvantages of its options.

TAMPA'S REQUEST FOR A FORMAL DETERMINATION BY EPA

The Factual Background

The City of Tampa's McKay Bay Refuse-To-Energy Facility is located at a site that has been used for the incineration of municipal solid waste (MSW) for approximately 29 years. This site was first used in 1967, when the City built an incinerator capable of burning 750 tons per day (tpd) of MSW. The City's incinerator had three combustion units and each unit was rated at 250 tpd. The incinerator did not include any equipment to recover heat or generate electricity. Wet scrubbers were used to control the airborne emissions from the incinerator. The incinerator was closed in 1979 because it was unable to comply with newly adopted environmental regulations.

The City subsequently decided to convert the incinerator into a waste-to-energy facility, which began commercial operations in 1985 as the McKay Bay Refuse-to-Energy Facility. The waste-to-energy facility is located in the same building that housed the incinerator. The waste-to-energy facility also uses other components of the incinerator, including the tipping floor, the refuse pit, the access roads, and portions of the ash handling system.

Although some parts of the incinerator were used in the waste-to-energy facility, significant changes to the incinerator were necessary. Volund rotary kilns were used in the City's incinerator. New Volund kilns were installed when the incinerator was converted to a waste-to-energy facility. A

fourth combustion unit (250 tpd) was added, which increased the Facility's total capacity to 1,000 tpd. A waste heat recovery system and a turbine generator were installed. The wet scrubbers were removed and electrostatic precipitators (ESP) were installed.

The Facility was a state-of-the-art design for the late 1970s and it has operated relatively well. The Facility has consistently met the emissions limitations contained in the City's permits (PSD-FL-086; FDEP AO29-206279)[2].

The City is in the process of identifying the specific improvements that must be made to the Facility to comply with the newly adopted EPA regulations for MWCs. In general, the City's consultants have concluded that the Facility will not satisfy the requirements in EPA's Emission Guidelines for MWCs unless the City removes the existing kilns and installs new air pollution control systems, furnaces, grates, auxiliary burners, continuous emissions monitors, and other equipment. The City also must improve the Facility's heat recovery system, the electrical system, and the instrumentation and control system. These proposed improvements to the Facility are necessary to ensure the Facility's compliance with the Emission Guidelines, but the City will not increase the Facility's maximum MSW throughput or electrical output.

The Applicable EPA Regulations

On December 19, 1995, EPA promulgated new regulations for municipal waste combustors, including the City of Tampa's Facility. The new regulations are codified in 40 CFR, Part 60, and they include:

(a) Subpart Eb, which establishes the new source performance standards (NSPS) that govern MWCs built after September 20, 1994; and

(b) Subpart Cb, which establishes the emission guidelines (EG) that govern existing MWCs.

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[2] A PSD permit (PSD-FL-086) was issued by EPA Region IV on July 2, 1982 for the construction of the Facility.

The NSPS apply not only to new MWCs, but also to "each municipal waste combustor unit . . . for which modification or reconstruction is commenced . . . " after June 19, 1996. 40 CFR 60, Subpart Eb, Section 60.50b(a). Thus, the NSPS for MWCs would apply to the City's Facility if a "modification" or "reconstruction" of the Facility occurred after June 19, 1996.

In the NSPS for MWCs, "reconstruction" is defined as:

> "rebuilding a municipal waste combustor unit for which the reconstruction commenced after June 19, 1996 and the cumulative costs of the construction over the life of the unit exceeds 50 percent of the original cost of construction and installation of the unit (not including any cost of land purchased in connection with such construction or installation) updated to current costs (current dollars)."

40 CFR 60, Subpart Eb, §60.51b. For convenience, we will refer to the foregoing requirement as EPA's "50% Rule." This 50% Rule also is included in the NSPS definition of a "modification," which is set forth in Section 60.51b.[3]

These definitions of "reconstruction" and "modification" only apply to changes to the "municipal waste combustor unit." In the NSPS, the "municipal waste combustor unit" is defined to include:

> "but is not limited to, the municipal solid waste fuel feed system, grate system, flue gas system, bottom ash system, and combustor water system. The municipal waste combustor boundary starts at the municipal solid waste pit or hopper and extends through:

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[3] In 40 CFR 60, Subpart Eb, Section 60.51b, a "modification" is defined to include any physical or operational change in a MWC unit that "increases the amount of any air pollutant emitted by the unit for which standards have been established under section 129 or section 111" of the Clean Air Act. This definition of a modification is not discussed in the body of this letter because the City assumes that the proposed improvements to the Facility will not cause an increase in the Facility's emissions of any air pollutant for which standards have been established under sections 129 or 111.

(i) The combustor flue gas system, which ends immediately following the heat recovery equipment or, if there is no heat recovery equipment, immediately following the combustion chamber,

(ii) The combustor bottom ash system, which ends at the truck loading station or similar ash handling equipment that transfer the ash to final disposal, including all ash handling systems that are connected to the bottom ash handling system; and

(iii) The combustor water system, which starts at the feed water pump and ends at the piping exiting the steam drum or superheater.

(3) The municipal waste combustor unit does not include air pollution control equipment, the stack, water treatment equipment, or the turbine-generator set."

Section 60.51b.

Based on our review of EPA's regulations and our discussions with EPA's staff, it is clear that there are limitations on the application of the 50% Rule. First, the 50% Rule does not apply to the cost of changes that do not involve the MWC unit. Since some components of the MWC (e.g, the stack) are excluded from the definition of an "MWC unit," changes to those components of the MWC are not considered when determining whether there has been a modification or reconstruction of the MWC unit.

Second, the NSPS provide that:

"Physical or operational changes made to an existing municipal waste combustor unit primarily for the purpose of complying with emission guidelines under subpart Cb are not considered a modification or reconstruction and do not result in an existing municipal waste combustor unit becoming subject to this subpart [i.e., the NSPS in Subpart Eb]."

Section 60.50b(d). Therefore, if the City makes physical or operational changes to its Facility primarily for the purpose of complying with EPA's new emission guidelines, the cost of those changes cannot be considered by EPA when determining whether there has been a modification or reconstruction of the City's Facility.

The Basic Issue For Tampa

The basic issue in this case is simple: How will EPA categorize the improvements that the City must make to its Facility? For each one of the proposed improvements, the City needs to know whether the cost of the proposed improvement must be included in the calculations that are to be performed under the 50% Rule when determining whether there has been a modification or reconstruction of the Facility. After EPA provides the City with its response concerning each one of the proposed improvements, the City can calculate whether the total cost of the improvements will exceed the threshold in the 50% Rule. The City then will know whether the Facility will be subject to the requirements in the EG or NSPS.

To fully respond to this letter, EPA will need to categorize each one of the City's proposed improvements. First, EPA must determine whether the proposed improvement (e.g., new stack) is part of the "MWC unit," as defined in the NSPS. If the improvement is not part of the MWC unit, then the cost of the improvement should not be included in the calculations under the 50% Rule. Similarly, EPA must determine whether the proposed improvement to the City's Facility is necessary "primarily" for the purpose of complying with the MWC Emission Guidelines in Subpart Cb. If so, the cost of the improvement should not be included in the calculations under the 50% Rule.

The Improvements to the City's Facility

The City of Tampa's Facility has operated satisfactorily and been in compliance with the applicable permit limits from 1985 to the present. Nonetheless, the City now must upgrade its Facility to comply with the requirements of EPA's Emissions Guidelines. The City believes that the improvements to the Facility do not constitute reconstruction and do not trigger the requirements of EPA's NSPS for MWCs.

For ease of reference, the City has prepared a separate document (Exhibit "A") that identifies each of the necessary improvements to the City's Facility and explains why the improvements should not be classified as reconstruction of the Facility. The City also prepared a table (Exhibit "B") of the improvements to the Facility and categorized them. Copies of Exhibits "A" and "B" are attached to this letter.

Also attached is Exhibit "C", a report dated March 1996 that was prepared by one of the City's consulting firms, Sjoberg Ventures, Inc. (SVI). SVI's report describes the improvements that the City must make to its Facility and the reasons why the improvements are necessary. SVI's report contains diagrams and plot plans for the existing Facility, as well as conceptual diagrams and plot plans for the Facility as it may look in the future.

RELATED ISSUES

Updated Costs

When determining whether reconstruction has occurred under EPA's 50% Rule, the facility owner or operator must look at "the original cost of construction and installation of the unit . . . updated to current costs (current dollars)." The EG do not indicate how the costs are to be updated. The City assumes that it should use the ENR Construction Price Index, but it would like to receive EPA's confirmation that this assumption is correct.

Basis of Cost Comparison

The City of Tampa is concerned about the basic facts that will be used to determine whether its improvements to the Facility will constitute reconstruction. To determine whether reconstruction has occurred, the Emission Guidelines indicate that the facility owner or operator must determine the "original cost of construction and installation of the unit." [4] This requirement for MWCs appears to be different than the general

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[4] See the definition of "reconstruction" in the MWC NSPS. 40 CFR 60, Subpart Eb, Section 60.51b.

requirements in 40 CFR Part 60 that apply to all other stationary sources. To determine whether reconstruction has occurred under 40 CFR §60.15(b), the facility owner looks to the "fixed capital cost that would be required to construct a comparable entirely new facility."

It will be extremely difficult or impossible for the City to accurately determine the "original cost" of the City's Facility. As indicated above, the City's Facility contains significant components of the City's 1967 incinerator, as well as components of a 1985 WTE facility. Construction of the Facility occurred on two separate occasions, many years apart. The individual components of the Facility were not the subject of separate bids, so the City never had detailed records concerning the cost of the individual components of the Facility. The City's records today are even less complete and cannot be relied upon to establish the actual cost of the Facility. Consequently, it would be very difficult to attempt to segregate the Facility into 1967 and 1985 components and then prepare a reasonable estimate of the "original cost." Even if estimates could be prepared for the costs in 1967 and 1985, those estimates then would have to be adjusted for inflation, which would add more uncertainty to the analysis. For all of these reasons, the City believes that the "original cost" should not be used in this case as the basis for comparison.

The City would like to have the flexibility to use the approach authorized in 40 CFR 60.15(b), which focuses on the cost of a comparable entirely new facility. It would be much easier and more accurate to determine the cost of the components in a modern 1,000 tpd MWC. This approach apparently is available to any stationary source of airborne emissions. Accordingly, the City respectfully requests EPA's approval to use the approach authorized in 40 CFR 60.15(b) when conducting the cost comparison under EPA's 50% Rule.

Conclusion

On behalf of the City of Tampa, we want to thank you for your assistance with the issues addressed in this letter. We hope that EPA will exercise its discretion in a manner that provides some flexibility to the City as it tries to evaluate its options for complying with the new MWC Emission Guidelines. The City is willing to make the necessary improvements to its

Facility to comply with the EG, but the City does not want these improvements to be used as the basis for imposing the NSPS on the City's Facility. The City believes EPA should use its discretion when responding to this letter and thereby help ensure that the City and other similarly situated communities are not unduly penalized when they attempt to retrofit their MWCs and come into compliance with the new Emission Guidelines.

Please call me if you have any questions.

Sincerely,

David S. Dee

cc: Fred Porter
Walt Stevenson (w/attachments)
Brian Beals (w/attachments)
Scott Davis
Howard Rhodes
Clair Fancy (w/attachments)
Bill Thomas
Jerry Campbell (w/attachments)
Sam Halter
James Palermo
Mike Salmon (w/attachments)
Wayne Brookins
Nancy McCann
Julie Andresen (w/attachments) (Fed Ex)
Andrew Nguyen (w/attachments)

/vc:TAMPA20

EXHIBIT "A"

THE PROPOSED IMPROVEMENTS TO THE CITY'S FACILITY

This document identifies the improvements that the City of Tampa (City) must make to the McKay Bay Refuse-To-Energy Facility (Facility) to comply with the requirements of the Emissions Guidelines (EG) for municipal waste combustors (MWC). 40 CFR 60, Subpart Cb. This document explains why the City believes these improvements do not constitute reconstruction or modification of the Facility. The technical and engineering reasons for the improvements are described in a report dated March 1996, prepared by Sjoberg Ventures, Inc. (SVI). The SVI report is attached hereto.

I. Air Pollution Control Equipment

To comply with the Emissions Guidelines (EG), the City will need to replace the Facility's electrostatic precipitators with new air pollution control equipment, which likely will include dry scrubbers, fabric filters, carbon injection systems, and perhaps selective non-catalytic reduction systems.

The installation of new air pollution control (APC) equipment does not constitute reconstruction or modification of an MWC unit at the Facility because EPA's definition of an MWC unit expressly excludes "air pollution control equipment." 40 CFR 60, §60.51b. Moreover, the installation of new APC systems does not constitute reconstruction because the APC systems are being installed solely for the purpose of complying with EPA's EG. See 40 CFR 60, §60.50b(d). For both of these reasons, the cost of the new air pollution control systems should not be included in any calculation of "reconstruction" under EPA's 50% Rule.

II. Continuous Emissions Monitors

The City's Facility has continuous opacity monitors (COMs), but the City will need to install several new continuous emissions monitoring systems (CEMS) to comply with the EG. The EG require the use of COMs to monitor opacity, plus CEMs to monitor carbon monoxide, sulfur dioxide, and oxides of nitrogen.

Since the City must install this new monitoring equipment to comply with the EG, the cost of the new equipment should not be included in any calculations under the 50% Rule.

III. Auxiliary Burners

EPA's EG are based on the use of "good combustion practices." Among other things, good combustion practices (GCP) require the owner or operator of a modern MWC unit to use auxiliary fuel to heat the furnace before and during startup operations. Auxiliary burners also should be used during shutdowns and other occasions when it is necessary to maintain minimum temperatures in the MWC unit. This GCP requirement is designed to minimize emissions, especially dioxin emissions, by ensuring that certain minimum temperatures are maintained whenever municipal solid waste (MSW) is burned in the MWC unit. Further, the use of auxiliary burners minimizes the likelihood that the fabric filters will be "blinded" during "cold start" conditions. In effect, the auxiliary burners serve as a type of "air pollution control equipment," which is excluded from the definition of an MWC unit.

The City's Facility currently does not have auxiliary burners. Since auxiliary burners must be installed at the Facility to ensure compliance with the emissions limits in the EG, the cost of installing the auxiliary burners should not be included in any calculations under the 50% Rule.

IV. ID Fans

The City will need to install new induced draft (ID) fans at the Facility when it installs the new air pollution control systems that are required by the Emissions Guidelines. The existing ID fans are adequate for use with the Facility's electrostatic precipitator, but the existing ID fans will not be sufficient to overcome the pressure drop that will occur in the flue gas system after the new fabric filters are installed. Larger ID fans will be required to operate the Facility with the new APC system.

The new ID fans will be installed solely for the purpose of enabling the Facility to comply with the EG. Moreover, the ID fans are not part of the "MWC unit". The fans are located downstream of the "heat recovery equipment," which is defined by EPA as the end of the MWC unit. For both of these reasons, the cost of the new ID fans should not be included in the calculations under the 50% Rule concerning reconstruction.

V. General Equipment and Maintenance Building

The City intends to purchase new shop tools, rolling stock (e.g., front end loaders), office computers, and related equipment when the City constructs the improvements to the Facility. The City will construct a maintenance building, where equipment can be stored and repaired. The City believes that this equipment and the maintenance building do not comprise part of the "MWC unit" and thus do not need to be included in any calculation performed under the 50% Rule.

VI. The Furnaces, Grates, and Kilns

The City will need to replace the Facility's furnaces, grates and kilns to comply with the emissions limitations in EPA's Emissions Guidelines for MWCs.

The City's Facility uses Volund furnaces, grates and rotary kilns, which were based on the technology of the 1970's. The Facility's furnaces, grates and kilns do not have the sophisticated combustion controls that are needed to meet the emissions limitations in the EG for dioxin and carbon monoxide. The underfire air and the secondary air in the grate section of the furnace cannot be adequately controlled from the Facility's control room. The air and the combustion in the kiln cannot be controlled in any fashion.

The City's consultants have concluded that the Facility will not be able to comply with the EG's emission limits for dioxin and carbon monoxide unless the kilns are removed and new furnace and grate systems are installed. New furnaces and grates are necessary to ensure that there will be sufficient turbulence in the combustion air for the complete combustion of the MSW and other products of combustion, which will greatly reduce the dioxin concentrations in the flue gas reaching the air pollution control system. The City must take steps to destroy dioxin and dioxin precursors in the combustion process or else the new air pollution control systems will be insufficient to ensure continuous compliance with the EG.

The City's consultants believe it would be extremely difficult or impossible for the City to obtain a performance guarantee for dioxin unless the improvements to the Facility include the removal of the kilns and the installation of new furnaces and grates. No creditworthy vendor or engineering firm will guarantee that the Facility will satisfy the new emissions limitations for dioxin without these improvements. Unless the City can obtain a vendor's guarantee and an appropriate opinion from its consulting engineers, the City will not be able to sell bonds to finance the construction of the improvements to the Facility.

Since the City must improve the Facility's furnace, grates and kiln to comply with the EG, the cost of these improvements should not be included in any calculations concerning the 50% Rule.

VII. Furnace Configuration

As previously noted, the City will need to replace the Facility's furnaces to reduce the Facility's dioxin emissions and comply with the EG. When evaluating the City's options, the City has tried to determine whether it would be more economical or otherwise beneficial to reduce the number of furnaces at the Facility. The Facility currently has four furnaces and kilns that have a total MSW processing capacity of 1,000 tons per day. It may be desirable to replace the Facility's present system with two 500 tpd or three 333 tpd furnaces.

The City is not evaluating this issue for the purpose of increasing the Facility's maximum MSW processing capacity or electrical output. The City is trying to determine whether it could reduce the City's capital, operating or maintenance costs by reducing the number of furnaces at the Facility. It also may be possible to improve the Facility's operations or emissions by using fewer furnaces.

The City should have the flexibility to choose the most desirable and cost-effective method of coming into compliance with the EG. Since the City must install new furnaces at the Facility to comply with the EG, the cost of the furnaces should not be counted toward the cost of reconstruction, regardless of the number of furnaces that are used in the retrofit. Accordingly, the City believes that it may replace the four existing furnaces with two (or three) new furnaces, without including the cost of the new furnaces in the City's calculations under the 50% Rule.

VIII. Boiler and Economizer

The City must make certain changes to the Facility's heat recovery system, including the boiler and economizer, to help the Facility come into compliance with the dioxin emission limits in EPA's Emission Guidelines. The City must reduce the temperature of the Facility's flue gas if the City is to minimize the potential for dioxin reformation downstream of the Facility's furnaces. The Facility's flue gas sometimes exceeds 600° fahrenheit when it leaves the boiler. At these temperatures, there is the potential for dioxin reformation to occur before the flue gas reaches the APC equipment. The current configuration of the Facility's heat recovery system is inadequate to reduce the

temperature of the Facility's flue gas to more appropriate levels. The Facility's heat recovery system must be changed to obtain the necessary reductions in the temperature of the flue gas and, in turn, to reduce the potential for dioxin reformation.

Some boiler modifications also will be necessary when the kilns are removed and the furnaces replaced. The heat recovery system is an integral component of the combustion unit. The proposed changes to the furnace, grate and kiln will require corresponding modifications to the heat recovery system to ensure that both systems are compatible.

Since the improvements to the Facility's heat recovery system are necessary to comply with the EG, the cost of these improvements should not be included in any calculations under the 50% Rule to determine whether reconstruction has occurred at the Facility.

IX. Electrical System

The existing electrical control and distribution systems at the Facility are adequate for the Facility's current mode of operation. However, when the new air pollution control (APC) systems and ancillary equipment are installed at the Facility to comply with the EG, the City will need to install new electrical control systems that are compatible with the new APC systems. New electrical systems will be needed to handle the additional loads from the new pumps, motors and other equipment associated with the new APC systems. For example, there will be: (a) new, larger motors for the ID fans; (b) new motors and pumps for the lime slaker and carbon injection systems; and (c) new motors and controls for the combustion air control systems.

The cost of the improvements to the Facility's electrical system should not be included in the calculation of reconstruction because the improvements to the Facility are necessary to ensure compliance with the EG. These improvements to the Facility would not be made if EPA had not promulgated the EG.

X. Control Systems

The control systems at the City's Facility are adequate to operate the Facility in its existing configuration. However, the existing control systems cannot closely monitor or regulate the combustion process. The existing control systems are not adequate to operate (or compatible with) the new air pollution control equipment, furnaces, grates, and combustion air systems that will be installed to comply with the EG. Since the City must upgrade the Facility's control systems to ensure that the

Facility is operated in compliance with the EG, the cost of the new control systems should not count as reconstruction.

XI. Ash Building and Enclosures

When the City upgrades the Facility to comply with the EG, the City will need to construct a building where the City can process, treat, store, load and otherwise manage the Facility's ash. The ash management building will be fully enclosed to minimize the potential for fugitive emissions of MWC ash. Similarly, the City will need to build enclosures around the Facility's ash conveyor system to ensure that there are no fugitive emissions of ash from the conveyor system.

These improvements to the Facility will be necessary to comply with EPA's Emission Guidelines, which strictly limit fugitive emissions of ash. 40 CFR 60, §§60.36b and 60.55b. The proposed ash management building and enclosures will serve, in effect, as air pollution control equipment because they will minimize the Facility's fugitive emissions of ash.

The City believes the cost of the proposed ash management building and enclosures should not be included in the calculations under EPA's 50% Rule. These improvements: (a) are primarily to ensure compliance with the EG; (b) serve as air pollution control equipment, which is not part of an MWC unit; and (c) are not expressly or implicitly included in the definition of the MWC unit.

XII. Ash Conveyor System

The Facility's fly and bottom ash conveyor systems will need to be relocated when the City retrofits the Facility. The bottom ash conveyors will need to be disconnected and relocated when the City works on the furnaces, kilns and grate. The fly ash conveyors will need to be disconnected and relocated when the City replaces the Facility's air pollution control (APC) equipment. The ash conveyors will need to be modified to be compatible with the new furnace and APC equipment.

The ash conveyors also will need to be redirected to a new ash management area. The existing ash management area will be used for staging and other purposes during the construction of the new improvements to the Facility. The existing ash yard also must be relocated so that the City can gain access to the furnaces. The new ash conveyor system is expected to be longer than the existing system because the new ash management building probably will be further away from the MWC unit than the existing ash yard. The locations of the existing ash management area and the proposed ash management building are shown in SVI's report,

which is attached hereto as Exhibit "C".

The City believes the cost of the new ash conveyor systems should not be included in the calculations under EPA's 50% Rule. The proposed changes to the ash conveyor system are necessary to enable the Facility to come into compliance with the EG.[1]

XIII. Ash Treatment System

The City is considering the possibility of installing a permanent ash treatment system inside the proposed ash management building. The City would like to have a WES-PHix or equivalent ash treatment system available for use, if necessary, to stabilize any metals in the Facility's ash. With the proposed system, the Facility's fly ash would be treated and then combined with the bottom ash. The combined fly and bottom ash would be placed in a pile, where the ash would dewater until it was loaded into transport trucks for hauling to an appropriate disposal site.

EPA's definition of an MWC unit does not expressly refer to ash treatment systems. We recognize that EPA defines an MWC unit to include "all ash handling systems that are connected to the bottom ash handling systems," but we believe the City's proposed ash treatment system is fundamentally different than the ash handling systems described in EPA's definition. An ash handling system is essential to the operation of any MWC unit. The City's proposed ash treatment system is not essential to the operation of the City's Facility.

The City believes that the ash treatment system will not need to be used during the Facility's normal operations. Based on the TCLP test data collected at MWC facilities in Florida, it is clear that combined ash will routinely pass the TCLP test if the ash is obtained from an MWC facility that is equipped with an acid gas scrubber system. Indeed, ash from several MWC facilities in Florida passed the TCLP test even though the

[1] If EPA disagrees with the City on this issue, EPA should consider a related issue: When using the 50% Rule to determine whether reconstruction has occurred, is it fair to compare the cost of the existing (i.e., shorter) ash conveyor system to the cost of a longer system, which is being installed to enable the City to comply with the EG? Under the present circumstances, the City believes it would not be fair to compare the cost of the shorter system with the cost of a longer system.

facilities do not have acid gas control systems. These data suggest that the combined, untreated ash from the City's Facility will pass the TCLP test after the Facility's new air pollution control systems are operational.

Nonetheless, the City is considering the possibility of installing an ash treatment system because it will provide extra protection ("insurance") against unanticipated conditions or new regulations that might disrupt the City's ash management operations. The ash treatment system appears to be a prudent, but purely optional addition to the Facility. In this regard, the City's proposed ash treatment system is fundamentally different than the ash handling systems that are described in the EG.

For these reasons, the City believes that its proposed ash treatment system is not part of the Facility's "MWC unit" and, therefore, the cost of installing an ash treatment system should not be included in any calculation concerning reconstruction. If EPA reaches a different conclusion about this issue, EPA's decision will have the practical effect of discouraging the City from installing a system that EPA presumably would like to have available at all MWC facilities.

XIV. The Tipping Floor

The City may need to regrade and repave the "tipping floor" of the Facility. The tipping floor is the area located next to the refuse pit. The garbage trucks drive to the Facility on a paved access road, which leads into the paved tipping floor, where the trucks dump (i.e., tip) the municipal solid waste (MSW) into the pit. The MSW is stored in the pit until it is ready to be loaded into the hoppers and fed into the combustion unit.

In many respects, the paved tipping floor is simply an extension of the paved access road that leads to the Facility. The tipping floor also appears to be similar to a paved parking lot where trucks unload their cargo. A number of MWCs do not have tipping floors per se, which suggests that the tipping floor is not an essential part of an MWC unit. Theoretically, fuel could be loaded into the hopper directly from delivery trucks or, in the alternative, fuel could be loaded into the hopper with a conveyor system from a remote fuel storage area.

It is our understanding that when EPA evaluates whether reconstruction has occurred at a utility boiler, EPA does not include coal loading and unloading systems within its definition of a utility boiler. If a coal loading system is not deemed to be part of a utility boiler, we would assume that a tipping floor would not be included within the definition of an MWC unit.

For these reasons, the City believes the tipping floor is not part of an MWC unit and, therefore, the cost of the proposed improvements to the Facility's tipping floor should not be included in the calculations under the 50% Rule.

XV. The Pit

The City of Tampa will need to reinforce the concrete and steel (i.e., rebar) in the pit where the MSW is stored.

EPA's NSPS are not clear as to whether the MWC unit includes the pit. The definition of "municipal waste combustor unit" in Section 60.51b states that the "municipal waste combustor boundary starts at the municipal waste pit or hopper and extends through" the combustion system.

Given the ambiguity in the NSPS, we suggest that the MWC units at Tampa's Facility should be deemed to start at the hopper (i.e., the chute) where the MSW fuel is loaded into the MWC unit. The hopper conveys the fuel directly into the furnace. The hopper is an integral part of the system and is physically connected to the MWC unit. Consequently, there is a strong argument that the hopper is the first component of the MWC unit that is essential to the unit's operation. Conversely, the pit is not essential to the operation of the MWC unit. The MWC units could continue to operate even if the pit were eliminated at the Facility. Accordingly, the City believes the pit should not be classified as part of the "fuel feed system" and should not be categorized as part of the MWC unit. Improvements to the pit should not constitute reconstruction of the MWC unit.

XVI. The Cranes

The City probably will refurbish the Facility's cranes when it installs the new APC system at the Facility.

EPA's definition of the MWC unit does not expressly refer to cranes. The definition of an MWC unit states that the MWC unit includes the "fuel feed system," but there is no definition or description of the fuel feed system. Given this ambiguity in the EPA regulations, the City has concluded that the cranes at the Facility are not part of the MWC unit.

The cranes, like the pit, are not an essential component of the MWC unit and they are not physically connected to the MWC unit. The cranes, like the pit, would be superfluous if the delivery trucks unloaded directly into the hopper or the fuel were supplied by a conveyor system from a distant fuel storage

pile. Further, if the MWC unit starts at the hopper, then the fuel feed system is the hydraulic ram or gravity chute into the furnace. The crane, however, is outside the hopper.

For these reasons, the City believes that the cost of refurbishing the Facility's cranes should not be considered under the 50% Rule.

/vc:TAMPA20B

EXHIBIT "B"
MCKAY BAY REFUSE TO ENERGY FACILITY

Potential Facility Improvements	Part of MWC Unit?	For EG Compliance?	Reconstruction?
1. Air Pollution Control Equipment	No	Yes	No
2. Continuous Emission Monitors	No	Yes	No
3. Auxiliary Burners	Yes	Yes	No
4. ID Fans	No	Yes	No
5. General Equipment and Maintenance Building	No	No	No
6. Furnaces, Grates & Kilns	Yes	Yes	No
7. Furnace Configuration	Yes	Yes	No
8. Boiler and Economizer	Yes	Yes	No
9. Electrical System	Yes	Yes	No
10. Control Systems	Yes	Yes	No
11. Ash Building and Enclosures	No	Yes	No
12. Ash Conveyor System	Yes	Yes	No
Potential Facility Improvements	Part of MWC Unit?	For EG Compliance?	Reconstruction?

13. Ash Treatment System	No	No	No
14. Tipping Floor	No	No	No
15. Pit	No	No	No
16. Cranes	No	No	No

Tampa/RR
- agency comm
- corresp.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
345 COURTLAND STREET, N.E.
ATLANTA, GEORGIA 30365

AUG 20 1996

4APT-AEB

Mr. David S. Dee
Landers and Parsons
310 West College Avenue
P.O. Box 271
Tallahassee, Florida 32303

SUBJ: McKay Bay Refuse to Energy Facility

Dear Mr. Dee:

This letter is in response to your correspondence to the U.S. Environmental Protection Agency (EPA), dated April 2, 1996, requesting an applicability determination for the above referenced facility. Your correspondence requested an applicability determination pursuant to 40 C.F.R. §60.5 with regard to the retrofitting of equipment at the existing McKay Bay Refuse to Energy facility located in Tampa, Florida.

This determination is primarily based on the federal rule for municipal waste combustors (MWC's), promulgated on December 19, 1995, in the Federal Register under 40 C.F.R. Part 60, Subparts Cb (Emission Guidelines and Compliance Schedules for MWC's) and Eb (Standards of Performance for MWC's for Which Construction is Commenced After September 20, 1994). The rule contains the emission guidelines (EG) for existing MWC sources and the new source performance standards (NSPS) for new MWC sources. In addition to our review and interpretation of these federal regulations with regard to the proposed retrofit at the McKay Bay facility, to ensure national consistency, EPA Region 4 consulted with the Office of Enforcement and Compliance Assurance (OECA) and the Office of General Counsel (OGC), and received technical assistance from the EPA Office of Air Quality Planning and Standards (OAQPS).

Background: Reference Definitions and Concepts

The resultant applicability determination is derived directly from specific portions of the federal rule for MWC's. As a reference, the MWC applicability and the "MWC unit," "Modification," and "Reconstruction" definitions from the federal rule are included in this section.

Under 40 C.F.R. §60.51b, the boundaries of a municipal solid waste combustor are defined as follows:

The MWC unit includes, but is not limited to the municipal solid waste fuel feed system, grate system, flue gas system, bottom ash system, and the combustor water system. The MWC boundary starts at the municipal solid waste pit or hopper and extends through:

(i) the combustor flue gas system, which ends immediately following the heat recovery equipment, or if there is no heat recovery equipment, immediately following the combustion chamber

(ii) the combustor bottom ash system, which ends at the truck loading station or similar ash handling equipment that transfer the ash to final disposal, including all ash handling systems that are connected to the bottom ash handling system

(iii) the combustor water system, which starts at the feed water pump and ends at the piping exiting the steam drum or superheater

The MWC unit does not include air pollution control equipment, the stack, water treatment equipment, or the turbine-generator set.

Under 40 C.F.R. §60.51b, Modification (or Modified MWC Unit) and Reconstruction are defined as follows:

Modification or Modified MWC Unit means a MWC unit to which changes have been made after June 19, 1996, if the cumulative cost of the changes, over the life of the unit, exceed 50 percent of the original cost of construction and installation of the unit (not including the cost of any land purchased in connection with such construction or installation) updated to current costs; or any physical change in the MWC unit or change in the method of operation of the MWC unit [that] increases the amount of any air pollutant emitted by the unit for which standards have been established under section 129 or section 111. Increases in the amount of any air pollutant emitted by the MWC unit are determined at 100 percent physical load capability and downstream of all air pollution control devices, with no consideration given for load restrictions based on permits or other nonphysical operational restrictions.

Reconstruction means rebuilding a MWC unit for which the reconstruction commenced after June 19, 1996, and the cumulative costs of the construction over the life of the unit exceed 50 percent of the original cost of construction and installation of the unit (not including any cost of land purchased in connection with such construction or installation) updated to current costs (current dollars).

Under 40 C.F.R. §60.50b, the applicability of the MWC guidelines and standards are outlined, to exclude certain actions:

> (d) Physical or operational changes made to an existing MWC unit primarily for the purpose of complying with emission guidelines under subpart Cb are not considered a modification or reconstruction and do not result in an existing MWC unit becoming subject to this subpart.

As the definitions state, the determination of the occurrence of a modification/reconstruction at a MWC unit is based on a cost analysis process. This process includes four steps:

> (1) Determine the original construction and installation costs for the unit.
>
> (2) Aggregate all costs of changes to the unit since start-up, including all costs for the emission guidelines.
>
> (3) Subtract the "allowed" retrofit costs required for compliance with the emission guidelines.
>
> (4) Compare the cost of changes to the unit since start-up to the original cost of the unit. If this value is greater than 50 percent of the original cost then a modification/reconstruction has occurred.

Your correspondence addresses the "allowed" retrofit costs (in step 3), but does not address the other costs (in item 2) for McKay Bay. This response will address all aspects of the cost analysis process.

1985 Conversion to Waste-to-Energy Facility

The McKay Bay Refuse-to-Energy Facility was originally constructed in 1967 as a solid waste combustor without heat recovery. The original facility included three combustion units, each with a capacity of 250 tons per day of municipal solid waste. This facility was in operation from 1967 until it ceased operation in 1979. In 1985, the facility began operations after being converted to a waste-to-energy facility. This conversion included the replacement of three Volund rotary kiln combustion units and the installation of one new Volund kiln unit (250 tons per day capacity) at the facility. A waste heat recovery system, a turbine generator, and four electrostatic precipitators were also installed during the conversion. Under the federal MWC rule, the cumulative costs of the changes at McKay Bay are included in determining the occurrence of a modification/reconstruction. The original three combustion units

began operation in 1967; the fourth unit began operation in 1985. In order to complete the applicability determination of the subpart Cb emission guidelines or subpart Eb performance standards under the "cumulative cost" criteria, we are requesting the submittal of information outlining the waste-to-energy conversion costs and other modification costs for each combustion unit from the initial start-up dates of 1967 (for units 1, 2, and 3) and 1985 (for unit 4) through June 18, 1996.

Applicability Determination: Source Retrofit Categories

This section will initially outline our applicability determination, formulated in response to your question concerning whether the proposed retrofit improvements at McKay Bay would constitute modification/reconstruction of the MWC unit under the EG. Under the potential retrofit improvements discussed in your correspondence, categories for these improvements have been developed. These categories are:

(1) Improvements to components that are not part of the definition of a MWC unit, are being undertaken to comply with the EG, and are not considered part of potential costs of modification/reconstruction. This category has been determined to include the following potential improvements:

- Air Pollution Control Equipment
- Continuous Emissions Monitors
- Induced Draft Fans
- Electrical System (portions)
- Combustion Control Systems (portions)

(2) Improvements to components that are part of the definition of a MWC unit, are being undertaken to comply with the EG, and are not considered part of potential costs of modification/reconstruction. This category has been determined to include the following potential improvements:

- Auxiliary Burners
- Furnace, Grates, and Kilns
- Boiler and Economizer
- Ash Enclosures
- Ash Conveyor System

(3) Improvements to components that are not part of the definition of a MWC unit, are not being undertaken to comply with the EG, and are not considered part of potential costs of modification/reconstruction. This category has been determined to include the following potential improvements:

- General Equipment and Maintenance Building
- Control Room Systems

- Ash Building
- Ash Treatment System
- Tipping Floor

(4) Improvements to components that are part of the definition of a MWC unit, are not being undertaken to comply with the EG, and are considered part of potential costs of modification/reconstruction. This category has been determined to include the following potential changes and improvements:

- Furnace Configuration
- Refuse Pit
- Cranes

Within these four categories, for the purposes of determining whether or not this facility meets the criteria for modification/reconstruction under 40 C.F.R. §60.51b, the potential source improvements identified in Category 4 only would be considered a part of the potential costs of modification/reconstruction at the McKay Bay facility. In addition, the cumulative costs of changes over the life of the unit from the initial construction date through June 18, 1996, would be included in the potential costs of modification/reconstruction at the McKay Bay facility. A summary of the potential source improvements and their applicability criteria within this determination for the McKay Bay facility is presented in Table 1.

Applicability Determination: Discussion

Different interpretations are apparent when comparing our determination and the proposed determination in your correspondence. The basis for EPA's determination regarding the potential source improvements at the McKay Bay facility will be discussed in this section.

Category 1 Improvements: Air pollution control equipment is specifically excluded from the MWC unit definition and is being installed for compliance with the EG. Continuous emissions monitors are being installed specifically for compliance with the EG. As the rule (at §60.51b) is written, induced draft fans are not part of the MWC unit definition. This exclusion does not set a precedent however, for applicability to other NSPS boundary determinations. This exclusion is only for sources affected under subparts Cb, Ea, and Eb. The portions of the electrical system that are being installed for compliance with the EG (for compatibility with the new air pollution control system) are excluded from consideration as a modification/reconstruction. No costs associated with these potential improvements are included in modification/reconstruction cost calculations. In addition,

control systems for the combustion units and the air pollution control equipment are not included in the MWC unit definition, thus their costs can be excluded.

Category 2 Improvements: Auxiliary burners are included in the MWC unit definition and are being installed for compliance with the EG for the maintenance of good combustion practices. The furnaces, grates, and kilns are included in the MWC unit definition and are being installed primarily for compliance with the EG to meet the new emission limits. The boiler and economizer are included in the MWC unit definition and are being installed for compliance with the EG to maintain compatibility with the furnace system upgrades. The ash enclosures are included in the MWC unit definition and are being installed for compliance with the EG for the control of fugitive ash emissions. The ash conveyor system is included in the MWC unit definition and is being installed for compliance with the EG for the control of fugitive ash emissions. No costs associated with these potential improvements are included in modification/reconstruction cost calculations.

Category 3 Improvements: General equipment improvements and the maintenance building are excluded from the MWC unit definition and are not being installed or improved for compliance with the EG. The control room systems are excluded from the MWC unit definition and are not being installed for compliance with the EG. The ash building is excluded from the MWC unit definition, is not being installed primarily for compliance with the EG, and is not primarily for the control of fugitive ash emissions (fugitive ash emissions are controlled by the ash conveyor system enclosures). The ash treatment system will be installed in the ash building and will treat fly ash prior to its combination with bottom ash, dewatering, and disposal. The ash treatment system, however, does not constitute a part of the ash handling system. The ash treatment system is excluded from the MWC unit definition and is not being installed primarily for compliance with the EG. The tipping floor is specifically excluded from the MWC unit definition and is not being improved for compliance with the EG. No costs associated with these potential improvements are included in modification/reconstruction cost calculations.

Category 4 Improvements: The furnaces are specifically included in the MWC unit definition, however, a change in the existing furnace configuration would not be completed primarily for compliance with the EG.[1] Furnace configuration changes, such

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[1] The McKay Bay facility is currently configured with four combustion units, each with a capacity of 250 tons per day.

as a change to either three units each with 333 tons per day capacity or two units each with 500 tons per day capacity, are a fundamental change to the MWC units at McKay Bay. These furnace configuration changes require a "unit by unit" comparison of costs to an existing 250 tons per day capacity unit at McKay Bay. Therefore, all costs associated with this potential change are included in modification/reconstruction cost calculations.

The intent of the rule was to include the refuse pit or the hopper, whichever occurs first, specifically in the MWC unit definition. Improvements to the refuse pit would not be done primarily for compliance with the EG. Therefore, all costs associated with this potential improvement are included in modification/reconstruction cost calculations.

Cranes are specifically included in the MWC unit definition as part of the fuel feed system. Any improvements to the cranes would not be done for compliance with the EG. All costs associated with this potential improvement are included in modification/reconstruction cost calculations.

Applicability Determination: Modification/Reconstruction Costs

On the basis of the definitions of modification and reconstruction in 40 C.F.R. §60.51b and our analysis of the proposed retrofit at the McKay Bay facility, the following improvements have been determined to be considered in the modification/reconstruction cost analysis: Furnace Configuration Change, Refuse Pit, Cranes. This cost comparison is to be completed on a "unit by unit" basis, comparing each existing unit's original cost of construction and installation (not including any cost of land purchased in connection with such construction or installation) updated to current costs (current dollars) to the replacement or modified unit's cumulative costs of changes over the life of the unit. These cumulative costs of changes over the life of the unit are not to exceed the threshold level of 50 percent of the original unit's updated current cost for a source to remain subject to the EG.

In response to your queries regarding original unit costs, new facility costs, and current dollars computations, EPA has the following responses:

(1) There are two separate original costs for the MWC units at McKay Bay. The cost of the three original combustion units may be determined from the comparison of originally issued bonds for the construction of the facility, as originally constructed in 1967 as a solid waste combustor. For the fourth combustion unit, constructed new in 1985, its original cost is determined from this baseline date (1985). For the McKay Bay facility, however, a better comparison

cost may be determined from an accurate estimate of the cost of a new MWC facility of comparable design.

(2) To determine the fixed capital cost required to construct a comparable entirely new MWC facility, reference the EG proposal from September 20, 1994, of the Federal Register. On page 48240, Tables 3A and 3B outline the Capital and Annualized Costs of Air Pollution Control For Typical New and Existing Large and Small MWC Plants.

(3) The method for performing a cost update to current dollars can be selected by the source. Provided the appropriate historical and financial documentation is included, the ENR Construction Price Index can be used.

We look forward to your submittal of additional data to complete the subpart Cb/Eb applicability determination. If you have any questions or comments concerning this response, please contact either Mr. Brian Beals or Mr. Scott Davis of my staff at (404) 347-3555, extensions 4167 or 4144, respectively.

Sincerely,

Winston A. Smith
Director
Air, Pesticides and Toxics
Management Division

Enclosure

cc: Joyce Chandler, OECA
Leslye Fraser, OGC
Walt Stevenson, OAQPS
Clair Fancy, Florida DEP
Iwan Choronenko, Hillsborough County EPC
Jerry Campbell, Hillsborough County EPC

TABLE 1

Potential Source Improvement	Defined under "MWC Unit"?	For EG Compliance?	Include in Reconstruction?
Air Pollution Control Equipment	NO	YES	NO
Continuous Emissions Monitors	NO	YES	NO
Auxiliary Burners	YES	YES	NO
Induced Draft Fans	NO	YES	NO
General Equipment and Maintenance Building	NO	NO	NO
Furnaces, Grates, and Kilns	YES	YES	YES TYPO
Furnace Configuration	YES	NO *	YES *
Boiler and Economizer	YES	YES	NO
Electrical System	NO *	YES	NO
Control Room Systems	NO *	NO *	NO
Control Systems (APC/Combustor)	NO *	YES	NO
Ash Building	NO	NO *	NO
Ash Enclosures	YES *	YES	NO
Ash Conveyor System	YES	YES	NO
Ash Treatment System	NO	NO	NO
Tipping Floor	NO	NO	NO
Refuse Pit	YES *	NO	YES *
Cranes	YES *	NO	YES *

* Differences exist between Determinations by EPA and the Source

-Tampa
- agency comments

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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DEC 3 0 1996

4APT-ARB

Mr. David S. Dee
Landers and Parsons
310 West College Avenue
P.O. Box 271
Tallahassee, Florida 32303

SUBJ: McKay Bay Refuse to Energy Facility

Dear Mr. Dee:

This letter is in response to the additional information you submitted to the U.S. Environmental Protection Agency (EPA) on August 22, 1996, and as a follow-up to our correspondence to you, dated August 20, 1996, concerning federal rule applicability at the above referenced facility. Your correspondence and additional information was submitted pursuant to our request and pursuant to any applicability determination with respect to the retrofitting of equipment at the existing McKay Bay Refuse to Energy Facility in Tampa, Florida.

The basis for this response is the federal rule for municipal waste combustors (MWC's), promulgated on December 19, 1995, in the Federal Register under 40 C.F.R. part 60, subparts Cb (Emission Guidelines and Compliance Schedules for MWC's) and Eb (Standards of Performance for MWC's for Which Construction is Commenced After September 20, 1994). The rule contains the emission guidelines (EG) for existing MWC sources and the new source performance standards (NSPS) for new MWC sources. To ensure national consistency, EPA Region 4 consulted with the Office of Enforcement and Compliance Assurance (OECA) and the Office of General Counsel (OGC), and received technical assistance from the EPA Office of Air Quality Planning and Standards (OAQPS) on this response. As you are aware, the Court of Appeals for the District of Columbia Circuit issued an opinion on December 6, 1996, that indicated the Court's intent to vacate the NSPS and EG. Davis County Solid Waste Management District v. EPA, No. 95-1611 (D.C. Cir.). Since the standards are effective until the Court actually issues a mandate vacating them, this determination is based on the rules as promulgated on December 19, 1995.

Clarification and Correction to Initial Correspondence

In addition to providing answers to your questions related to the proposed activity at the McKay Bay Facility, EPA is clarifying and correcting several statements from our previous correspondence (dated August 20, 1996). This supplemental information is as follows:

(1) In the Definitions section (see page 3), the discussion of reconstruction/modification analysis should be clarified such that the determination of the occurrence of a modification is based on either a cost analysis or an emission analysis process.

(2) In the Source Retrofit Categories section (see page 4), the discussion of improvements to components as the rule defines a MWC unit should also include the specific physical boundaries of the MWC unit as defined in the rule.

(3) In the Discussion section (see page 5), the Category 1 improvements paragraph discusses the induced draft fans. The rule does not specifically exclude induced draft fans from part of the MWC unit, but the diagram of the McKay Bay Facility which shows the location of the induced draft fans as located outside the physical boundaries of the MWC unit definition excludes the fans from the definition in this instance.

(4) In the Modification/Reconstruction Costs section (see page 7), the first response on original costs should be clarified by including the following language: "However, for a facility than modifies after June 19, 1996, reconstruction costs under 40 C.F.R. Section 60.51b is based upon a comparison of the project costs to the updated costs of the original unit, not a comparable facility."

(5) In the Table 1 enclosure, which summarizes EPA's findings and conclusions about the McKay Bay Facility, there is an error in the category of "Furnaces, Grates, and Kilns." The third column in this category (Include in Reconstruction?) should read "No" instead of "Yes." The City of Tampa's proposed improvements to the furnaces, grates, and kilns will not be included in the calculations that must be performed when determining whether there is a modification or reconstruction of the McKay Bay Facility. Table 1 did not accurately reflect the content of the Discussion section (see page 6), which discussed the City's proposed improvements to the McKay Bay furnaces, grates, and kilns and concluded that "[n]o costs associated with these potential improvements are included in modification/reconstruction cost calculations." A corrected Table 1 is enclosed with this response.

Initial Construction Date for the MWC Units

According to the information provided by the City of Tampa, three combustion units started operation at the McKay Bay Facility in 1967 and the fourth unit started operation in 1985. In light of this information, our previous correspondence requested "the submittal of information outlining the waste-to-energy conversion costs and other modification costs for each combustion unit from the initial start-up dates of 1967 (for units 1, 2, and 3) and 1985 (for unit 4) through June 18, 1996." In response to our request, the City of Tampa provided EPA with additional information and documents which demonstrate that all four of the MWC units at the McKay Bay Facility were newly constructed in 1983-85 and determined to be subject to the then applicable NSPS for Incinerators (40 C.F.R. part 60, subpart E).

The McKay Bay Facility was originally constructed in 1967 as a solid waste combustor without heat recovery. The original facility (Tampa Municipal Incinerator) included three combustion units, each with a capacity of 250 tons per day of municipal solid waste. This facility was in operation from 1967 until it ceased operation in 1979. On July 23, 1981, the City of Tampa submitted a Prevention of Significant Deterioration (PSD) preconstruction application for construction of a new refuse to energy facility on the site of the closed incinerator. The City of Tampa has submitted documents which demonstrate that this application was reviewed in 1981-82 by EPA Region 4 and the Florida Department of Environmental Regulation (DER) in light of the applicable NSPS requirements of subpart E. The Final PSD Determination was issued by the Florida DER on May 28, 1982. The PSD permit (PSD-FL-086), authorizing the construction of the four new MWC units and incorporating the NSPS requirements of subpart E, was issued by EPA Region 4 on July 2, 1982.

Construction occurred from 1983-1985. Four new Volund rotary kiln combustion units (250 tons per day capacity each) were installed at the McKay Bay Facility. The three MWC units built in 1967 were replaced from chute to stack during this construction. The City of Tampa installed new feed chutes, cranes, furnaces, kilns, boilers, stacks, electrostatic precipitators, a waste heat recovery system, and a turbine generator before commencing operations in 1985. All four units were deemed to be new units subject to the NSPS, subpart E.

Based on the new information submitted by the City of Tampa, EPA has determined that the "initial start-up date" for the McKay Bay Facility's four MWC units occurred in 1985. Therefore, when EPA determines whether a modification or reconstruction has occurred at any or all of the McKay Bay MWC units, EPA will compare the original cost of construction and installation based upon the units installed in 1985 updated to current costs to the cumulative cost of changes to each MWC unit that occurred from

the initial start-up date in 1985 through the present project.

NSPS Siting Requirements

The City of Tampa has asked whether the McKay Bay Facility will be subject to the NSPS siting requirements for new MWC units in 40 C.F.R. Section 60.57b(a) and (b) if EPA determines that a modification or reconstruction has occurred at this facility. These siting requirements include preparation of a materials separation plan and a siting analysis, along with public meetings for both. The rule states that:

> The owner or operator of an affected facility located within a small or large municipal waste combustor plant, for which the initial application for a construction permit under 40 C.F.R. part 51, subpart I, or part 52, as applicable, is submitted after December 19, 1995 shall prepare... (a materials separation plan and a siting analysis). 40 C.F.R. § 60.57(a) and (b) [emphasis added]

The PSD permit for the McKay Bay Facility and related documents indicate that the City of Tampa submitted its initial PSD application for a construction permit on July 23, 1981, and the application was subject to the requirements in 40 C.F.R. part 52. Consequently, the NSPS siting requirements in Sections 60.57b(a) and (b) do not apply to this facility. The preconstruction permit requirements and review for the proposed retrofits at the McKay Bay facility will not include a new PSD (or New Source Review) permit application, since there will be no significant increase in emissions (overall emissions will decrease with the addition of new pollution control technology). Furthermore, if the McKay Bay Facility is modified or reconstructed, the facility will be subject to the emissions limitations contained in the NSPS for MWC's (subpart Eb), but will not be subject to the NSPS siting requirements because its permit application was submitted prior to December 19, 1995.

If you have any questions or comments concerning this response, please contact Mr. Scott Davis of my staff at (404) 562-9127.

Sincerely,

for R. Douglas Neeley
Chief
Air and Radiation Technology Branch
Air, Pesticides and Toxics Management Division

Enclosure

cc: Joyce Chandler, OECA
Leslye Fraser, OGC
Walt Stevenson, OAQPS
Clair Fancy, Florida DEP
Iwan Choronenko, Hillsborough County EPC
Jerry Campbell, Hillsborough County EPC

TABLE 1

Potential Source Improvement	Defined under "MWC Unit"?	For EG Compliance?	Include in Reconstruction?
Air Pollution Control Equipment	NO	YES	NO
Continuous Emissions Monitors	NO	YES	NO
Auxiliary Burners	YES	YES	NO
Induced Draft Fans	NO	YES	NO
General Equipment and Maintenance Building	NO	NO	NO
Furnaces, Grates, and Kilns	YES	YES	NO
Furnace Configuration	YES	NO *	YES *
Boiler and Economizer	YES	YES	NO
Electrical System	NO *	YES	NO
Control Room Systems	NO *	NO *	NO
[illegible] Systems [illegible]bustor)	NO *	YES	NO
Ash Buil[illegible]ing	NO	NO *	NO
Ash Enclos[illegible]ures	YES *	YES	NO
Ash Conveyo[illegible]r System	YES	YES	NO
Ash Treatmen[illegible]t System	NO	NO	NO
Tipping Floor	NO	NO	NO
Refuse Pit	YES *	NO	YES *
Cranes	YES *	NO	YES *

* Differences exist between Determinations by EPA and the Source

EXHIBIT 2

7.0 MINIMUM TECHNICAL REQUIREMENTS

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- 7.1.1 Design Criteria
- 7.1.2 Conceptual Drawings
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7.9 Combustion Control and Facility/Instrumentation System

- 7.9.1 Distributed Control Philosophy
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7.0 MINIMUM RETROFIT TECHNICAL REQUIREMENTS

Contractor's Retrofit of the Facility shall, at a minimum, meet the technical requirements described in this Section 7.0. The minimum technical requirements described in this section include design, refurbishment, retrofit, repair, demolition, and new construction work. The Contractor may exceed the minimum technical requirements to maximize the waste throughput and energy recovery of the Facility within the limits of applicable permits and to meet the Contractor's guarantees as specified in the Retrofit Construction Agreement and the Operations and Maintenance ("O & M") Agreement. **(Note that the City's selection of the Contractor will be based on the evaluative process described in Section 6 of this RFP.) Each Proposer shall submit Technical Specifications with their Technical Proposal which describe how they will meet these minimum technical requirements. The Proposer's Technical Specifications shall be presented in the exact order of this Section 7.0.** Contractor's Technical Specifications, Drawings required to be submitted in Section 4 of this RFP, and Proposal Form 2 (Equipment Specification Data Sheets) will become Schedule 4 of the Retrofit Construction Agreement.

7.1 GENERAL

7.1.1 Design Criteria

The design information provided in this Section 7.0 establishes the minimum technical requirements for major systems affected by the retrofit. The Contractor shall meet the minimum technical requirements and shall be responsible for establishing design and operational criteria for all equipment, components and systems of the entire retrofitted Facility to meet the performance requirements and Performance Guarantees set forth elsewhere in this Request for Proposals ("RFP").

The scope of this retrofit, in summary, includes modification or replacement of four individual waste combustion systems to meet the combustion and heat recovery requirements and emission limits set forth in this RFP. The combustion system technology shall be of the type proposed in the Proposer's Statement of Qualifications submitted in response to the City's Request for Qualifications issued May 1,1997. Retrofitted system and equipment shall include, but not be limited to, the charging hoppers, feed chutes, grate systems, furnaces, combustion air systems, combustion control system (including auxiliary burners), boilers, economizers, superheaters, flue gas spray dryer absorbers ("scrubbers"), lime injection systems, carbon injection system, ammonia (or urea) injection systems, continuous emission monitoring system (CEMS), fabric filter houses ("baghouses"), induced draft ("ID") fans, stacks, fly-ash and bottom ash handling equipment, and plant auxiliaries equipped with all necessary instrumentation, electrical, piping, foundation, steelwork, and ductwork. The Retrofit shall also include refurbishing the refuse cranes, upgrading, and repairing certain buildings and structures. Sitework includes modifying roads and underground utilities, as well as supplying a new ash management building, ash handling and ferrous recovery systems,

scalper building, maintenance/warehouse building, parking lots, wastewater settling basin and storage tank, and a storm water collection and retention system.

Each combustion processing train shall be designed to operate independently from the others and shall not use shared components with the exception of common piping ties including, but not limited to, the main steam system, boiler feedwater headers, blowdown systems, condensate piping etc. The Contractor shall use all new materials for the Retrofit except those items specifically indicated in the Retrofit Agreement and those items which are not specifically required to be replaced in this Section 7.0. The Contractor shall ensure compatibility of the balance of plant and plant auxiliary equipment with the retrofitted combustion lines and optimize the design accordingly. **The Facility retrofit shall be designed, constructed, and maintained to provide a minimum of 20 years of service following commencement of the O&M Agreement. This includes all existing components that remain in the Facility.**

The retrofit design for each furnace, boiler, air pollution control ("APC"), and ash handling system shall be nominally based on processing 250 tons per day ("tpd") of Municipal Solid Waste ("MSW"), with sufficient design margin to meet the Maximum Continuous Rating ("MCR") and peak operating capability established in the minimum design envelope requirements of this Section. The Facility shall be capable of processing MSW which varies in composition and heat content.

The waste processing capacity range (Design Envelope) for each processing train shall, at a minimum, meet the following requirements without the use of auxiliary fuel:

- Nominal Throughput equal to 250 tpd
- MCR at 100 million Btu per hour of heat input from waste fired (firing 250 tpd of waste at HHV of 4800 Btu/lb)
- A Peak Operating Capacity of 110 percent of Nominal Throughput

- Range of fired-waste HHV: 3800 Btu per pound to 6000 Btu per pound
- Turn-down capability down to 75 percent of Nominal Throughput

Proposal Form 2 requires the Contractor to provide a Design Envelope, which meets these minimum requirements.

The maximum steam flow rate that can be handled by the existing turbine-generator ("T-G") with the valves wide open is equal to 235,200 lb/hr at 600 psig and 700 degrees F (as indicated on the original design documents for the existing equipment). At this flow rate, the T-G is rated at 23,182 KW. The steam generation system design shall provide operational flexibility to maximize net electric export by maximizing steam flow at all loads, including times when one or more units are out of service. Excess steam (not utilized by the T-G) should be used by the turbine driven boiler feed pump to the maximum extent possible. The Contractor is not required to replace the T-G or other power generation system components except as noted in Section 7.14.

7.1.2 Conceptual Drawings

Appendix H of this RFP includes the following conceptual drawings prepared by Camp Dresser and McKee ("CDM") and Kisinger Campo and Associates ("KCA") for this project:

- Sheet C-1 Project Boundary Limits
- Sheet C-2 Demolition Plan
- Sheet C-3 Site Plan
- Sheet C-4 Paving, Grading and Drainage Plan

- Sheet C-5 Utility Plan
- Sheet C-6 Landscape Plan
- Sheet C-7 Wet Detention Area Plan
- Sheet C-8 Detention Area Sections
- Sheet CD-1Drainage Structural Details
- Sheet A-1 Existing Foundation Plan Boiler/APC/Stack Area
- Sheet A-2 Existing Foundation Plan Boiler/APC/Stack Area
- Sheet A-3 Cross Section through Center Line of Combustion Train
- Sheet A-4 Existing Foundation Plan Estimated Loads on Piles
- Sheet A-5 Existing APC Foundation Plan Estimated Loads on Piles
- Sheet A-6 Conceptual Ash Management Building Plan and Elevations
- Sheet A-7 Conceptual Ash Management Building Floor Plan
- Sheet A-8 Existing Building Plan Refuse/Tipping Building
- Sheet A-9 Existing Wall Sections Refuse Pit - North Wall
- Sheet A-10Existing Wall Sections Refuse Pit - South Wall
- Sheet A-11Existing Wall Sections Refuse Pit - West Wall
- Sheet A-12Existing Refuse Crane Support Beam Damage Details
- Sheet A-13Existing Column Details and required Repairs Tipping Building/Refuse Pit

- Sheet A-14Conceptual Plan Tipping Building Floor
- Sheet A-15Conceptual Maintenance Building Plan and Evaluations
- Figure 2-1 Operations Building Floor Plans First Level
- Figure 2-2 Operations Building Floor Plans Second Level
- Figure 2-3 Operations Building Floor Plans Third Level
- Figure 2-4 Operations Building Floor Plans Fourth Level
- Figure 2-5 Operations Building Floor Plans Fifth and Sixth Levels
- Figure 2-6 Operations Building Roof Plan
- Operations Building Room Finish Schedule (2 pages)

The intent of the conceptual drawings is to assist in the description of project requirements and concepts. Contractor shall not rely on the conceptual drawings provided in Appendix H for design and construction of the Retrofit.

Several of the drawings provided in Appendix H were submitted to the Florida Department of Environmental Protection as part of the "Application for an Environmental Resource Permit for the City of Tampa McKay Bay Refuse-to-Energy Facility". These drawings are Sheets C-1, C-4, C-8, and CD-1 ("ERP Drawings").

A topographic survey of the Site was conducted by George F. Young, Inc. on January 9, 1997. The results of this survey are also included in Appendix H.

7.1.3 Applicable Codes and Standards

The Retrofit design and construction of the Facility, along with all equipment, components and auxiliaries, shall conform with all applicable governmental and industry codes

and standards. The Contractor shall incorporate into its design that the building and structures are part of an existing operating plant and that not all codes and standards may be applicable to components remaining from the original construction that are not modified, refurbished, or repaired. The Contractor is solely responsible for the final design and modifications made to the Facility during the retrofit and obtaining the required construction permits and licenses prior to the start of construction. The following codes and standards in effect on the date that the City and the selected Contractor have finalized and signed a contract shall be incorporated into the design:

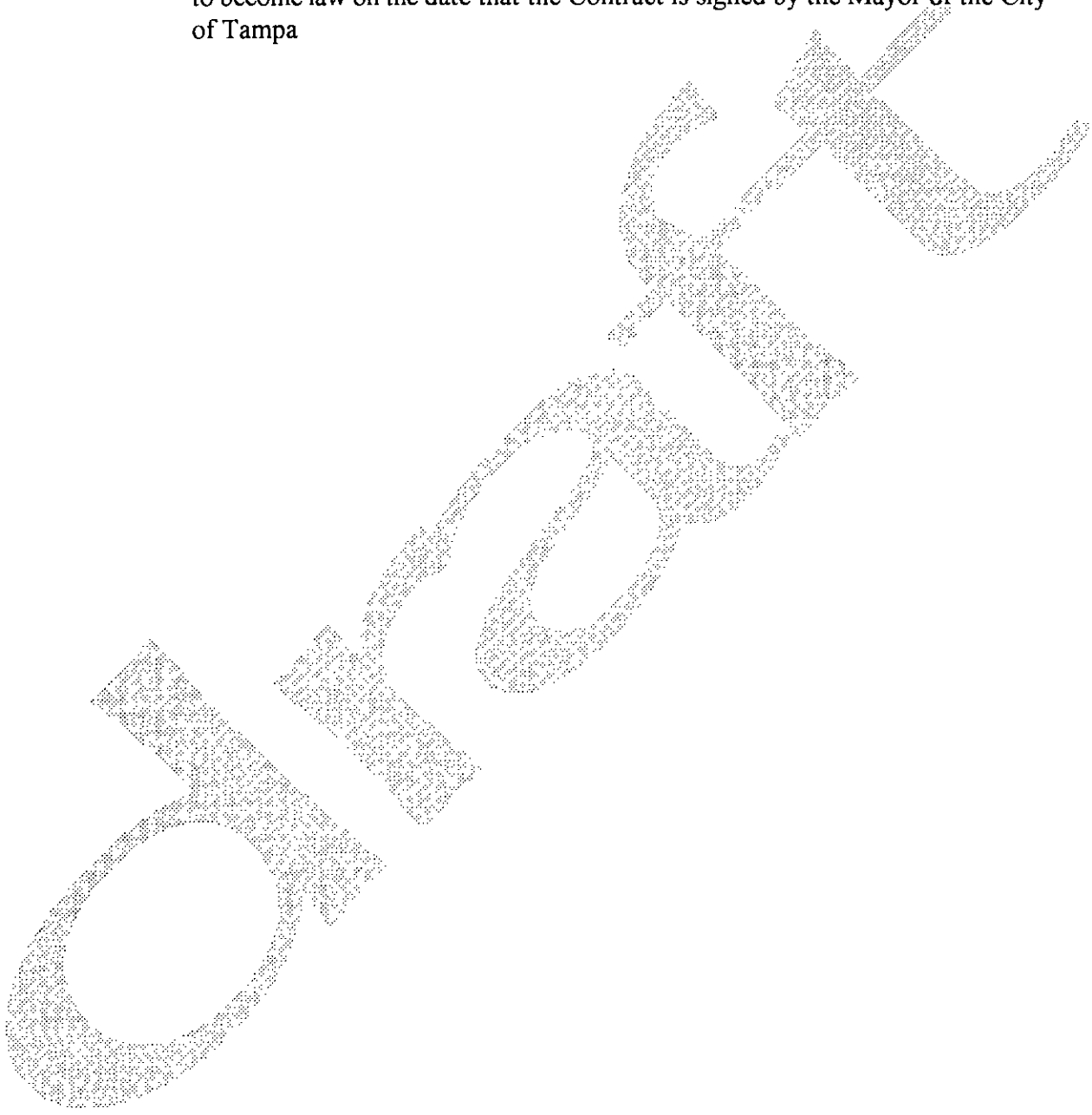
- Air Moving and Conditioning Association (AMCA)
- All Standards Promulgated by the U.S. Secretary of Labor Under Occupational Safety and Health Administration (OSHA)
- American Association of State Highway and Transportation Officials (AASHTO)
- American Boiler Manufacturer Association (ABMA)
- American Concrete Institute (ACI)
- American Disabilities Act (ADA)
- American Gas Association (AGA)
- American Gear Manufacturers Association (AGMA)
- American Hot Dip Galvanizers Association (AHDGA)
- American Institute of Architects (AIA)
- American Institute of Steel Construction (AISC)
- American Iron and Steel Institute (AISI)

- American National Standards Institute (ANSI)
- American Petroleum Institute (API)
- American Public Health Association (APHA)
- American Public Works Association (APWA)
- American Society of Civil Engineers (ASCE)
- American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE)
- American Society of Landscape Architects (ASLA)
- American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME)
- American Society of Mechanical Engineers Standards for Power Piping
- American Society of Non-Destructive Test Engineers (ASNDTE)
- American Society of Plumbing Engineers (ASPE)
- American Society of Testing and Materials (ASTM)
- American Water Works Association (AWWA)
- American Welding Society Code (AWS)
- American Wood Preservers Association (AWPA)
- Anti-Friction Bearing Manufacturers Association (AFBMA)
- Chlorine Institute (CI)

- Code of Federal Register of Environmental Protection Agency (CFR)
- Concrete Reinforcing Steel Institute (CRSI)
- Cooling Tower Institute (CTI)
- Ductile Iron Pipe Research Association (DIPRA)
- Electronics Industries Association (EIA)
- Factory Mutual (FM)
- Federal Aviation Administration (FAA)
- Florida Department of Transportation Standards (FDOT)
- Heat Exchange Institute (HEI)
- Hydraulic Institute Standards and Code
- Illuminating Engineering Society (IES)
- Industrial Risk Insurer (IRI)
- Institute of Boiler & Radiator Manufacturers (IBRM)
- Institute of Electric and Electronic Engineers (IEEE)
- Instrument Society of America (ISA)
- Insulated Cable Engineers Association (ICEA)
- Lightning Protection Institute (LPI)
- Local Building and Construction Codes
- Manufacturers Standardization Society of the Valve and Fitting Industry (MSS)

- National Association of Pipe Coating Applications (NAPCA)
- National Bureau of Standards (NBS)
- National Clay and Pipe Institute (NCPI)
- National Electric Manufacturers Association (NEMA)
- National Electrical Code (NEC)
- National Electrical Safety Code (NESC)
- National Fire Protection Association [(NFPA) All applicable sections]
- NPFA 850 Recommended Practice for Fire Protection for Fossil Fueled Steam Electric Generating Plants
- Occupational Safety and Health Administration (OSHA)
- Pipe Fabrication Institute (PFI)
- Sheet Metal Air Conditioning Contractors National Association (SMACCNA)
- Southern Standard Building Code
- Steel Structures Painting Council (SSPC)
- Tile Council of America (TCA)
- Tubular Exchange Manufacturers Association (TEMA)
- Underwriters Laboratory, Inc. (UL)
- Uniform Building Code (UBC)
- All other applicable codes and regulations either in effect or published in the

Federal Register, State of Florida Register or local ordinances that are scheduled to become law on the date that the Contract is signed by the Mayor of the City of Tampa



7.2 CIVIL WORK

7.2.1 Demolition, Repair and Replacement

Below is the list of demolition, repairs, replacements, modifications, and additions to the Facility. A detailed discussion of these items is addressed in the appropriate subsections below.

Demolition of Existing Structures

1. Existing combustion and APC system (Chutes to Stacks including stacks)
2. Ash residue processing and metal recovery system (including residue sump, ash storage bunkers, ash/metal loading area, and fly-ash conditioning system to the extent that the Contractor chooses not to use the conditioning system)
3. Purchasing, Receiving, and Shipping Building (south of stacks)
4. Chemical/Oil Storage Building (west of stacks) at the Contractor's option
5. Former fly-ash silo (south of stacks)
6. Former incinerator electrical foundations (east of Refuse/Operations Building)
7. Former containment basin in northwest area of ash yard
8. Metal guardrail along west side of entrance ramp to tipping building

Wherever the words "demolition, "demolished" or "removed" are used herein, they shall be understood to include the disposal of the demolished or removed material in accordance with Section 7.2.9, unless specifically stated to the contrary. Further, subsections entitled "Demolition" shall be read in context with the other requirements of the whole

section. "Demolition" shall also include any work necessary to prepare the area for reuse if applicable.

Repairs, Replacements and Modifications to Existing Systems

1. Perimeter and interior fencing/gates
2. Site grading, drainage, and paving
3. Landscaping
4. Utilities
5. Yard and street lighting
6. Complex buildings and structures remaining in service

Items that are specified herein to be repaired shall meet at least the following performance standards:

1. Fit for its intended use and purpose
2. Meet all applicable codes and standards
3. The quality of the repair required in Sections 7.2 through 7.4 of this Section 7.0 shall be such that the repaired item can reasonably be expected to last at least twenty years after the Commercial Operations date, assuming proper operation and maintenance, normal wear and tear excepted
4. Be compatible with and blend in with the other Facility items

Items that are specified herein to be replaced shall meet the above criteria for repair and shall be new items of the most current design and manufacture unless such is incompatible with similar items in the Facility.

7.2.2 Abandonment of Underground Piping

Not withstanding any requirements to the contrary, any piping two inches in diameter or less which is not needed for the retrofit construction may be abandoned in place. Piping larger than two inches shall be filled with grout if it is to be abandoned and not removed.

7.2.3 Overview of Existing Project Layout

The Site consists of a 1,000 tpd Facility, weigh scales, scale house buildings, transfer station building, public restroom building, and an interconnecting network of roads and parking facilities. The entire Site is secured by a six foot high chain link fence along the perimeter. The Site is owned by the City and was initially constructed in 1965 as an incinerator without energy recovery. The Facility was reconstructed in 1983-1985 with the addition of an energy recovery, air pollution control, and metal recovery system. An enclosed tipping building, transfer station building, public restroom building, weigh scales, and scale house buildings were also added in 1985. The tipping building was increased in size in 1988 to provide additional refuse storage capacity. Only the Facility and immediate surrounding area as shown on Sheet C-1, Project Boundary Limits, in Appendix H are the subject of the civil site work in this Section 7.2 and 7.4.

The Site is located on a U-shaped site of approximately 15 acres, with the Facility located on a 7.1 acre parcel on the northern end. The City of Tampa police dog training facility and automobile/bicycle impound storage lot is situated between the Facility and the main entrance road to the weigh scales. The Site is bordered on the north by the City of

Tampa McKay Bay Nature Park, McKay Bay on the east, the City fire training facility on the south, and 34th Street on the west. The main entrance and exit for the Site is east of 34th Street along the southern border and allows access to the weigh scales, transfer station, or Facility. A second gated entrance and exit is provided at Clark Street for the operation and maintenance staff. The refuse trucks exit the tipping building to the west onto 34th Street.

Several parking areas are located on the Site for the operating staff, contract maintenance personnel, and visitors. A six vehicle unpaved parking area under a sheet metal canopy is located east of the scales for the City weigh scale attendants. A thirteen vehicle paved parking area under a sheet metal canopy is located north of the refuse/operations building for the facility management and administration staff. There is an additional seven vehicle uncovered paved parking area adjacent to the staff parking area provided for visitors to the Site. A small gravel parking area is provided for transfer trailers west of the transfer station. A second gravel parking area north of the transfer station and public restroom is used for additional transfer trucks, material storage, vehicle maneuvering and maintenance.

Located between the Facility and the entrance road to the weigh scales are the City police dog training facility and automobile/bicycle impound storage lots. These facilities have their own access roads from 34th Street and are enclosed by a perimeter fence. The City fire training facility located along the southern border also has its own access road from 34th Street and perimeter fence. An undeveloped parcel south of the transfer station is accessible from the Site from the main entrance road just east of the weigh scales.

7.2.4 New Site Layout

Conceptual Site modifications have been developed to address the demolition, repairs, and additions to the Site necessary to bring the Facility into compliance with all regulatory requirements and provide at least an additional 20 years of operating life. The conceptual

Site plan is shown on Sheet C-3 in Appendix H. This drawing identifies the general configuration and arrangement of all new equipment, buildings, roads, pavements, and drainage features. The conceptual Site plan is also the basis for the existing operating permit and future construction permit issued by the Florida Department of Environmental Protection ("FDEP"). Site features related to the management of storm water, leachate, and ash residue have been incorporated into the conceptual Site plan. **[Note: Modifications to the Site plan may be proposed by the Contractor during the comment period for consideration by the City.]** If accepted by the City, all costs for modification of regulatory permits required to accommodate the Contractor proposed changes shall be at the Contractor's expense.

Changes to the existing Site layout are a result of the required demolition, repairs, replacements, and additions for the retrofit project. The structures to be demolished include the existing combustion and air pollution control equipment, buildings that interfere with the location of the new replacement process structures, and obsolete buildings and structures remaining from the initial 1965 incinerator construction. Structures with additional service life shall be repaired while new structures and buildings to meet the current environmental regulatory standards shall be added. The general flow of traffic within the Site shall remain the same, with the exception in the vicinity of the new ash management building.

7.2.5 Site Plan Approval

The Contractor shall submit a final Site layout plan to the City for a formal Site Plan Review prior to any Site construction activities. The City Building Department typically coordinates all plan reviews, building permits, and inspections through a single City Department (Department of Business and Community Services) noted below:

City of Tampa
Department of Business and Community Services
Construction Services Center
1400 North Boulevard
Tampa, Fl 33607
813-259-1761

An application for Site Plan Review shall be submitted to the Department of Business and Community Services and approved prior to any Site construction activities. The Site Plan Review application requires basic project information, list of the Contractor contacts, and seven complete sets of Site plans. The Site plans shall locate all structures, utilities, pavement, tanks, process equipment, sanitary lift stations, and storm water drainage features. The typical City review cycle for a set of site plans requires 4-5 days. All City comments requiring drawing modifications shall be incorporated by the Contractor into a revised set of plans and resubmitted for review. The normal site plan review and approval process requires approximately 3-4 weeks, assuming one or two drawing revisions are required in response to City comments.

The Contractor is also responsible for securing all required building permits.

7.2.6 Site Clearing

The design and retrofit of the Facility shall include all clearing, grubbing, cut and fills, and drainage necessary to prepare the Site for the demolition, repair, replacement or additions to the Facility. All removed top soils and structural fill materials shall be individually stockpiled on-site for later reuse. Those materials not reused at the Site shall be disposed of at the Contractor's expense.

All removed materials that contain debris or ash residue shall be disposed of in accordance with applicable law at the Contractor's expense.

7.2.7 Site Drainage

The following subsections outline the minimum drainage requirements during the retrofit project.

7.2.7.1 Construction Drainage

All drainage during construction shall be in accordance with the standards and specifications of all applicable regulatory agencies, including but not limited to the City and the Florida Department of Environmental Protection (the "FDEP"), and in accordance with the final Environmental Resource Permit (ERP) issued by the FDEP for this project. The storm water permit issued by FDEP will be based upon the Paving, Grading, and Drainage Plan in Appendix H of this RFP and specifications submitted by the City with the permit application. The Contractor shall maintain positive storm water drainage at all times during construction. No blockage of off-site storm water flow from adjacent property is permitted. The Contractor shall utilize appropriate measures to prevent erosion and transport of sediment. Hay bales, silt barriers, and/or floating turbidity barriers shall be used to mitigate adverse impacts to existing surface water quality and adjacent properties.

7.2.7.2 Storm Water Drainage System

An ERP application has been submitted to the FDEP for construction of a storm water drainage system to serve the Site. Included with the ERP application are ERP Drawings that delineate, among other things, the sub-basins and flow routing. The permitted system includes demolition of some existing storm water lines and pipes, repair of existing storm inlets and areas damaged by erosion, addition of new storm water inlets and pipes, and addition of a new storm water detention area with a control/diversion structure and a bleed down structure. The Contractor shall construct the storm water drainage system in accordance with the FDEP ERP permit and associated ERP Drawings. All paving and

drainage construction shall conform to the standards and specifications of the applicable regulatory agencies including, but not limited to the City, FDEP, and Florida Department of Transportation ("FDOT").

Demolition

Several existing storm water inlets and pipes are located in the area proposed for construction of the new ash management building. These storm water inlets and pipes shall be removed prior to the construction of this building. An abandoned section of underground storm water pipe located under the asphalt pavement in the ash handling area shall be removed or filled with grout prior to re-grading and final pavement of this area. An existing storm water inlet located within 34th Street shall be demolished and replaced with a control/diversion structure as shown on the ERP Drawings.

Repairs

Within the Site, all existing ponds, drainage pipes, and inlets shall be cleaned of nuisance vegetation and debris. All damaged spillways, inlet structures, and control structures which are to remain shall be repaired or replaced. All side slopes and areas damaged by erosion or construction shall be re-graded and sodded. Access shall be provided to allow periodic inspection and maintenance of all inlet, outlet, and control structures. All culvert headwalls shall be repaired or replaced.

Additions

The permitted storm water drainage system includes new drainage structures and reinforced concrete pipe ("RCP") storm sewers within the Site dry detention areas in the vicinity of the new parking lot, a storm water detention area located to the north of the tipping building exit ramp, and a new storm water control/diversion structure within the 34th

Street right-of-way (adjacent to the west side of the new storm water detention area). All swale and detention area side slopes shall be sodded and landscaped in accordance with the Landscape Plan shown in Appendix H. Top elevations of inlets and manholes within the Facility may be adjusted as necessary to match roadway plans. The design of control structures No. 1, 2 and 3 and the storm water detention areas respective volumes must be in agreement with the ERP Drawings.

Run-off from the area under the boilers, air pollution controls, and chemical storage vessels shall not be discharged to the storm water drainage system. A concrete curb [minimum elevation six (6) inches above surrounding grade], shall surround this area and all runoff shall be collected and stored for use in the Facility process as described in Section 7.18. The Contractor shall provide water stops on all curbs and joints to prevent leakage. All boilers, APC equipment, and chemical storage equipment shall be equipped with roof drains to limit the amount of runoff collected from this area. Roof drains shall discharge outside of the concrete curb which surrounds the boiler, air pollution control, and chemical storage equipment area.

7.2.8 Utilities

The following subsections outline the utilities requirements during the retrofit project.

7.2.8.1 Water

All water utility construction shall conform to the standards and specifications of the applicable regulatory agencies, including but not limited to the City Water Department, City Fire Department, and Hillsborough County Public Health Unit. Two existing metered connections to the City's potable water system are currently located within the Site. The main potable water valve and meter station is located at the base of the tipping building entrance ramp along the west. This connection is the main supply of potable water for the

refuse/operations building and also serves as a makeup source for the auxiliary fire protection system. A second potable water valve station is located northwest of the cooling tower along 34th Street. This connection provides potable water to the boiler feedwater system and backup potable water to the cooling tower.

Demolition

The underground potable water supply system shall be partially demolished and relocated due to the addition of the new ash management building. The main 12-inch supply line located along the north side of Clark Street, the 6 inch branch run north to the refuse/operations building, and the 12-inch branch run south to the scale house and City Police/Fire training facilities shall be relocated. A small 2 inch line from the former incinerator project located underground at Clark Street near the entrance ramp is no longer in service and shall be removed or abandoned.

A 1-inch service line from the main plant water supply to the existing purchasing, receiving, and shipping building shall be removed since this building will no longer remain. Numerous small branch runs within the main plant process area shall be removed as required to accommodate the new combustion and APC systems.

Repairs

The existing potable supply water valve stations shall be cleaned and painted, the structural supports and concrete slabs shown on the drawings shall be repaired. All interior and exterior above ground potable water piping shall be inspected, repaired, or replaced. The existing tipping building washdown water system shall be inspected, repaired or replaced with the source of the water provided from the metered potable water system.

Additions

New potable water service shall be provided to the ash management building, maintenance building, lime slaking system, tipping building and all areas of the new plant requiring potable water service for wash down water, emergency showers, eyewash stations, and process makeup or cooling. The utility plan shows the preferred location for the new potable water main, valve, and meter station south of the new ash management building.

7.2.8.2 Fire Protection Water (Below Grade)

All fire protection water utility construction shall conform to the standards and specifications of the applicable regulatory agencies, including but not limited to the City Water Department, City Fire Department, NFPA, and Hillsborough County Public Health Unit. The Contractor shall thoroughly review the existing Fire Protection System P & ID drawing previously issued by Bechtel and the diagram prepared by the Hartford Steam Boiler Inspection and Insurance Company dated September 4, 1989 (a reference copy is located in the Project Library and available at Florida Reprographics) prior to any work on this system. Additionally, the Contractor shall coordinate all demolition, repairs, and additions to the fire protection system with the City and the Facility fire protection insurance carrier.

Demolition

The refuse/operations building fire protection water supply is provided from the 6-inch potable water branch pipeline which runs from Clark Street and enters the building at grade (approximately elevation 10 feet) on the east. The tipping building fire protection water supply is provided from an 8-inch PVC line that originates from 34th Street east to the northwest corner of the tipping building. Both lines shall remain in service for plant safety reasons during any rerouting of these critical lines. The final tie-in connections of these water lines shall be coordinated with the plant operating staff. The refuse/operation building and plant wide fire protection system shall remain operational during all construction phases

except for periods when partial shutdown of systems and areas are necessary for retrofit activities. Temporary connections or other means shall be used during any extended shutdown periods in order to maintain the integrity of the system and provide adequate fire protection for the Facility. A third point of connection is located south of the turbine island, with no planned improvements for this line.

There are several underground and above ground fire protection water lines at the northwestern end of the tipping building which supply the tipping building fire protection sprinkler system and the fire hydrants (2) north and east of the refuse/operations building as shown on the Hartford fire protection diagram referred to above. Caution shall be exercised during the demolition of the tipping building slab and ash management bunker slabs due to the location of underground fire protection water lines in these areas.

Repairs

The two existing fire protection water supply valve stations shall be cleaned and painted. The structural supports and concrete slabs shown on the drawings shall be repaired. All fire hydrants, post indicating valves, and above ground connections and piping shall be inspected, repaired, or replaced as required.

Additions

The existing 6-inch diameter underground supply pipe located under the tipping building floor shall be replaced with a 6-inch diameter underground pipe line along the north side of the Tipping Building. The above existing pipe line shall be capped, removed, or abandoned in place upon completion of the new pipe line. Additional fire protection water service shall be provided to the new maintenance and ash management buildings. The maintenance building shall be protected by an interior sprinkler system as detailed in Section

7.17. Both the maintenance building and the ash management building shall have new fire hydrants located nearby to meet all City of Tampa requirements and other applicable codes.

7.2.8.3 Natural Gas

Although natural gas is not currently used in the McKay Bay Facility processes, the former incinerator project was provided with natural gas service. All existing gas lines are the property of Peoples Gas and shall not be disturbed by the Contractor. Mr. Robert Hudack of the Peoples Gas engineering department (813-272-1573) shall be contacted to coordinate all construction activities. Any decommissioning or construction activities must be performed by Peoples Gas with the cost paid by the Contractor. A toll free number is available (1-800-432-4770) to have the underground lines located prior to any other underground construction activities. Prior to the commencement of excavation, the Contractor shall confirm with Peoples Gas the locations and status of all gas lines.

Demolition

Natural gas service to the Facility was provided to the former incinerator project at two locations. A 2-inch underground gas line is located approximately 100 feet south of the tipping building exit ramp centerline. The line originates from 34th Street and terminates due east at the southwest corner of the refuse/operations building. This line is reportedly no longer in service (has been capped at 34th Street according to Peoples Gas service department) and portions of this line shall be removed or abandoned in place as required for the construction of the new maintenance building foundations.

A 3-inch main gas line is located approximately 40 feet south of the Clark Street centerline. The 3-inch line originates at 34th Street and runs parallel to Clark Street and terminates approximately 536 feet east of the centerline of 34th Street in the area south of the

tipping building entrance ramp. This 3-inch line is currently pressurized and in service. This line will require relocation in the vicinity of the new ash management building.

Repairs

No repairs are anticipated.

Additions

Natural gas service shall be provided by the Contractor to the auxiliary burners in each furnace/boiler. The natural gas service tie-in required for the new combustion system auxiliary burners and the routing of the gas service line shall be coordinated with the City and Peoples Gas. The gas service line shall be generally located south of the tipping building exit ramp between 34th street and the west end of the refuse operations building, as conceptually shown on the Utility Plan.

7.2.8.4 Advanced Water Treatment ("AWT") Water

AWT water is provided by the City from the Hooker's Point Wastewater Treatment Plant ("WWTP"). The AWT water supply valve station is located in the corner southwest of the cooling tower. The AWT water is used as makeup water to the cooling tower and irrigation system. The continued use of AWT water shall be used where ever practical.

Demolition

The existing ash/metal truck wheel wash piping system that currently uses AWT water will no longer be required and shall be removed upon completion of the new ash management building.

Repairs

The supply valve station piping, valves, and supports shall be repaired or replaced, cleaned, and protected with a corrosion resistant painting system designed to withstand the harsh chemical environment resulting from the cooling tower mist.

Additions

The AWT water system may be extended at the Contractor's option for additional service in the plant process. All AWT water service additions shall be designed in accordance with the City of Tampa Sewer Department, Hillsborough County Public Health Unit, and other applicable regulatory agency codes.

A corrosion resistant enclosure shall be provided over the existing AWT water supply valve station to minimize the settling of cooling tower mist onto the piping system. The enclosure shall be easily removable to allow for periodic inspections and maintenance of the piping, valves, and meter. The enclosure shall be constructed of fiberglass or other non-metallic material resistant to the cooling tower mist and fully cover all above ground piping and structural components. An access port shall be provided for periodic reading of the meter.

7.2.8.5 Sanitary Sewer

All demolition, repairs, and additions to the sanitary sewer shall be coordinated with the City Sewer Department.

Demolition

The main sanitary sewer pipe exits the refuse/operations building west of the elevator and runs underground southward to a sanitary sewer manhole located just east of the Unit 4 rotary kiln. This manhole cover is currently hidden from view by an overlay of asphalt pavement. The main pipe continues to the south to another manhole located to the east of the

purchasing, shipping, and receiving building, continuing to a final manhole located near the existing pump lift station south of Clark Street. The main sanitary sewer run from the refuse/operations building shall be relocated to avoid the new scalper and ash management buildings.

The west-east branch run from the boiler sump which ties into the main north-south run shall be replaced in its entirety due to frequent repairs in the recent past. The new location of this line shall avoid any conflicts with the new foundations in the new boiler area if applicable.

Several portions of existing force main service lines in the vicinity of the existing pump lift station south of Clark street shall be removed to allow for the construction of the new ash management building. A portion of the 2-inch force main from the City police dog training facility and the main 8-inch discharge from the pump lift station must be relocated. The Utility Plan shows the preferred routing for the relocation of these lines.

Repairs

The existing sanitary sewer system shall be cleaned, inspected, and repaired or replaced as needed.

Additions

New sanitary sewer service shall be provided from the new maintenance building. Additionally, all floor drains and sinks in the existing western portion of the refuse/operations building shall be connected to the new sanitary sewer system. Wash down water from the ash management building shall drain to a sump and be reused for ash quench and other appropriate purposes.

7.2.8.6 Electrical (Off-site of Existing Facility)

Any demolition, repairs, and additions to the electrical system located either outside or inside the existing Facility boundary, shall be coordinated with Tampa Electric Company (TECO). The TECO field representative shall be contacted at 228-1111 (extension 36332) to schedule a field meeting prior to any construction. The costs for this work shall be paid for by the Contractor.

Demolition

The overhead electrical service to the existing concrete block building (former truck wash building) south of the entrance ramp is no longer required and shall be removed by TECO or their authorized representative as part of the Contractor's Retrofit.

Relocation

The existing overhead electrical service to the sanitary sewer lift station shall be relocated by TECO or their authorized representative to the south side of Clark Street due to the addition of pavement and the new ash management building.

Additions

No additional electrical service to the Site from TECO is anticipated. The new ash management buildings, maintenance building and street/security lighting shall have electrical service provided by the Refuse-to-Energy Facility electrical distribution system.

7.2.9 Disposal

The Contractor shall be responsible for the legal disposal and the costs thereof, of all waste materials generated during the retrofit. The Contractor shall provide containers on Site for the disposal of construction debris and provide removal service as required whenever

containers are full. Construction debris shall not be stored in piles on the ground. Separate covered containers shall be provided for use by workers for disposal of food wastes. The Contractor shall maintain the Site in a clean and safe manner and provide vermin and insect control.

The City does not anticipate that Hazardous Waste exists on the Site. The Contractor shall notify the City in the event that hazardous waste is discovered. Hazardous Waste shall be disposed of by a licensed Hazardous Waste disposal firm who the Contractor shall have under contract. This Contractor shall be approved by the City.

7.2.10 Roadways and Pavements

The Site road and parking pavements were designed and constructed in several phases. The original asphalt pavement was constructed in 1964-1965 based upon the design criteria established by Robert and Company. Field review indicates that asphalt pavement from the existing site that shall remain in place, includes the tipping building entrance and exit ramps, portions of Clark Street, and the asphalt access road east of the existing combustion/APC equipment. The second phase of road and pavement construction occurred in two areas during 1984-1985. Roads around the Facility were designed by Bechtel. Henningson, Durham, and Richardson (HDR) designed the roads and pavements serving the weigh scales, transfer station, and public restroom areas. Subsequently, several areas of the existing road and parking network were repaired and overlayed by the Facility operator since their award of the operating contract in 1985.

Field review and inspections reveal that the existing road drainage, originally designed for sheet flow in most areas, is not performing as designed. An accumulation of silt has raised the shoulder elevation higher than the road, resulting in many areas which do not drain.

Demolition

The existing access road network to the east, west and south of the boiler/APC area shall be removed as required to accommodate the new combustion and APC systems. The existing ash and metal handling yard pavements (including curbing along the west border) shall be removed at the completion of the combustion and air pollution system reconstruction for the addition of the new maintenance building and paved storage yard. The portion of Clark Street east of the motorized entrance gate to the tipping building entrance ramp shall be removed for the addition of the new ash management building. The northern most section of the curved road at the base of the entrance ramp shall be removed to provide for the addition of a new ash management building exit and bypass road system in this area.

Repairs

All existing asphalt road pavements shall be inspected in accordance with procedures in the Florida Department of Transportation (FDOT) Flexible Pavement Design Manual for New Construction and Pavement Rehabilitation. Based upon the inspection results, all asphalt pavement shall be rehabilitated, or replaced to withstand anticipated loads imposed by refuse delivery trucks and transfer trailers. An estimate of the annual number of vehicles expected on the McKay Bay RTE site was prepared based upon actual City of Tampa weigh scale data. The total estimated number of refuse, ash, and metal trucks were used to calculate the estimated number of 18 Kip Equivalent Single Axle Loads (ESAL's) for each of the four main roadway areas (Curved Road, Entrance Rampa, Exit Ramp, and Clark Street). The ESAL's were calculated on a cumulative basis for use in the design of a pavement repair plan. A 10-year design life was selected as the basis of analysis and recommendations for refurbishing the project pavements. The pavement repair recommendations were developed based upon roadway core borings, analysis, and field inspections of the existing pavement conditions by KCA and Professional Service Industries, Inc. ("PSI"). The Existing Pavement

Evaluations Report and supporting data is included in the Malcolm Pirnie, Inc. Project Library and at Florida Reprographics. In summary, the Existing Pavement Evaluations Report made the following recommendations:

- Curved Road - Mill a minimum of 2 inches and overlay with a minimum of 3 inches of type S-III asphaltic concrete and 1 inch of friction course (FC-3)
- Entrance Ramp - Mill a minimum of 2 inches and overlay with a minimum of 3 inches of type S-III asphaltic concrete and 1 inch of friction course (FC-3)
- Exit Ramp - Mill a minimum of 2 inches and overlay with a minimum of 3 inches of type S-III asphaltic concrete and 1 inch of friction course (FC-3)
- Clark Street - Mill a minimum of 1 inch and overlay with a minimum of 1 inch of type S-III asphaltic concrete and 1 inch of friction course (FC-3)
- Prior to overlaying, a sealer or binder shall be placed over the existing milled asphaltic pavement.

The Contractor shall prepare a road and pavement plan for rehabilitating and replacement of all the project roads. Field review indicates that several areas of the existing road network exhibit serious rutting, pothole damage, and low spots in need of re-grading (entrance to tipping building, bottom of entrance ramp to tipping building, and the two (2) service road intersections with Clark Street).

In accordance with the above referenced FDOT procedure, the Contractor shall obtain additional core borings from all project pavement areas to determine the existing condition, assess the existing structural conditions, and specify the design method for repair of these areas. The area to be repaired shall be saw cut, all failed material removed, and new materials installed to meet the current Estimated Single Axle Loading (ESAL) loads. The final course of asphalt shall be FDOT Type S (structural course), with the required thickness calculated based upon the above pavement analysis.

All low areas subject to standing water shall be re-graded with a leveling course prior to the new final overlay course. All areas not properly draining as originally designed shall be re-graded by milling of high spots or other corrective measures, including re-grading of the road shoulders to allow sheet flow drainage as originally designed. The Contractor shall apply a new surface overlay of FDOT Type S (structural course) asphalt pavement on all existing road surfaces after making the necessary repairs discussed above. The required thickness shall be determined based upon an assessment of the initial pavement design and existing pavement condition, with the capability of meeting the future vehicle load conditions for a 10-year design period. Repairs took the various roadway pavements shall be made after all construction activities have been completed in the vicinity of each area.

The exit ramp from the tipping building shall be provided with traction improving features to improve the ability of trucks to stop at the bottom of this steep ramp.

All concrete pavements, sidewalks, and personnel door step off pads shall be inspected, repaired or replaced as required.

All concrete curbing shall be inspected, repaired, or replaced as required. The concrete curbing along the tipping building entrance and exit ramps, staff parking area east of the tipping building, and sidewalk entrance to the refuse/operations building shall be replaced.

Additions

All new roads and parking areas shall be asphalt and comply with FDOT standards for the calculated ESAL vehicle loads and designed for a minimum 10-year design period. In areas where new pavement sections are required, the pavement shall be designed to match the surrounding asphaltic concrete pavement and base thicknesses. The new pavement and base materials shall be in accordance with FDOT design criteria.

- The subgrade shall be firm and true to line and grade prior to paving. Traffic shall not be allowed on the subgrade as the base is placed to avoid rutting.

- Limerock and shell base material shall meet FDOT requirements including compaction to 98 percent of its maximum dry density as determined by the modified Proctor test (ASTM D01557) and a minimum Limerock Bearing Ration (LBR) of 100 percent. Crushed concrete shall have an LBR value of 100 percent and be graded in accordance with Florida Department of Transportation (FDOT) Standard Specification Section 204. A stabilized subgrade (minimum LBR = 30), having a minimum thickness of twelve (12) inches and compacted t at least 98 percent of its modified Proctor maximum dry density, should be utilized with a limerock, crushed concrete or shell base.

- The asphaltic concrete structural course shall consist of Type S asphaltic concrete. The asphaltic concrete shall meet standard FDOT material requirements and placement procedures as outlines in the current FDOT Standard Specifications for Road and Bridge Construction. The asphaltic concrete shall be compacted to a minimum of 96% of the Marshall maximum laboratory unit weight.

The Contractor shall apply FDOT Type S (structural course) asphalt pavement as a final surface course for all new roads and pavements.

A new two way bypass road and plant access road shall be provided in the vicinity of the new ash management building. Additional asphalt pavements shall be provided for maintenance access along the east, west, and south sides of the new boiler and air pollution control equipment, and in the equipment storage yard around the new maintenance building. All new pavements shall provide for transitions between the existing roadway elevations and the new building floor slabs which shall be installed at a minimum final floor elevation of 11' (feet) National Geodetic Vertical Datum ("NGVD"). A new parking area (52 spaces) shall be provided for the employees northeast of the curved road to the entrance ramp. New curbing and additional parking spaces (three or four) shall be provided for visitors east of the main entrance into the refuse/operations building. Five (5) new parking spaces shall be

provided along the west side of the new maintenance building. Wheel stops and striping shall be provided for all new and existing parking spaces.

7.2.11 Guardrails, Bollards and Protective Barriers

Demolition

All existing wooden bollards located along the curved road approaching the entrance ramp shall be removed. The custom fabricated metal guard rail along the west edge of the tipping building entrance ramp shall be removed in its entirety, including all corroded embedded portions. The existing temporary concrete curbing along the north and south edges of the Clark Street service entrance shall be removed. The post and cable guard barrier along the west side of the curved road approaching the tipping building entrance ramp shall be removed.

Repairs

All concrete filled metal pipe bollards shall be inspected, repaired, or replaced. The exit ramp metal high vehicle barrier (headache bar), including foundations, mounting hardware, and base plate grout shall be inspected and repaired. If required, all or a portion of the foundations shall be replaced. All guard rails shall be inspected, repaired, or replaced. All parking wheel stops shall be inspected, repaired, or replaced.

Additions

A new concrete FDOT Traffic Railing Barrier (Jersey style) shall be constructed integral with the existing and new extension of retaining wall along the west edge of the tipping building entrance ramp, including the east-west portion at the top of the ramp. This work shall be accomplished as soon as practical. New galvanized metal guardrails which meet FDOT specifications shall be installed along all areas of the project Site roads that required

protection. Concrete filled pipe bollards shall be installed at all building corners, driveways, and access doorways (inside and outside) to prevent impacts from vehicles.

7.2.12 Traffic and Facility Signs

Demolition

All traffic and Facility signs shall be demolished and replaced in their entirety. The existing Site information and traffic control signs have been listed in Appendix C.

Repairs

No repairs to existing traffic and Facility signs shall be made since all shall be replaced.

Additions

A new traffic and Facility sign plan shall be developed and implemented for the entire Site. All traffic signs shall meet FDOT specifications and shall be mounted on galvanized metal poles. Facility information and instructional signs shall be of similar construction and style as the traffic signs. The Contractor shall submit a traffic and facility sign plan, including specifications, to the City for approval prior to installation of the new sign plan.

The Site shall be provided with a sign at the main entrance (intersection of the scale house road and 34th street) mounted on a brick faced concrete block wall. The sign shall be visible to approaching traffic from the north. The entrance sign shall contain the name of the project "City of Tampa McKay Bay Refuse-To-Energy Facility" in letters at least twelve (12) inches high. The design and layout of the sign shall be approved by the City prior to construction.

A bronze dedication plaque, approximately 2 feet by 3 feet, shall be provided and installed in the vicinity of the existing dedication plaques at the entrance to the operations building. The wording of the plaque shall be approved by the City.

7.2.13 Landscaping

Demolition

Within the project boundary limits, all existing landscaping that interferes with the ability of vehicle drivers to clearly see all intersections and along curved roads shall be removed. All weeds and nuisance vegetation shall be removed from the existing landscaped areas within the project boundary limits. All tree branches and vegetation entangled in fences shall be removed. Accumulated silt and dirt along all road edges shall be removed to allow the original roadway drainage plan to function for sheet flow as-designed. The irrigation system shall be removed from the grassed areas in the vicinity of the new ash management building and employee parking lot prior to construction of those facilities.

Repairs

All missing and dead hedge type plants shall be replaced along the fence line landscaped areas with similar plants (primarily viburnum, minimum 3 gallon size). All existing gravel or shell areas shall be cleaned of weeds and nuisance vegetation and the gravel or shell replenished to a minimum compacted depth of 3 inches. All existing landscaped areas shall be cleaned of weeds and nuisance vegetation and replenished with new mulch. All damaged components of the existing irrigation system shall be repaired or replaced with compatible parts. All irrigation washouts and eroded areas shall be repaired. Numerous erosion damaged areas exist along the west, north, and east sides of the tipping building embankment, east side of the entrance ramp. All areas disturbed by construction activity shall be planted with new sod.

Additions

New landscape plants (minimum size 3 gallon) shall be planted along the north and south sides of the tipping building exit ramp, along the east side of the tipping building entrance ramp, in the vicinity of the main entrance to the refuse/operations building, south of the new ash management building, and new employee parking area. A new hedge shall be planted to replace the screening provided by the wooden privacy fence along Clark and 34th Streets.

The Contractor shall use a landscape architect registered in the State of Florida with experience in the general region of the Site. The registered landscape architect shall ensure that materials and plantings are compatible with the City's Landscape Code and local growing conditions. New landscaped areas shall be designed in natural groupings, not in straight lines, in order to create an irregular natural appearing edge rather than a formal straight line. New landscaping shall not impede the ability of vehicle drivers from having a clear line of sight, especially at all intersections and along curved roads. Permanent irrigation shall be provided in all landscaped, seeded and sodded areas.

The Contractor shall not be responsible for planting or maintaining the landscaping in and around the retention pond area north of the tipping building located within the boundaries of the McKay Bay Nature Park. This pond, sited on Parks Department property, will be planted and maintained pursuant to park guidelines by the City of Tampa Parks Department.

7.2.14 Fencing and Gates

Demolition

The wooden privacy fence south and west of the cooling tower shall be removed at the end of construction. All barbed wire and support hardware shall be removed from the perimeter fencing (with the exception of the fence around the police training facilities).

Several sections of the existing fence line shall be removed to allow new construction activities to take place, including those sections in the vicinity of the new ash management building south of Clark Street and north of the tipping building in the vicinity of the new retention pond. Any existing chain link fences temporarily removed to allow construction shall be replaced with new materials compatible with the existing chain link fence. The existing post and cable fence along the west side of the curved road to the tipping building entrance ramp shall be removed.

Repairs

All damaged or missing gates, fence, and posts shall be repaired, or replaced as required, with new materials compatible with the existing chain link fence system. All supports and hardware shall be inspected and repaired as required. All leaning posts shall be straightened to a plumb condition and the adjacent soil compacted. The barbed wire fencing surrounding the electrical switchyard shall be repaired or replaced, as required. All corroded fence sections shall be repaired or replaced, as required. The motorized gates at the Clark Street maintenance entrance/exit shall be replaced. All corroded sections of the fence and the motorized gates south of the cooling tower along Clark Street shall be replaced.

Additions

New 6 foot high galvanized chain link fence sections shall be installed in the areas affected by new construction (in the vicinity of the new ash management building and the storm water treatment pond north of the exit ramp).

7.2.15 Yard and Street Lighting

Demolition

Several light poles shall be removed from their existing locations to allow for the placement of new equipment and buildings. Existing conduit and wiring shall be removed or relocated as necessary to allow construction of new equipment and new buildings. All wiring, conduit, miscellaneous electrical parts, mechanical parts, and concrete foundation materials removed shall be disposed of in accordance with the requirements of Section 7.2.9 (Disposal). The lights to be demolished include:

- Damaged light pole north of the existing ferrous metal recovery system
- Light poles east (2) and south (2) of the precipitator foundation area
- Light pole south of the turbine island

Old and obsolete lighting fixtures shall be replaced with new fixtures to provide a safe level of illumination in all outside areas. All area lighting fixtures mounted to the equipment and structures to be demolished and/or replaced shall be electrically disconnected at their lighting panel and removed. All removed light fixtures, in addition to any special mounting hardware, may be salvaged for future spare parts use.

Repairs

All light poles shall be inspected, repaired, or replaced as required to restore to an operable condition. Poles that are severely damaged by impact or structurally weakened shall be removed and replaced. Poles out of plumb shall be straightened and the adjacent soils compacted. All existing light poles shall be primed and painted with a painting system compatible with the existing materials and new architectural theme. All existing metal light poles shall be stripped of old paint, primed, and painted.

All existing damaged or inoperative light fixtures mounted on buildings or equipment shall be repaired or replaced as required to restore to an operative condition. Defective light bulbs, photocells, wiring, and conduit shall be replaced with new parts compatible with the existing components.

Additions

The curved road from the four-way intersection near the public restroom building to the tipping building entrance ramp shall be provided with new lighting fixtures. Additional improved areas in the vicinity of the new parking lot, Scalper building, ash conveying system, ash management building, maintenance building, and maintenance storage yard shall also be provided with new lighting fixtures.

All new lighting fixtures shall be similar (style, construction, bulb type, and intensity) to the existing yard and street light fixtures. Photocell controls shall be provided for all new exterior lighting fixtures. The lighting shall be provided in accordance with good lighting and engineering practice, applicable lighting standards and good safety practices, shall be kept low, and shall not shine toward the Facility Site boundaries.

7.2.16 Lightning Protection (Related to Retrofit Demolition/Construction Activities of Existing Buildings)

Demolition

Existing building lightning protection systems may need to be temporarily removed for repairs to the existing roofs. All existing lightning protection systems shall be repaired or replaced upon completion of any roof repairs and replacements. The Contractor shall insure the integrity of the lightning protection system is maintained throughout the retrofit.

Repairs

All lightning protection system wiring, supports, connections shall be inspected, repaired, or replaced to provide sufficient lightning protection consistent with the climatic conditions and frequency of lightning in the Tampa Bay area. All existing lightning protection and grounding systems damaged during construction activities shall be repaired or replaced in accordance with all applicable codes and regulations.

Additions

New lightning protection systems shall be installed for the ash management building, maintenance building, ash conveyor, scalper building, and on the stack. Damaged or missing lightning rods on existing structures shall be replaced. Other lighting protection requirements are contained in Section 7.13.

7.2.17 Retaining Walls, Sidewalks and Structures

Demolition

The concrete slab and box structure (former incinerator electrical foundation) east of the refuse/operations building shall be demolished to allow construction of additional parking facilities.

The existing steel personnel/guard rail shall be removed from the top of the retaining wall west of the tipping building entrance ramp. All portions of the embedded steel posts shall be removed from the concrete wall and the holes cleaned and filled with grout to prevent future corrosion and spalls. Approximately 25 feet of the retaining wall (with stepped foundation) shall be demolished at the south end to allow for an extension of the retaining wall to the south.

The curbed concrete slab in the northwest corner of the ash handling yard is no longer of service and shall be removed. The retaining wall and ramp at the southwest end of the

refuse/operations building shall be removed for the addition of the new maintenance building and stairway to the tipping building exit door.

The existing phosphoric acid tank foundation and retaining wall shall be removed and replaced if required and if it interferes with the proposed new equipment layout and foundation plan.

Repairs

The circumferential crack on the west end of the concrete tunnel (former Incinerator electrical supply access) under the tipping building entrance ramp shall be repaired to prevent moisture intrusion. The existing retaining wall along the west side of the entrance ramp shall be inspected and all cracks repaired to prevent the intrusion of water. The damaged sections in the concrete curb/retaining wall around the electrical switchyard shall be repaired. All culvert head walls shall be inspected and repaired as required.

Additions

The entrance ramp retaining wall shall be extended to the south at the base of the ramp to allow access for the new driveway east and north of the new ash management building. Refuse truck traffic shall be maintained during the construction period.

A new retaining wall shall be constructed from the east end of the metal storage bunker to the southwest corner of the refuse/operations building to allow construction of the new maintenance building and stairs to the tipping building exit door. New steps, retaining wall, and sidewalk shall be installed along the west end of the tipping building (approximate elevation 30') to grade (approximate elevation 12') at the northeast corner of the new maintenance building. A new retaining wall and truck access ramp and loading dock shall be provided east of the new maintenance building for receipt of materials into the existing weld shop (Room 220) on the second floor of the refuse/operations building.

7.2.18 Foundations

A series of drawings (Sheets A-1 through A-3) have been prepared to illustrate the existing foundations in the boiler, precipitator, and stack areas. These drawings are located in Appendix H of this RFP. The Contractor's Engineer of Record is responsible for the analysis, design, and preparation of signed and sealed drawings to meet the requirements of the City's building officials.

Demolition

The following foundations shall be demolished if they interfere with the Contractor's design and/or compromise the storm water management system or the efficient operation of the Facility. Slab on grade foundations which shall be demolished include those associated with yard and street light poles specified to be removed, buildings specified herein to be removed (purchasing, receiving, and shipping building, oil/chemical storage building,), and other miscellaneous foundations (former incinerator electrical foundations east of refuse/operations building, former retention basins in NW corner of ash yard).

Spread footer type foundations, which shall be demolished, include those supporting the metal recovery system, ash storage bunkers, and the lower portion of the entrance ramp retaining wall.

Foundations on piles, which shall be demolished, include those associated with the ash residue sump. The existing ash residue sump shall be demolished in two phases. After removal from service, the residue sump shall be drained, cleaned of all ash residue and debris, and inspected for structural damage due to the long term storage of ash leachate with high pH (10-12) and high salt content. Existing slab and pile cap foundations that are desired for reuse in the new boiler foundation shall be cored. Each core sample shall be tested for Compressive Strength, Chloride Intrusion, pH, and Carbonation. If the test results are unacceptable, the slab and pile cap foundations shall be demolished. All portions of the existing ash residue

sump that will not be reused in the retrofit project may be abandoned in place. If abandoned in place, the Contractor shall backfill these areas, compact, and pave the top surface as needed to suit the final grade in these areas.

Repair of Foundations on Piles

All existing pile foundations proposed to be reused in the new furnace/boiler/air pollution control system area shall be thoroughly inspected and tested. A preliminary series of non-destructive inspections and an evaluation of the existing foundations was completed in January 1997 by PSI under subcontract to CDM/KCA. This evaluation is provided for informational purposes only and shall not be relied upon by the Contractor for structural design purposes. Pursuant to the standard building code the foundations of demolished structures shall not be reused for new structures unless documentation satisfactory to the official in charge of enforcing the Standard Building Code has been provided. The Contractor shall meet with the City of Tampa officials responsible for enforcing the Building Code enforced by the City to establish the required documents. If required, the Contractor shall have non-destructive and destructive tests performed by a certified Geotechnical Engineer with knowledge of the local conditions to determine the suitability of the existing pile foundations considered for reuse. Based upon the final test results, all deficient foundations shall be repaired or replaced.

A schedule of estimated maximum pile loadings is provided in Sheets A-4 and A-5 and shall be used by the Contractor for information only. A report discussing the technical approach for these estimates is located in Appendix D. These loads have been estimated based upon the available design information on the Robert & Company, Bechtel, and Volund USA Limited drawings. No representation is made by the City that the foundations may support the loadings indicated. The Contractor is solely responsible for the foundation

design, including pile capacity ratings, all data and assumptions used in developing the design, and for satisfying the City's Building Code requirements in this regard.

Additions

The Contractor shall provide suitable new foundations for all structures required in this scope of work where existing foundations cannot be used. Existing geotechnical data are available for informational purposes in the Project Library. The Contractor shall be responsible for verifying the accuracy of the existing geotechnical information. The Contractor may conduct its own geotechnical investigation to verify the conclusions of the existing available data.

Foundation Assumptions and Design Submittal

The Proposer shall submit, with its Proposal, the foundation plan for the proposed Facility improvements to the Site specifically identifying those existing piles which the Proposer assumes will be suitable for reuse in the Retrofitted Facility and those existing piles which the Proposer assumes will be abandoned. The foundation plan shall show load assumptions, new piles, and new pile lengths. A scale drawing of the foundation plan shall also be provided as part of this submittal.

7.2.19 Construction Laydown and Staging Areas

If the Facility is insufficient for any laydown and staging areas required by the Contractor, the Contractor shall be responsible for obtaining additional laydown and staging areas as it may require.

7.2.20 Security

The Contractor shall be responsible for providing 24 hour security and protection of the Facility and all equipment, materials, tools and temporary structures thereon and shall provide protection for all construction in progress on the Facility against damage and deterioration.

7.3 REFURBISHMENT OF EXISTING FACILITY BUILDINGS

This section covers the repairs/upgrades/modifications to the existing refuse receiving building and tipping building.

7.3.1 Refuse Receiving Building

7.3.1.1 Tipping Building and Tipping Floor

The general arrangement of the existing tipping floor and refuse receiving building is illustrated on Sheet A-8 in Appendix H.

Scheduling of Refuse Receiving Building Improvements

Some or all of the below described work may have to be accomplished while the Facility is operating and trucks will therefore be delivering refuse and unloading it into the pit. The Contractor shall schedule and price the work to minimize interference with operations in the refuse receiving building.

Demolition

All existing concrete and asphalt floor slab pavements shall be removed to the base foundation. Caution shall be exercised during removal of the asphalt pavements in the northern end of the floor due to the location of an underground 6-inch fire protection water main. This fire protection water main shall be disconnected and replaced with a new line to the north of the tipping building as described in Section 7.2.8.2. All existing wheel stops at the refuse pit tipping bays shall be removed. All existing metal roof decking, gutters, and

down spouts shall be removed. The inoperative man door located in the east wall shall be removed. The sheet metal siding and translucent panels shall be removed and disposed.

All removed materials shall be disposed of in accordance with the requirements of Section 7.2.9.

Repairs

All exposed steel columns, overhead steel beams, support members, girts, purlins, conduit, and pipe shall be inspected and repaired or replaced to provide structural integrity and architectural appearance to match the retrofitted Facility. All damaged above ground concrete foundations shall be repaired to restore them to their original design conditions.

All existing and repaired structural steel, piping, and fixtures shall be cleaned, primed, and repainted with a painting system suitable for the service conditions (Refer to Section 7.4.12 for details regarding painting).

Additions

New base fill material shall be placed and compacted for a new (4,000 psi minimum) reinforced concrete floor slab as shown on Sheet A-14. The new concrete floor shall slope at a 1% grade into the refuse pit. The top of floor elevation shall be set such that no stormwater may enter the tipping building through the entrance and/or exit doors. The new floor slab shall be designed for loads imposed by City refuse packer trucks and large transfer trailer trucks with maximum allowable over the road legal weights (72,000 pounds). The new concrete floor shall be constructed in two layers, a lower structural layer including all reinforcing bars and an upper abrasion resistant wear layer a minimum of 4" in thickness. The aggregate of the upper wear layer shall be granite rock or equal. The entrance and exit areas to the tipping building shall be provided with humps at the doors to prevent water from running into or out of the tipping building. New wheel stops shall be provided at the ten (10)

tipping bays with provisions to allow liquids to drain into the refuse pit at each of the ten truck bays.

A new 20 year membrane roofing system shall be installed on the tipping building to meet the current City code. A new high intensity lighting system shall be designed and installed to improve the existing lighting conditions throughout the building. The existing fixtures may be reused if compatible with the new high intensity lighting system. The use of sky lights and translucency panels for natural lighting is encouraged.

New sheet metal siding, flashing, trim, gutters, and down spouts shall be installed with the down spouts re-connected to the existing collection header system. An additional collection header and branch pipe (discharging north to the base of the slope) shall be provided for the down spouts on the western end of the tipping building.

New truck access doors (rollup or hanger type 20' wide by 25' high) shall be provided at the existing entrance and exit openings. Additional framing shall be provided to accommodate the new doors. A new personnel access door shall be provided in the east wall between the operations building and the existing truck access door. All existing bollards shall be repaired or replaced as required to protect all doors and interior steel columns. A caged aluminum access ladder shall be installed on the east side to the top of the tipping building roof.

7.3.1.2 Refuse Storage Building and Refuse Pit

The existing refuse pit and refuse storage building arrangements have been illustrated on Sheet A-8 in Appendix H of this RFP along with several additional drawings (Sheets A-9 through A-13) which locate damaged structural areas and the areas where repairs shall be made.

Demolition

No demolition activities are anticipated.

Repairs

Extensive impact damage, missing corner armor, and exposed reinforcing steel exist on most of the ten (10) columns that frame the truck tipping bays. All columns shall be repaired in accordance with Sheet A-13 in Appendix H of this RFP. A spray application, high strength, fiber reinforced, shrinkage-compensated structural repair mortar (Master Builders Emaco S88-CA or equivalent) shall be used for structural repair of the existing concrete columns. This mortar can be injected behind the proposed armor plate that fully protects all the faces of the columns.

All areas of the interior refuse pit walls shall be thoroughly cleaned, inspected and repaired. All areas with less than one (1) inch of concrete cover (two inches of cover was provided during initial 1964 construction) shall be repaired. Large areas of erosion with exposed reinforcing steel are present on three sides (north, south and west) of the refuse pit walls. A spray application, high strength, fiber reinforced, shrinkage-compensated structural repair mortar (Master Builders Emaco S88-CA or equivalent) shall be used for structural repair of the existing refuse pit concrete walls. Based upon visual inspections of the refuse pit walls, (square foot basis) approximately 15 percent of the south wall, 10 percent of the west wall, and 30 percent of the north wall have exposed reinforcing steel bars.

All areas of the exterior refuse pit walls shall be thoroughly cleaned, inspected and repaired. Considerable impact damage to the exterior south parapet wall in the vicinity of the four charging hoppers exists. The extent of reuse of the existing charging hoppers will determine which portions of the south parapet wall shall be repaired. After repairs to the concrete, protective armor plate shall be installed along the entire exterior length of the parapet wall, including the horizontal top surface of the wall.

The Contractor shall maintain the use of the sump on the west side of the refuse pit and develop and implement a design for controlling odors escaping from the sump.

All structural columns, beams, and corbels shall be thoroughly cleaned, inspected and repaired. Minor damage exists on the concrete beam that supports the north and south refuse crane rails on the west end (directly under each crane rail, see Sheet A-12 in Appendix H).

All areas of the elevated concrete deck on the charging floor (approximate elevation 61 feet) shall be thoroughly cleaned, inspected for exposed reinforcing steel and those areas with exposed reinforcing steel shall be repaired.

The entire overhead concrete roof system (cast-in-place beams and pre-cast double-T beams) shall be thoroughly cleaned and inspected for exposed reinforcing steel. Minor damage that exists in several of the double-T beams (web and flange areas) and all other areas with exposed steel shall be repaired. The heavy corrosion on all roof beam embedded steel seats shall be cleaned and protected from future corrosion.

The Contractor shall submit to the City a final inspection and repair map after all structural repair work has been completed.

Additions

No additions to the Refuse Pit structure are anticipated.

7.3.2 Operations Building

The operations building consists of five elevations, including, but not limited to, offices, storerooms, shops, laboratory, lunchroom, and locker rooms which shall be repaired/modified/repainted to meet retrofit requirements.

7.3.2.1 Operations Building Interior

The existing Operations Building floor plan (Figures 2-1 thru 2-6) and Room Finish Schedule (Pages 1 and 2) included in Appendix H of this RFP and provide the existing floor plan and identify the location of all rooms referenced below. All finished areas found to require total replacement shall be replaced with materials similar to the existing materials.

Demolition/Modification

The refuse pit sump located to the west of the refuse pit in the first floor parts storage room (Room 115) shall be designed to prevent foul odors. The metal framed loading dock on the south side of the second floor weld shop (Room 220) shall be demolished for the future loading dock in this area. The concrete retaining wall and access ramp to the second floor weld shop shall be demolished for the new maintenance building and loading dock in this area. The fifth floor charging floor vestibule (Room 505) shall be modified as required for a new air lock.

All ventilation shafts within the east stair tower (Rooms 501 and 603) shall be removed and the openings shall be sealed in conformance with fire code requirements.

The roof in the vicinity of Room 402 (crane controls) shall be inspected and repairs made to prevent the intrusion of odors from the nearby refuse pit.

Repairs - Concrete

All concrete beams, slabs, columns, and block walls shall be cleaned, inspected, and repaired in order to restore them to the original design conditions with a surface finish compatible with the adjacent finish treatment.

Repairs - Metals

All metal access ladders, sheet metal, fasteners, and supports shall be inspected, repaired, or replaced. All stair treads and gratings shall be inspected and replaced as required. All steel metal supports for the attachment of the pre-cast concrete aggregate panels, translucent panels, roof drain supports, lighting fixture supports, and other items that are heavily corroded shall be repaired or replaced.

Repairs - Wood

All wood framing, doors and trim shall be inspected, repaired, or replaced.

Repairs - Doors and Windows

All damaged interior windows, doors, frames, weather stripping, and hardware shall be repaired or replaced. All thresholds shall be inspected and replaced as required. All broken glass in doors and windows shall be replaced. All doors within the east and west stair towers shall be repaired or replaced to meet current fire code for fire rating, closure and opening requirements. All doors which allow access into the boiler area shall be repaired or replaced to meet current fire code for fire rating, closure and opening requirements.

Repairs - Finishes

All interior concrete finishes shall be inspected and repaired to restore the finish to a like new condition. All drywall, finished areas shall be cleaned, inspected, and repaired. All painted offices, equipment rooms, rest rooms, locker rooms, storage rooms, conference rooms, and galley rooms shall be repaired, cleaned and repainted. All wall coverings (wallpaper) shall be stripped and replaced. All overhead suspended ceilings and support systems shall be inspected, repaired, or replaced to provide a like new appearance. All tile (ceramic, vinyl, concrete, etc.) shall be inspected, repaired, or replaced as required. All

carpeted floors shall be inspected and replaced as required. All base molding shall be inspected, repaired, or replaced as required.

Repairs - Specialties

All rest room fixtures, partitions, faucets, shall be inspected, repaired, or replaced. All toilets, urinals, sinks, showers, tissue dispensers, soap dispensers, and hand towel dispensers shall be inspected and replaced as required.

Repairs - City Engineer's Office

Room 312 shall be reserved for the City's resident engineer's permanent use.

Repairs - Furnishings

All laboratory cabinets, tables, galley cabinets, desks, bookcases, and computer furniture shall be inspected, repaired, or replaced. All chairs and file cabinets shall be inspected and replaced as required.

Repairs - Mechanical

All piping located above suspended ceiling tiles shall be insulated to prevent condensation from damaging suspended ceiling tiles in the future. All water fountains shall be inspected and replaced as required. All safety showers and eye wash stations shall be inspected, repaired, or replaced. All drain pipes, and support hardware shall be inspected, repaired, or replaced. All floor drain covers shall be inspected and replaced as required. All plumbing systems, utility piping systems, and supports shall be inspected, and replaced as required.

Repairs - Electrical

All damaged or inoperative light fixtures shall be repaired or replaced. All light fixtures with exposed wiring shall have the wiring rerun in conduit. All exposed low voltage wiring shall have the wiring rerun in conduit. All damaged conduit and electrical fixtures shall be replaced. All damaged electrical panel boxes shall be repaired or replaced. All damaged or missing electrical panel hardware shall be replaced. All existing overhead ceiling mounted light fixtures in the east and west stair towers shall be relocated to the wall approximately 8 feet above the landings to facilitate future bulb replacement and maintenance. All emergency lighting fixtures shall be inspected, tested, repaired, or replaced.

Additions - Control Room Improvements

The Control Room roof shall be enclosed with a sloped watertight roof to minimize the accumulation of dust and allow for periodic wash downs to remove any accumulated dust. The joints in the existing duct work on top of the control room shall be sealed and the plenum under the new sloped roof shall be filled with insulation. Flooring, walks, wall covering and ceilings shall be replaced.

Additions - Americans with Disabilities Act of 1990 (ADA) Compliance

The third floor men's rest room (Room 314) and women's rest room (Room 316) shall be inspected for ADA compliance, repaired, and modified as required by City code. Room 316 shall be modified to remove a wall which prevents use of an existing shower. This remodeled room shall be used as the women's locker room. As an alternate, the existing electric shop may be converted to a women's locker room. The women's locker room shall be outfitted with appropriate fixtures and sanitary dispensers.

ADA access to the operations building shall be via the main entrance. The existing City Engineer's office (Room 302) is to be vacated and can be used for meeting the ADA

access requirements. A new ADA access ramp shall be provided on the fifth floor to provide access into the control room (Room 503). Braille elevator panels shall be added to the outside of the elevator controls at each of the five floors.

Additions - Safety Related

New handrails shall be installed on the outside walls of the east and west stair towers and along all stair risers in accordance with NFPA 101 Life Safety Code. New handrails shall be installed along the hallway ramp on the first floor (Room 103) and second floor steps (Room 203) and any other areas so as to comply with applicable safety codes. Personnel protection features shall be provided on all existing and new access ladders for compliance with current OSHA requirements. See Section 7.19 of this Section of the RFP for other safety related issues.

Additions - Fifth Floor Vestibule and Rest Room

The fifth floor rest room shall be outfitted with new toilet, partition, urinal, sink and fixtures. A new air lock shall be built to minimize odors from entering the fifth floor from the charging floor level.

7.3.2.2 Operations Building Exterior

Demolition

No demolition activities are anticipated to the building exterior.

Repairs - Thermal and Moisture Protection

The existing Refuse/Operations Roof Plan included in Appendix H (Figure 2-6) of this RFP contains information on the roof details referenced below.

All existing gravel built-up roofs shall be removed down to the existing insulation. All damaged insulation shall be replaced with new materials. New 24 gage pre-finished metal gravel stop shall be installed at all locations, along with new corner flashing and drip edges. All new metal flashing and trim shall conform to the architectural theme discussed in Section 7.4. After all repairs and additions specified above have been completed, a new layer of ¾ inch perlite, four ply VI felt, asphalt flood, and gravel shall be applied to all roof areas. New gutters and down spouts shall be provided from all roof elevations and shall discharge at grade level onto paved areas to prevent washouts.

Roof at Elevation 91.25 Feet - Crickets shall be constructed along the northern edge of the roof to channel water into the existing five drains with new drain covers installed. A new roof hatch and new cover for the roof penetration for the abandoned roof skylight shall be installed in the roof prior to final repairs. The new cover for the abandoned roof skylight cover shall be constructed with a pitch to shed water. A metal frame and plate system shall be designed to cover the existing opening and support a 300 pound point load without collapse of the steel cover. The metal cover shall be insulated on the exterior and integrated into the permanent roof system to permanently seal the opening from intrusion of moisture.

Roof at Elevation 46 Feet - Two new drains shall be installed in the southwest corner and northeast corner low points to prevent the accumulation of water in these areas. Drain piping shall be routed below to tie into the existing roof drain piping.

All caulking shall be inspected and repaired or replaced, as required to maintain a water tight integrity.

Repairs - Electrical

All damaged or inoperative light fixtures shall be repaired or replaced. All light fixtures with exposed wiring shall have the wiring rerun in conduit. All exposed low voltage

wiring shall have the wiring rerun in conduit. All damaged conduit and electrical fixtures shall be repaired. All damaged electrical panel boxes and hardware shall be repaired or replaced.

Repairs - Doors and Windows

All exterior doors, frames, and hardware that does not meet the current fire code shall be replaced with items that do meet the current fire code. All broken or missing glass in doors and windows shall be replaced. All thresholds and weather stripping shall be inspected and replaced as required.

Repairs - Concrete

The existing concrete roof deck above the third floor dock storage area (Room 322) has approximately 60 feet of roof line that was previously modified for the 1988 tipping building expansion. All exposed reinforcing steel shall be trimmed, the old concrete chipped to a sound base, and a minimum of two inch minimum concrete cover applied using forms for a straight edge. All exterior concrete and stucco finishes shall be inspected and repaired to restore the finish to a like new condition.

Repairs - Precast Aggregate Concrete and Metal Siding

The existing exterior precast concrete aggregate panels shall be cleaned, pressure washed, stripped of existing seals and caulking. During the cleaning process, the Contractor shall inspect the attachment mechanisms of each precast panel to ensure proper anchorage to the structure. Deficient mechanisms and otherwise damaged elements shall be replaced as required. All joints and seams shall be resealed, caulked and painted along the seams for a new appearance.

All sheet metal siding, flashing, and trim shall be replaced, with the exterior style matching the new tipping building siding.

Additions - Safety Related

The Contractor shall provide a second means of egress from the fourth and fifth floors to meet the City of Tampa fire code requirements. The second means of egress shall be provided from the control room and conference room which meets the fire code requirements. Emergency exit doors, windows, caged ladders may be used in any combination so long as fire code requirements are met. See Section 7.17 for additional fire safety related requirements.

7.3.3 Employee Parking Canopy Structures

This section covers the existing canopy for the parking lot on the tipping building entrance elevation and the new parking lot provided for the new maintenance/warehouse building.

7.3.3.1 Existing Operations Staff Parking Area

Demolition

No demolition activities are anticipated.

Repairs

All damaged support posts and roofing on the canopy structure shall be replaced. The entire exterior structure shall be cleaned and painted with a painting system suitable for the service conditions (Refer to Section 7.4.11 for details regarding painting).

Additions

No additions to the parking canopy are anticipated.

7.3.3.2 New Canopies

Additions

A metal canopy shall be provided over the five (5) parking spaces west of the new maintenance building for vehicle protection from cooling tower drift. The canopy protective coating system shall be suitable for the cooling tower acid mist conditions.

7.4 ARCHITECTURAL REQUIREMENTS

7.4.1 General

Where required below, or in Section 7.3, damaged existing metal wall panels and damaged translucent siding panels including all fasteners, flashing, trim pieces, gutters and downspouts shall be removed from existing structures. Structural framing which has been exposed by removal of the panel system shall be inspected for corroded or otherwise damaged steel, and loose connections. Damaged elements shall be repaired or replaced. Existing insulation (where applicable) which is rotting, water damaged or otherwise in need of repair shall be replaced in like kind to provide a proper thermal envelope for the building. Upon completion of the repairs and replacements of structural elements and insulation, the Contractor shall clean, repair, and /or replace the removed metal wall panels and translucent siding panels with new metal wall panels and accessories as described below.

New exterior metal wall panels shall match or be compatible with the existing metal panels and shall be 24 gauge galvanized steel with G90 coating conforming to ASTM A-525. The Contractor shall verify the vertical spanning capability of the specific panels and shall provide supplemental framing as necessary to properly attach the panels to the existing superstructure; providing a weather tight enclosure and resisting the wind loads defined in the currently enforced building code. Compatible fasteners, trim pieces, flashing, copings, closures, sealants and all others accessories for a complete wall panel system shall also be provided. All openings for windows, louvers, doors, Heating Ventilation and Air Conditioning (HVAC) units and electrical units which do not close properly shall be repaired or replaced for proper closure and fit around such elements.

The Contractor shall provide industrial grade gutters and downspouts where alternate roof drainage systems are not otherwise provided or existing. Gutters and downspouts shall

be sized in accordance with the plumbing code for roof drains and rain leaders and shall be of 24 gauge galvanized steel (or .050 formed aluminum) and shall be compatible with the selected wall panels. The color of the gutters and downspouts, including fasteners and gutter straps, shall match the color of the adjacent wall panels. Appropriate fasteners to properly attach the gutter and downspout system to the building shall be provided and installed.

The finish of all new metal panels, trim pieces, gutters and downspouts shall be a fluoropolymer high performance coating (70 % "Kynar 500" resin). The exterior finish coat shall have a minimum dry film thickness of 1.0 mil and an interior washcoat of .50 mil.

The Proposer shall include in the Proposal an architectural color rendering and sketches. Samples (as large as practical) of siding, paint and other materials visible from the exterior shall be presented to the City for review and approval by the City prior to ordering or purchase by the Contractor. Final colors, pattern or banding shall be as approved by the City, which will establish the color scheme for the Site.

Installation details, weather tight performance, sealants, closures accessories and overall responsibility for the metal wall panel application shall be the responsibility of the Contractor.

7.4.2 Architect/Design

The Contractor shall provide design and construction documents for the modifications to the existing buildings and for all new buildings to ensure that the design is in compliance with the local building, life safety and accessibility codes, in accordance with the Florida Statutes.

7.4.3 Tipping Building

See Section 7.3.1.1 for removal and replacement work scope of the building's exterior wall system.

7.4.4 Refuse/Operations Building

See Section 7.3.2.2 for cleaning or removal and replacement work scope of the building's exterior precast concrete aggregate panels, metal panels, and translucent siding wall system.

7.4.5 Maintenance/Warehouse Building

The Contractor shall provide a pre-engineered metal building, 90 feet long by 50 feet wide for plant maintenance and storeroom for spare parts, as indicated on Sheet A-15 in Appendix H of this RFP. The Contractor shall select the sizing of exterior openings, including, but not limited to, windows, doors, and louvers, translucent panels and sky lights. The Contractor shall also be responsible for the design of all interior partitions. The architectural treatment of the building shall coordinate with the rest of the Facility.

The height of the Maintenance/Warehouse Building shall be determined by the Contractor based on operating and space requirements, but shall be in accordance with all applicable permits. One half of the building may be utilized with two stories to meet space requirements while the maintenance portion of the building shall be full height complete with monorail and electric hoist.

The maintenance/warehouse building, at a minimum, shall be equipped with two offices, lunchroom, shower and restroom facilities for ten personnel. A common work area sized for eight workbenches shall be provided. A 1,000 square foot warehouse located on the grade elevation, with shelves and storage bins shall be provided.

The maintenance/warehouse shop shall be provided with an electric roll up door sized to allow access for front end loader maintenance. Bollards placed on both sides of roll-up door openings. The Contractor shall provide, at a minimum, sprinkler system and portable fire extinguishers as specified in Section 7.17, plant communications equipment: connected

to the plant intercom and paging system with two intercom stations, HVAC system, and shop utilities.

7.4.6 Ash Management Building

The Contractor shall provide a pre-engineered metal building, 170 feet long by 110 feet wide building for processing and storing of ash, ferrous metals, and oversized materials as indicated on Conceptual Ash Management Processing Plans, Sheets A-6 and A-7 in Appendix H of this RFP. The ash management building has been sized for further processing, separating, and storage of non-ferrous, metals. The height of the ash management building shall be determined by the Contractor based on operating and space requirements, but shall be in accordance with all applicable permits. The Contractor shall select the sizing of exterior openings, including, but not limited to, windows, doors, and louvers, translucent panels and sky lights. The Contractor shall also be responsible for the design of all interior partitions. The architectural treatment of the building shall coordinate with the rest of the Facility.

The building shall be equipped with a fabric dust filter collector(s) as required by the FDEP Air Permit. Ferrous separating equipment shall be installed inside the building. All equipment and support steel at grade elevation shall be placed on six inch minimum concrete foundations. The structural steel above the ferrous recovery system shall be designed for hoisting equipment as required for maintenance. Translucent fiberglass panels shall be used on any exterior wall that will come in contact with ash or leachate, such as the area around the inclined ash conveyor entrance and walls adjacent to the ferrous recovery equipment.

The building, at a minimum, shall be equipped with a 20' x 20' storage room for ash handling equipment. A truck loading ramp shall be installed a minimum six inches above the building floor slab and extend twelve feet beyond the exit ramp. Two feet wide by four inch high speed bumps shall be installed near the entrance and exit ramps. Entrance and exit ramps shall slope back into the building to capture any potential spillage or ash carryover from ash

trucks as they exit the building. Bollards shall be placed on both inside and outside of all truck door openings.

The Contractor shall install pre-fabricated twelve inch wide by twelve inch deep (as needed) floor trenches with removable two inch thick cast iron grating. This shall drain to the leachate collection system settling basin as shown on Paving, Grading, and Drainage Plan, Sheet C-4 in Appendix H of this RFP.

The Contractor shall install embedded railroad steel, structurally attached to reinforcing bar, in the storage bunker floor slabs. The upper four inches of the floor slab shall consist of un-reinforced sacrificial concrete. The Concrete between the edges of the ash and ferrous storage bunkers and the elevated truck ramp shall have a surface hardener applied equivalent to Master Builders Anvil Top 200 or approved equal.

Potable water, wash down water (AWT), service air, and electrical outlets (110 volt and 220 volt) stations shall be provided.

Communications: building shall be connected to the plant intercom and paging system with two intercom stations. Building shall be equipped with closed circuit television cameras ("CCTV") and monitors (located in the Facility control room). The CCTV system shall monitor the ferrous separation conveyors and bunkers as per Section 7.13 of this Section 7.0.

All interior panels, purlins, girts, steel structures, and equipment shall be protected against high pH ashes, high humidity, and hot atmosphere. All structural components and building siding (non-metallic) in the area of the ash residue equipment shall have an acid proof coating applied prior to Facility operations and handling of ash residue.

Interior conduit, push button stations, junction boxes shall meet NEMA 12X of stainless steel or fiberglass.

7.4.7 CEMS Building

The color of the CEMS building shall coordinate with other buildings architectural appearance. The building shall have a floor elevation a minimum of 6" above final finished grade or surrounding floor area.

7.4.8 Water Treatment and Chemical Storage Building

See Section 7.4.1 for removal and replacement work scope of the building's exterior wall system. Materials of construction and coatings shall be suitable for use in a highly corrosive environment.

The color of this building shall blend with the colors of the other facility buildings. The existing primary and secondary steel framing shall be surface prepared using sand blast or hydroblast techniques and painted.

7.4.9 Turbine-Generator Island and Electrical Building

The exposed structural steel and integral existing concrete building shall be surfaced prepared for field painting with a compatible paint system for the substrate involved. The color and pattern of the paint shall be complimentary to the color and pattern scheme outlined for the metal wall panels in Section 7.4.1.

7.4.10 Scalper Building

The scalper building frame shall be steel with appropriate steel roof joists, trusses or beams. The wall panels and accessories described in 7.4.1 shall be used as the exterior sheathing system. It shall coordinate aesthetically with other Facility buildings. It shall be sited between the boiler and the tipping building entrance ramp as defined on the location map. The materials of construction must be suited for use in a high pH, corrosive

environment. Acid proof coatings shall be applied to all interior building surfaces prior to Facility operations and handling of ash materials.

7.4.11 Ash Conveying Gallery

A square or round (approximately 10' by 10') enclosure shall be provided around the ash conveyor. The enclosure shall match the pitch of the conveyor (approx 15 degrees) and shelter the ash and conveying system from the weather. Provisions for managing washdown water shall be provided. The materials of construction must be suited for use in a high pH, corrosive environment. Acid proof coatings shall be applied to all interior gallery structural surfaces prior to handling of ash materials. The outside color of the gallery shall blend with the other Facility buildings. The enclosure shall be properly vented in accordance with all applicable codes.

7.4.12 Painting/Protective Coatings

Exterior and interior visibly exposed components of the buildings that are not pre-finished/pre-colored shall be painted with compatible paint systems for the proposed substrate (including, but not limited to, primed doors, exposed pipes, steel framing and or mechanical equipment). See Section 7.23 for further paint requirements.

7.5 REFUSE CRANES

[ON HOLD, THE CITY IS IN THE PROCESS OF PREPARING A REPORT OF THE MINIMUM REPAIRS/UPGRADES REQUIRED ON THE REFUSE CRANES]

The two existing traveling bridge cranes used for refuse charging at the Facility shall be refurbished, at a minimum, in accordance with the requirements detailed in this section. Actual refurbishment work, as it relates to crane downtime, shall be scheduled to coincide with the Facility shut-down period(s) during the retrofit construction period so as to minimize by-passed waste. Retrofit activities that can be performed with the cranes in operation are acceptable provided they do not affect actual waste throughput.

7.5.1 Existing Crane Description

The two traveling bridge refuse cranes were manufactured by ESCA/Kone/Southern Monorail companies (Crane Pro 21, Inc.) and installed in 1985. The cranes have operated to meet the Facility operation schedule of seven (7) days per week, 24 hours per day since installation. Currently, the refuse cranes are typically in operation as follows:

One crane operates 24 hours/day Monday - Friday

Second crane operates 12 hours/day Monday - Friday

Any one of the two cranes operates 24 hours/day Saturday and Sunday

The refuse crane performs approximately 100 functions/hour (including pit management, mixing, spreading and waste charging) during peak receiving hours.

7.5.2 Refurbishment [THIS SECTION WILL BE PROVIDED LATER]

7.6 CHARGING SYSTEM

The existing charging hopper consists of a poured in place concrete structure, lined with steel plate. A connecting chute and shut-off gate are supported by and welded to the steel plate that forms the charging hopper. An expansion joint connects the shut-off gate to the refractory lined feed chute. The charging hopper dimensions at the feed chute are approximately 8'0 x 4'6".

The Contractor is encouraged to utilize the existing charging hopper design as extensive concrete work will be required to install an alternative system.

The Contractor shall evaluate the structural integrity of the existing hopper structure prior to any planned reuse of this equipment.

The Contractor may utilize the existing charging hopper and feed chute, refurbish them, or supply a new charging hopper and refractory lined or water cooled feed chute. New charging hopper and feed chute installation shall meet the following requirements:

7.6.1 Charging Hoppers

New charging hoppers shall be designed to withstand the weight of the refuse as well as the impact of a full crane bucket moving both horizontally and vertically. The charging hoppers shall be supported by the charging floor structure and arranged so that, in normal operation, there is no spillage of refuse onto the charging floor. Spill plates shall be provided between the bin and the edge of the hoppers facing the bin wall. Charging hoppers, if new, shall be lined with abrasion resistant plating at heavy wear areas. If existing charging hoppers are used, they shall be repaired to at least the minimum original specifications and lined with new abrasion resistant plating at heavy wear and abrasion areas.

7.6.2 Feed Chutes

The chutes connecting the charging hopper extensions and the furnace-boiler feed throats shall be of sufficient length to ensure an air seal is maintained at all times between charging cycles.

7.6.2.1 Water Cooled Feed Chute

The chute assemblies shall be designed for a minimum hydrostatic pressure of 10 psig. Exterior reinforcing shall be designed to resist the dead and live loads of the chutes and refuse. Each chute assembly can be designed as one integral assembly or as a four-sided sectionalized assembly with four vertical sections. Horizontally sectionalized assemblies shall not be used.

The cooling of the chutes shall be accomplished by a water circulation system with the cooling water entering at the lowest points and exiting at the highest point of the chute sections. The type of system used shall not allow water in any section of the chutes to exceed 150 degrees F. If a recirculation system is used, it shall include water-to-air or water-to-water heat exchangers, surge tanks, pumps and valves, including a safety valve for automatic transfer of the system to a fresh water supply line in case of failure of any of the recirculation system components. The cooling system may be self contained or connected to the Facility auxiliary cooling system. The cooling water flow shall be thermostatically controlled so that the water temperature in any section of the chutes(s) does not exceed 150 degrees F. An automatic water level control shall be provided with low level and high temperature alarms.

The junction of the water cooled chutes and the furnace/boiler cavity shall be designed so that no welding is in the direct path of radiant heat from the furnace-boiler cavity. A sensing device that would signal low level of refuse in the chutes shall be provided. An ultrasonic, or equal sensing device shall be used.

7.6.2.2 Refractory Lined Feed Chute

If the existing feed chutes are used, the Contractor shall inspect, repair, and replace as required the supporting steel, casing, anchors and refractory to maintain the desired integrity of installation to meet operational requirements. If new refractory lined feed chutes are used, they shall meet or exceed the existing design criteria.

7.6.3 Shut-off Gates

If new shut-off gates are supplied, the extension chutes between the charging hoppers and feed chutes shall be fitted with hydraulic cylinder operated cut-off gates to prevent burnback during shutdowns. The gates shall be shaft mounted and shall not protrude below the interior faces of the chutes at any point when in the open position. The operating mechanism shall be designed to include counterweights to balance the gate in any position. In their closed position, the gates shall be designed to support the weight of refuse with a fully charged hopper, plus the appropriate safety factors.

The hydraulic operators shall be fitted with valves and controls for remote operation and position indication. The gate assemblies shall be removable without dismounting the charging hopper extensions and without requiring access from inside of the chutes. The hydraulic systems shall include gas filled accumulators to provide 1.5 times the capacity to complete one gate motion from full open to full closed position with the hydraulic power units off. The hydraulic piping, valves, fittings and control, etc., shall be designed for 300 percent of normal operating pressure. Hydraulic operators shall be a cushioned type, or shall be fitted with shock suppression devices. All pipe shall be steel tubing or pipe with flexible connection hoses not exceeding a length of four feet. All piping shall be supported by 3-way supports.

The Contractor shall install a hopper level indicator connected to the DCS to notify the crane operator when a low level exists or the hopper is "bridged over".

7.6.4 Charging Hopper/Feed Chute Fire Suppression

The Contractor shall incorporate a method to suppress or control "burnback" into the feed chute.

7.7 COMBUSTION SYSTEM

The Contractor shall, as part of the Facility retrofit, replace each of the existing four air-cooled furnaces with rotary kilns with a mass-burn, stoker/grate-fired furnace system, to achieve combustion performance for proper emission control and to provide required operating life for the retrofitted unit. The furnace shall be integrated with the boiler as specified in Section 7.8.

The Combustion System shall be of the manufacturer's standard design unless specifically authorized by the City.

The Combustion System retrofit shall include, at a minimum, the following for each unit:

- Replace furnace with a mass-burn grate-fired design without kiln
- Provide a new waste feed system
- Provide a sectionalized stoker/grate system
- Provide new air plenums with multiple zones with individual controls for air distribution
- Provide new combustion air system to supply primary and secondary air for the retrofitted furnace design
- Provide a steam coil air preheater
- Provide a hydraulic system for powering the combustion grates and feeders
- Provide insulation and lagging
- Integrate furnace and boiler designs
- Integrate with combustion controls (Section 7.9)

- Provide closed circuit television (color) monitoring of furnace combustion (Section 7.13)
- Provide auxiliary burner system

Furnace/boiler system shall be capable of handling fluctuations in Btu content, moisture content, and chemical analysis of the waste processed. The combustion heat release shall be a maximum of 15,000 Btu/cu. ft./hr. to the boiler at MCR. The furnace/boiler system shall be designed to maintain a minimum temperature of 1,800°F for at least one second downstream of the last point of overfire air injection. The maximum combustion gas temperature shall be controlled to minimize slagging. The combustion efficiency of the system shall minimize Products of Incomplete Combustion (PIC) such that the levels of carbon monoxide (CO), hydrocarbons and halogenated organics (dioxin/furans) leaving each unit remain within the regulatory acceptable limits established for the Facility.

The furnace/boiler system including superheaters and economizers shall be designed so that the flue gas velocities do not exceed 20 ft./sec. in any section.

As a means for maximizing combustion efficiency, the Contractor shall conduct a cold-flow laboratory modeling study of the proposed stoker/grate system, furnace, and boiler retrofit prior to fabrication. A bench scale replica of the proposed stoker/grate system, furnace and boiler shall be constructed and tests shall be performed to examine fluid flow, velocity profiles, and degree of mixing in various air zones. The study shall also examine the relationship between mixing and controlled residence times. Prior to conducting the modeling, the Contractor shall submit a protocol to the City indicating all parameters for the modeling. The City shall have the option of witnessing the flow modeling test and the Contractor shall demonstrate the test was comprehensive and conclusive. A copy of the flow

modeling report shall be submitted to and approved by the City prior to the release of fabrication of the combustion system.

During the modeling study, the Contractor shall modify air flows and throat configurations as necessary to achieve complete mixing. The final configuration resulting from the modeling study shall be incorporated into the designs and subsequent fabrication of the stoker/grate, furnace and boiler systems.

7.7.1 Furnace

The furnace system shall be designed to permit strict regulation of air distribution, limit air infiltration, and achieve satisfactory combustion of waste throughout the design range to meet emission limits, performance, and operating guarantees. Furnaces equipped with waterwalls shall be of membrane type construction. Where waterwalls are installed and exposed directly to direct flame or alternate reducing and oxidizing atmosphere, the tubes shall be protected with a minimum 1" layer of Silicon Carbide low oxidizing grade castable refractory, anchored to the tubes with welded studs. The walls adjacent to the stoker surface shall be of water cooled Silicon Carbide tile or equivalent extending a minimum of four feet above the grate surface. Refractory lined furnace design shall include air cooling to minimize slag build-up.

7.7.2 Feed System and Stoker/Grates

Each stoker/grate shall be sectionalized and provided with independent plenums under each stoker/grate section for primary air distribution.

All stoker/grate and ram operations (speed, cycle frequency, etc.) shall be arranged for remote operation from the control room with local manual override. Stoker and ram drive shall be by servo-controlled, load compensated, variable-volume hydraulic motor or cylinders. If a water-cooled grate system is offered by the Contractor, it shall be a design successfully

used in mass-burned municipal waste combustion units and deemed by the City to have proven reliability. The Contractor shall provide information as to the operational control system of stokers utilizing water cooled grates prior to the release of fabrication. Stoker/grate operation shall be fully compatible with the combustion control system requirements in Section 3.9. Ram feed systems shall be designed to limit air filtration and sealed to prevent waste from escaping through seals.

7.7.3 Stoker/Grate Materials

Reciprocating grates shall be of cast chromium alloy steel grate bars. Parts designed to prevent erosion of side walls (if applicable) extending above the stoker surface shall be proven industry accepted MEEHANITE HS type cast iron or equal. All other surface castings shall be comprised of heat resistant alloy conforming to ASTM A 297-74A *Grade HF* designation. Alloy (weldable stainless steel) steel grates shall have a minimum of 4 percent nickel composition. Wear plates shall be "NT" (high density forged steel plate) or approved equal. The type of material used in water cooled stoker/grates shall be of manufacturer's proven design.

7.7.4 Combustion Air System

The combustion air systems shall be designed as an integral part of the combustion system provided for each unit, and shall be fully coordinated with the capacity and static pressure requirements of the associated stoker/grate, boiler, air pollution control equipment, and interconnecting ductwork.

Separate fans for primary and secondary shall be used on each combustion unit (minimum of two combustion air fans per boiler). The combustion air fans shall be centrifugal, backward inclined blade, non-overloading type, minimum Class II design, with variable speed drives or motor driven volume control dampers or approved equal. All

combustion air fans installed on steel platforms or elevated floors shall be mounted on vibration elimination bases with non-combustible flexible connections at the inlets and outlets of the fans.

The combustion air duct work inlets shall be arranged to draw air from the refuse storage pit. Each primary and secondary air duct shall be fitted with a venturi type or similar non-plugging type flow measuring device with transmitter for remote readout and use in the combustion rate control systems. Ducts shall be provided with sufficient straight sections and flow straighteners (if required), upstream and downstream of the flow measuring device to assure the accuracy of each flow measurement device.

The combustion air duct work shall be manufactured of A-36 steel plate with a minimum 3/16 inch thickness. Section joints shall be flanged and gasketed, access doors or panels shall be provided at each bend and the duct work system shall have the appropriate turning vanes and shall be essentially airtight with leakage not exceeding 1 percent of the maximum design air flow.

The fan drives shall be selected for a minimum of 125 percent of the maximum design brake horsepower (BHP) with belt drives or couplings rated at 150 percent of the maximum design BHP. Volume control dampers, if used, shall be radial inlet vane type. Radial vanes shall be designed with all external linkages and gears out of the combustion air stream. The forced draft combustion air system shall include air preheaters for occasional use to dry excessively wet waste. The secondary air system shall include high velocity air jets that cover the entire furnace flow to mix the furnace gases.

If combustion control utilizes recirculated flue gas, the ducts shall be constructed of a minimum of Core-Ten © steel or approved equivalent.

7.7.5 Auxiliary Fuel Burners

Auxiliary fuel burners shall be used to maintain the furnace temperature at 1800° F before waste is introduced into the furnace. Auxiliary fuel burners shall be used when: the quality of burning waste is inadequate, the combustion system has an upset condition which lowers the furnace temperature below 1800°F, during start-up and shut-down, and as required in the operating permit. Supplemental heat input shall not be required for operation within the Design Envelope (see Section 7.11).

The auxiliary burners shall use natural gas only and be designed to preheat the furnace to the permitted temperature requirements prior to lighting of waste and to maintain at least 1800°F until the grate surface is empty upon shut-down.

The burners shall be equipped with a burner management system approved by the Contractor's boiler insurance company.

[Specific Temperature and Start/Shutdown Criteria To Be Established By Permit]

7.7.5.1 Design Criteria

Each furnace shall be equipped with natural gas burners having a minimum total capacity of 40 MM BTU/HR for start up and to maintain minimum combustion temperatures as outlined in Section 3.7. The burner shall have a sufficient turn-down ratio to meet operating requirements. The fuel firing system shall be protected from furnace conditions by guillotine doors. The gas burners, piping, and controls shall be installed in accordance with but not limited to all applicable NFPA codes.

7.7.5.2 Installation

Locations shall be determined by the Contractor.

7.7.6 Air Preheater

A steam coil air preheater shall be provided that has the capability to preheat the forced draft combustion air temperature to a minimum of 300°F. The air preheater and duct work shall be designed to independently regulate the air temperature to each of the grate zones. A fin tubed preheater with a minimum ¼ inch clearance between the fins and ¼ inch clearance between the tube sections is required. The air preheater assembly shall have adequate access doors for cleaning and provisions for draining the sump. The steam supply shall be saturated or superheated steam from the boilers at the Contractor's discretion. All piping, controls, and instrumentation shall conform to applicable codes and standards. The external surface of the air preheater and hot air ducting shall be insulated as per Section 7.19.3.

The Contractor shall provide for condensate recovery from the steam coil air heater steam supply line. Condensate return piping shall be to the deaerator or main condenser.

7.7.7 Refractory

The refractory furnace enclosures, where applicable, shall be of super duty quality brick laid in high temperature mortar. The refractory walls and arches shall be of the sectionally supported type, anchored with high temperature stainless steel alloy anchors.

The refractory enclosure materials shall conform to the latest revisions of the following minimum requirements and classification:

- Super duty fire brick ASTM C 27
- Silicon Carbide walls insulating brick ASTM C 155
- Silicon Carbide castable Service Temperature 2900°F
- High alumina castable Service Temperature 2730°F (Cergun super LI or equal)

- Insulating castable ASTM C 401
- Expansion joint filler - Fiberfrax, kaowool, or equal
- Sectionally supported wall and arch mortar Superduty Fireclay
- Insulation - Mineral wool block
- Tile engaging castings or anchors ASTM A 276

7.7.8 Bottom Ash Discharger

The Contractor shall design the furnace connection of the bottom ash discharge chute to be the full width of the final grate section. The distance from the end of the stoker to the furnace rear wall shall be equal to the height of the boiler feed throat lintel above the stoker feed section. Provisions shall be made to accept sifting and fly-ash for combining with the bottom ash prior to the conveyor transport system. A hydraulic operated ram pusher shall discharge mixed bottom ash and fly ash onto a bifurcated chute to discharge onto conveyors. The bottom ash discharger shall not be attached to the furnace or boiler or impose any loads on their supporting structure. The furnace discharge chute shall extend into a water filled quench tank sufficiently to seal the furnace/boiler enclosure at pressures encountered during operations. The quench tank shall have level controls to maintain the water level within a controlled range. Bubbler type or proximity controls are recommended. Float type controls shall not be used to maintain the quench tank water level.

7.7.9 Sifting Hoppers

Sifting hoppers shall be provided for each stoker/grate air plenum section. Hoppers shall be arranged to prevent air leakage between grate zones. The design shall be compatible with the grate siftings which contain glass, molten aluminum, dirt, liquids and other materials.

The sifting hoppers shall be designed with hinged 18 inch x 18 inch air tight maintenance doors, and maximum slopes for siftings flow. The hopper discharge throats shall have minimum 4 inch inspection/clean out ports and striker plates. A conveyor system shall be provided to discharge siftings to the bottom ash discharger.

7.7.10 Hydraulic System

The Contractor shall provide two 100 percent capacity hydraulic pumps and reservoir system for powering the actuation of the grates, rams, and ash discharging and charging chute cut-off gates for each combustion unit. Fire retardant hydraulic fluid shall be used. The hydraulic systems shall be installed in an enclosed room with provisions for adequate reduction of ambient noise level outside the room and appropriate fire protection.

7.7.11 Insulation/Lagging

(Refer to Section 7.19.3 for more detailed information regarding insulation and lagging).

7.7.12 Structural Steel

If a top-supported boiler is proposed, the stoker/grate support framing shall be designed as a self contained assembly without transmitting any dynamic loading, thrust, or torque of the drives to the boiler or building structures. For bottom-supported boilers, stoker/grate and boiler support systems may be integrated, provided that proper isolation to avoid interference from boiler to stoker/grate, or stoke/grater to boiler. Determination of suitability of any existing steel for reuse shall be the sole responsibility of the Contractor. Refer to Section 7.20, Miscellaneous Steel, for specifications.

7.8 STEAM GENERATION EQUIPMENT

The Contractor shall integrate the retrofitted steam generation system (or boiler) with the combustion system for proper cooling and energy recovery from the gases exiting the furnace. Sections of the existing boiler and structures may be retained by the Contractor for integration into the proposed boiler design, however, any pressure part intended to be retained shall be tested by ultrasonic methods to determine wall thickness. Any pressure part whose thickness is below 80 percent of the original thickness shall be replaced. If the existing boiler is utilized, the convection pass with superheater, evaporator, and economizer sections shall be replaced with redesigned sections. The Contractor shall be solely responsible for determining the adequacy, including code compliance, of any retained component(s) to meet the specified design performance and guarantees set forth in the Retrofit Construction Agreement. Complete fluid mechanical analysis and heat transfer analysis of the retrofitted furnace and boiler shall be performed by the Contractor as part of design.

All boiler components shall be designed and constructed in accordance with the ASME Boiler and Pressure Vessel Code and shall be so stamped. The tube wall thickness shall include corrosion allowance of the minimum required by the ASME code. Corrosion allowance shall be compatible with expected metal loss rate in various sections of the boiler, but shall be not less than 1/16 inch.

The Contractor shall establish the design superheater outlet operating pressure and temperature to meet the steam turbine inlet conditions of 600 psig and 700°F.

If new steam drums are used, they shall be of Class 1 fusion welded construction, tested before shipment. The steam drums shall be fitted with steam separation baffles yielding dry steam with purity of not more than 1 ppm solids at maximum continuous steaming conditions, at the design pressure and temperature, when the boiler water concentrations do

not exceed standard ABMA limits. Each drum shall have two (2) manhole openings fitted with manhole covers. Proper provisions shall be made for thermal expansion of the drums so that excessive stresses are not produced on either the pressure parts or on the supporting structure. If the existing drums are retained, the Contractor may redesign drum internals or connections needed to meet the performance requirements of the boiler.

Sufficient access doors allowing for inspection and maintenance of the tubes and tube cleaning system shall be provided. At a minimum there shall be four (4) maintenance access doors per pass (two per side) and one (1) access door on each side between tube banks or bundles. The Contractor shall demonstrate the techniques provided for tube replacement, cleaning, and maintenance.

The Contractor shall provide a piping drawing description, and procedure for insuring that the turbine is not damaged by foreign objects entering the steam piping system as a result of the retrofit installation during the various phases of the Retrofit activities. This drawing shall be submitted to the City prior to the commencement of any work which affects the main steam.

7.8.1 Watertube/Waterwall Construction

All new boiler wall sections shall be of welded membrane type construction with a maximum ½ inch spacing between tubes. Membranes shall be a minimum 3/8 inch thick and continuously welded (on the fire-side) to the tubes and at the seams with full penetration welds equal to the membrane thickness. All tubes exposed to flame impingement shall be protected by silicon carbide refractory tile, or the refractory placed directly on studded tubes. Waterwall tubes forming deflection arches or turning points in the flue gas flow shall be protected from abrasion and erosion by tube shields and/or by alloy overlay. Radiant sections shall be designed for a minimum of 10,000 Btu/per sq. ft. per hr. heat absorption and at a 15 percent fouling factor.

7.8.2 Generating Section

The temperature of gases entering a generating section such as a convection tube bundle or screen tubes shall not exceed 1600°F. The maximum gas velocity through the generating section shall not exceed 20 ft/sec. These tubes shall be designed to absorb a maximum 10,000 Btu/sq. ft./hr at a 15 percent fouling factor.

7.8.3 Superheater Section

The superheaters shall be manufactured of an alloy with proven performance suitable to resist thermal high temperature corrosion and erosion encountered in a refuse combustion system. The superheater tubes shall be protected by alloy steel metal shields, refractory, metallic, or ceramic coatings at locations vulnerable to corrosion and erosion. The superheaters shall be designed with proper provisions for thermal expansion and shall be provided with interstage attemperators. The superheater shall be designed to operate and maintain the operating outlet steam temperature at 75 - 100 percent of throughput.

The superheater bundles shall be placed at a location where the gas temperature does not exceed, 1,250°F.

7.8.4 Economizer Section

Each boiler unit shall be provided with a bare tube type tubular economizer (no finned tubes). The economizer shall be designed for forced circulation provided by the boiler feed pumps using an entering feedwater temperature of 280°F and a maximum exit gas temperature of 450°F regardless of load or fouling condition. Sampling ports shall be installed in the ductwork following the economizer to meet regulatory requirements.

7.8.5 Boiler Soot Removal System

The boilers shall incorporate an on-line soot removal/tube cleaning system appropriate for the temperatures, ash buildup, and other conditions in the various sections within the boiler. Steam soot-blowers, mechanical rappers or combination of methods may be utilized to meet online operating requirements and downtime limitations while meeting environmental guarantees. The soot removal system supplied shall be of sufficient capability to prevent any need for supplementary cleaning (such as hydro-cleaning) or shut-downs between the scheduled unit outages. The installed system shall be designed to limit external erosion on the boiler tubes.

7.8.6 Boiler Refractory (Refer to Section 7.7.7: Refractory)

7.8.7 Boiler Trim

Each boiler unit shall be furnished with boiler trim in accordance with the ASME code requirements as well as conforming to the standards of good power plant practice. The trim shall be designed for a minimum of 150 percent of the nominal operating pressure (psig) for pressure containing parts.

The following list of accessories, at a minimum, are required. The final number and type of accessories shall be determined by the Contractor based on the water circulation and steam distribution designs. Only new and unused parts shall be used for all trim and shall include but not be limited to the following:

- Safety valves as per ASME code
- Water column including: drum level compensator, gauge and glass drain valves, high and low alarm, low water cutoff, high water turbine trip
- Feedwater control, bypass, stop, and drain valves

- Feedwater stop and check valves
- Boiler air vent valves
- Chemical feed valves
- Continuous blowdown valves
- Tube cleaning system
- Steam and water flow orifice/nozzles and transmitters
- Differential level transmitters
- Remote drum level indicators
- Roof access maintenance ports (for scaffold rigging)
- $DeNO_x$ injection ports
- Main steam stop and nonreturn valves
- Temperature and pressure measurement ports (two per pass minimum for each measurement, except a minimum of four temperature ports on the first pass roof) as per Section 7.9
- Inspection Ports
- Access doors complete with grab handles inside and out
- Attemperators using boiler feedwater shall be provided to maintain the final steam temperature leaving the superheater at 705°F, with adjustable setpoint

7.8.8 Boiler Fly-ash Hoppers

Totally enclosed steel boiler fly-ash hoppers shall be provided under each pass. A minimum of two gasketed hatch type, air tight steel access doors shall be provided for each

hopper. Each hopper shall be constructed of a minimum of 3/8 inch carbon steel plate at a 55 degree minimum valley angle. Hoppers in gas zones exceeding 800°F shall be refractory lined.

All penetrations through siftings and boiler fly-ash hoppers shall be sealed by gaskets or other methods. All seals and gasketing materials shall be suitable for the continuous temperature of 1000°F. The lower end of the siftings hoppers shall be designed with flanged connections to fit the sealing method used for ash transport. A 4-inch rod out port connection shall be provided on each hopper. Striker plates shall be welded to the hopper skin.

7.8.9 Insulation/Lagging (Refer to Section 7.19.3: Insulation of Piping and Equipment)

7.8.10 Structural Steel

The structural framing of the boilers shall be established by the Contractor to suit the equipment furnished and shall be independent of the building structure. The design of the boiler support steel, particularly the columns and beams, shall be coordinated with the design of the existing building and available space. The boiler steel shall support the vertical loads from the boiler, roof and platform system, as well as the horizontal wind loads imposed on the boiler walls (including during erection). The boiler footprint and loading shall be coordinated with the foundation loading requirements set forth in Section 7.2.1.3.

The design of boiler attachments shall consider and provide for the expected movement of the boiler. The boiler assemblies may be top or bottom supported with provisions for expansion of the drum and all waterwalls.

Adequate expansion joints shall be provided between the lower waterwall headers and stoker structures to prevent transfer of loads and stresses due to thermal expansion of the waterwalls.

Refer to Section 7.20 for steel specifications.

7.8.11 Maintenance Access

The design of the furnace, boiler, air preheater, and combustion equipment shall provide for maintenance accessibility. Sufficient platforms, galleries, and stairs shall be provided. Prior to the 70% design review stage, the Contractor shall demonstrate that maintenance accessibility has been provided for replacing grates, refractory, superheaters, waterwall tubes, economizer tubes, soot blowers, start up drains and vents, and steam and feed water valves. The Contractor shall schedule a meeting with the City to discuss maintenance access prior to the 70% phase. The Contractor is encouraged to use "3-D" computer-aided design and drafting (CADD) programs to facilitate design.

Sufficient access doors allowing for inspection and maintenance of the tubes and tube cleaning system shall be provided. At a minimum there shall be four (4) maintenance access doors per pass (two per side) and one (1) access door on each side between tube banks or bundles. The Contractor shall demonstrate the techniques provided for tube replacement, cleaning, and maintenance. Grab handles shall be installed at the interior and exterior of all access doors to provide for safe access and exit.

7.9 COMBUSTION CONTROL AND FACILITY INSTRUMENTATION SYSTEM

A Distributed Control System (DCS) shall be provided for the Facility. The combustors, steam generating equipment, and other related equipment shall be monitored and controlled in the existing control room. The Facility systems shall be controlled by Distributed Control Units (DCU) located in the control room and the DCU shall be connected by a data highway to the new control room workstations. The operator workstation in the control room shall display the facility status mimics, alarms, and reports configured from data transmitted from the DCU's. In order to effectively control the process, an integrated monitoring and control system shall be provided. The system shall cover all project elements.

Overall monitoring of the system shall be performed by the Distributed Control System (DCS) located in the existing control room and new operator workstations shall be installed in this control room. System monitoring shall provide all information necessary for supervisory control of the system and shall provide a central location for overall system alarm management and data acquisition. Overall process control shall be executed by distributing the control for the respective combustion unit. Each Distributed Control Unit (DCU) shall be configured to perform the control of equipment for the respective combustion trains (including all necessary protective functions such as shutdown of equipment). This approach shall allow control of equipment with a level of redundancy since each combustion unit shall have a dedicated DCU. Workstations provided shall be able to view/control the other combustors and balance of plant equipment.

Panels located outside of control rooms shall be NEMA 4X construction. Panels located inside control rooms shall be NEMA 12 construction.

7.9.1 Distributed Control Philosophy

An automatic combustion control system shall be provided which shall enable the Facility to process the refuse while maintaining a minimum amount of combustibles in the residue, and limiting the amount of air pollutants emitted to levels that comply with the Environmental Guarantees. The primary function of the combustion control system shall be to maximize combustion efficiency while maintaining the set master demand and individual furnace demand steaming rates. The automatic control scheme shall use multiple loops that change grate feed rates and forced draft and overfire air flows in order to maintain steaming rates with changing refuse characteristics. The automatic process control equipment for combustion control, monitoring, and optimization shall be located in the existing Control Room. The DCS shall perform the following, as a minimum, and have capabilities for expansion.

- Modulate combustion air total volume (forced draft and overfire air separately) in response to master demand and individual furnace demand signals (steam flow, furnace temp, CO)
- Modulate stoker/grate fuel feed rate and speed in response to master demand and individual furnace demand signals (with trim adjustment)
- Modulate air flow to each of the undergrate air plenum sections
- Automatically adjust combustion conditions (including auxiliary burners) to obtain a gas temperature of 1,800° F for a minimum of one second in a zone after the last overfire air has entered the combustion chamber. (This requirement may be verified during start-up by correlating with boiler first pass temperature
- Modulate induced draft fan to control furnace draft
- Modulate feedwater/control valves to control steam drum water level
- Monitor furnace/boiler train gas side temperatures and drafts

- Monitor boiler steam flow and ancillary steam flows

7.9.2 Control Room Instrumentation

A DCS shall be provided to control all furnace/boiler functions, APC control and balance of plant interface. The existing control panel for the furnace/boiler shall be removed, however, there are a significant number of motor controls hard wired to the panel that the Contractor may elect to utilize without replacing. The turbine-generator, and balance of plant panel will remain. The existing plant control system shall be converted to DCS. There shall be a minimum of four (4) display terminals located on an operators control console that each shall have the capability of controlling/monitoring any of the four processing lines and balance of plant equipment.

The system shall be designed with one DCU for each train and one for balance of plant monitoring, to operate and monitor the plant. Design of the system shall be such that upon power failure or hardware failure the plant fails to a condition allowing safe and orderly shut down. In case of DCS failure, the grate operation, combustion air fans, and I.D. fans, shall be transferrable to manual mode for shutdown of equipment. The system shall be provided with sufficient quantity of screens to accommodate the graphic display requirement described herein. The system shall have the capability to "scan" each point, at a minimum, every two seconds and provide appropriate alarms and indications of abnormal conditions. The system shall be capable of eliminating nuisance or maintenance alarms. Valves and setpoints shall be modified by plant operations personnel.

7.9.3 System Equipment

The DCS shall allow efficient, flexible data transmission to and from the DCU and a comprehensive data highway system shall be incorporated. DPU's typically provide processor capabilities suitable for executing complex distributed control functions. This degree of

processor power is required to accomplish the anticipated control functions. DPUs shall provide the necessary processor capability and in plant standardization communications protocols, and configuration languages. Modular industrial workstations, containing a minimum of four 21-inch CRT monitors, shall provide flexible mounting arrangements of workstation components. They shall allow users to configure DCUs tailored to the functional requirements of each interaction point in the plant. The modular workstation furniture shall incorporate a mix of equipment-workstation displays, input devices, processors, and data storage devices. The workstations shall support multiple-screen, real-time display software interactions. This combination shall allow workstation resources to be optimally allocated to meet changing day-to-day needs. Multiple-screen workstations shall enable comprehensive handling of more plant information in a coordinated fashion. Industrial automation software shall provide access to process data for use by plant operating personnel. The presentation of this data, in real-time or historic form, shall be handled by one set of programs and the acquisition of the data by another. The required software functions are listed below and the specific project requirements are discussed for each function.

All control room equipment shall be housed in NEMA 12 enclosures.

7.9.3.1 Data Collection

Input/output (I/O) "drivers" programs, that enable the data collection software to communicate with the hardware to which signals are physically wired, shall be provided. The intelligent microprocessor based controllers shall contain software to communicate directly with the workstations.

7.9.3.2 Data Compression and Storage

For proper process control, real-time data shall be rapidly read. The evaluation of trends and reporting shall be accomplished by averaging the real-time readings and storing the

averages. Typically, six- or ten-minute, hourly, daily and monthly averages shall be stored, with each of these time increments using the data from the next-shorter time period as its base. This feature is required to monitor long and short term trends and to facilitate fine tuning of operating strategies.

7.9.3.3 Alarm Handling and Logging

Alarms shall detect changes of state directly by monitoring a switch or contact, or through a calculation made by comparing an analog value with a preset limit. The software shall be capable of grouping alarms and categorizing or prioritizing them in order, to allow for efficient alarm management. A minimum of approximately twelve (12) groups shall be required to display and report alarms. This shall allow the operator to quickly identify related alarms caused by a single malfunction or event. Alarms grouped together shall be displayed simultaneously and shall show the associated alarm categories. The system configuration shall permit the operator to acknowledge multiple alarms within a specific group in one step. The alarm software shall be linkable with other displays so that acknowledging an alarm brings appropriate information and displays to the operator. The specific alarm groups for this project may include the following:

- One for each combustion train
- One for balance of plant function
- One for the Control Room

A minimum of five alarm categories shall be required. These categories shall be as follows:

- Events: These shall correspond to the lowest priority situations that must be logged but do not require operator intervention; (e.g., routine starting and stopping of equipment under automatic control).

- Operational Confirmation: This category shall include control strategies and system maintenance lockouts that require operator confirmation before execution.

- Low Priority Alarms: These shall be alarms that do not prevent system operation or threaten human safety.

- High Priority Alarms: This category includes alarms that threaten operation of the system.

- Critical Alarms: These alarms indicate a threat to human safety

7.9.3.4 Displays

Graphic displays are the focal point of any computer based system. Properly designed displays are intuitive and facilitate operator's understanding of, and response to operating conditions. The levels in the vessels shall be indicated by "filling" the symbol in response to changes in the value of the measurement, as well as displaying the value in engineering units. The fill color of both vessels and equipment shall change to indicate alarm conditions. The capability to link displays in both hierarchial and parallel arrangements shall allow operators to move quickly from screen to screen to obtain the information needed to make decisions. To allow rapid creation and modification of displays, a library of symbols shall be provided. Additionally, a set of templates for commonly used displays, such as controllers and trends, are required. Standard utility displays shall be available including "fill in the blank" templates for point definition, trend configuration, and report configuration.

The Contractor shall provide, at a minimum, the following displays for each furnace/boiler/APC line:

- Pressure/temperature profiles
- Mimic display showing equipment status
- Continuous emission data

7.9.3.5 Data Accumulation/Recording

The DCS system shall serve as an independent Data Logger that will have the ability to do the following:

- Retain all scanned data for seven days; Accumulate data and average every hour (rolling averages not permitted); and data shall be sampled a minimum 15 times/minute
- Retain hourly averages for up to 6 months
- Store data on diskette or compact disk (CD) in a manner to be read by a personal computer (PC) with the latest available Windows operating system
- Provide software for reading data on a standard personal computer
- Generate "user friendly" reports as required by plant engineering, applicable environmental regulations, and City of Tampa staff
- Provide trending information of data selected by staff in minutes, hours, and days
- Perform automatic back-up to tape and ability to read the tape
- Print alarms

7.9.3.6 Printers

Provide three printers with the necessary adaptors and cables:

- Color printer
- 132 column dot matrix printer for alarms
- Laser printer for reports

7.9.4 Distributed Control System Manufacturers

The DCS shall be one of the following:

- Bailey INFI 90
- Westinghouse WDPF
- Or equivalent to the systems above as approved by the City of Tampa

7.9.5 Field Instruments

Field instruments such as pressure transmitters, primary elements, and pressure gauges shall be hardened industrial units. Accuracies of instruments shall be a minimum of ±2 percent of full scale. Instrument installation, including its location, shall not compromise the stated accuracy. Instruments shall be manufactured by vendors such as: Fischer & Porter, Foxboro, ABB Kent-Taylor, Rosemount, Great Lakes and Johnson Yokagawa. All instruments shall meet NEMA 4X requirements unless used in a explosion proof area where NEMA 7 shall be used.

The Facility is subject to freezing weather, therefore, freeze protection shall be provided. All instrumentation supplied shall be suitable for operation from 20° to 140° F.

Marshalling panels shall be provided so that I/Os from field instruments, valve actuators and the motor control center I/O shall be connected to terminals in the field

termination cubicle of the marshalling panels prior to routing to the control room. A marshalling panel shall be provided for each train.

The Contractor shall furnish the minimum amount of instrumentation listed below for each processing line:

LOCATION (Multiple points as needed)	**Pressure**	**Temp**	**Level**	**Flow**	**Speed**	**Amps**
Combustion Air						
Forced draft fan	X	X		X		X
Air preheater outlet	X	X				
Under grate (all zones)	X	X		X		
Secondary air fan	X			X		X
Furnace/Boiler						
Feed chute (if water-cooled)	X	X				
Ram feeder (if supplied)		X			X	
Grate (at all zones)		X		X	X	
Lower header metal left side		X				
Lower header metal right side		X				
Steam drum metal top		X				
Steam drum metal bottom		X				
Flue Gas						
Furnace (multi point)	X	X				
Boiler inlet (multi point)	X	X				

LOCATION (Multiple points as needed)	Pressure	Temp	Level	Flow	Speed	Amps
Boiler 2nd pass inlet	X	X				
Boiler 3rd pass inlet	X	X				
Primary superheater inlet	X	X				
Secondary superheater inlet	X	X				
Economizer inlet	X	X				
Economizer outlet	X	X				
Scrubber inlet	X	X				
Baghouse differential	X					
Scrubber differential	X	X				
Scrubber outlet (multi point)	X	X				
Baghouse outlet	X	X		X		
Induced draft fan						X
Stack inlet	X					
Process						
Hydraulic oil pumps, discharge, reservoir	X	X	X			
Feedwater header	X	X		X		
Steam drum	X		X			
Saturated steam		X				
Primary superheater outlet	X	X				
Secondary superheater outlet	X	X		X		

LOCATION (Multiple points as needed)	Pressure	Temp	Level	Flow	Speed	Amps
Attemperator	X			X		
Steam to air preheater				X		

7.9.6 Balance of Plant Interface

All information and displays shall be developed for presentation on the control room work station CRT's. Balance of plant consists of all equipment other than "chute to stack" equipment and includes the following major systems:

1. Power Generation System
   - Turbine-Generator and Auxiliaries
   - Electrical Distribution/MCC
   - Cooling Tower/Fans
   - Circulating Water Pumps
   - Condensers, Main and Bypass (Dump)
   - Vacuum Pumps
   - 125V DC System
2. Condensate System
   - Hotwell Level Control
   - Condensate Pumps
   - Bypass Dump Condenser Drain Pump

- Low Pressure Feedwater Heater

3. Feedwater System
   - Deaerators
   - Boiler Feed Pumps
4. Water Treatment System (local control only but alarms to DCS)
   - Reverse Osmosis
   - Demineralizer
   - Storage Tanks
5. Chemical Feed Systems (local control only)
6. Compressed Air System (local control only)
7. Wastewater Treatment System (local control only) Tank levels and Alarms to DCS

7.9.7 Graphic Displays

The BOP electrical MCC controls and select indicators are located on the existing BOP panel in the control room. As these are hard wired switches, the Contractor shall have the options to retain these. Indicators, on/off lamps, and alarm panels shall interface with the BOP screen on the DCS system. The intent is not to replace the BOP panel, but to enhance the operators view of the various systems as needed. The Contractor shall furnish, in addition to furnace/boiler/APC lines, the following screens on the work station CRT's at a minimum:

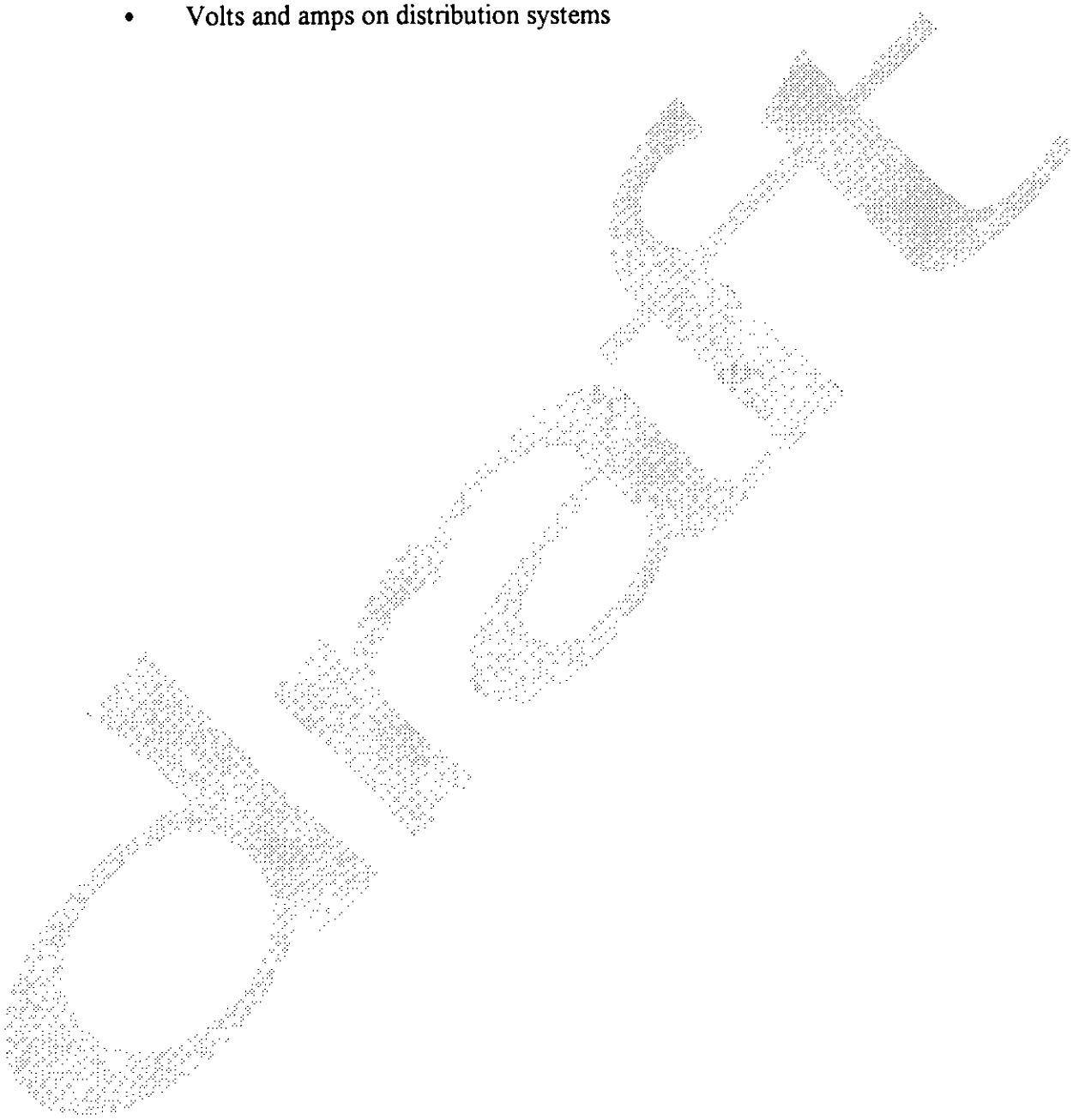
- Furnace/Boiler Systems (4)
- APC Systems (Scrubber-to-Stack)(4)

- Emissions Data
- Electrical Generation/Distribution System
- Steam Distribution System
- Condensate/Feedwater System
- Water/Wastewater Treatment System
- Lime Feed, Slaking, and Pumping System
- Ash Handling/Ferrous Recovery System
- Turbine-Generator Monitoring tie into and Monitor Existing System i.e. Bearings: vibration, temperature, oil pressures, Steam: inlet, 1st stage, extraction, exhaust temperatures, pressures, etc.
- NO_x Control System
- Carbon Injection System
- Remaining Auxiliaries

Each screen shall provide a schematic of the flow process showing major equipment and flow. The following lists the minimum information to be provided:

- Tank Levels
- Process Flows and Direction
- Flow Quantity and Temperatures
- Equipment Status Indication
- Alarm Indication
- Amperage of all motors 50 H.P. or over

- Volts and amps on distribution systems



7.10 AIR POLLUTION CONTROL SYSTEM

The existing APC equipment for each unit, consisting of an electrostatic precipitator, pneumatic fly ash handling system, ID fan, and common stack (two processing lines per stack) shall be replaced within the scope of the retrofit. The new equipment to be provided for each processing line shall include: scrubber, lime/carbon injection system, baghouse(s), a continuous emission monitoring system ("CEMS"), a selective non-catalytic NO_x reduction system, ID fan. A common single multi flued stack shall be provided. Reagent storage and handling systems shall be included. Separate APC systems and flue gas ducting shall be provided for each combustion train. Requirements for the CEMS and stack are provided in other sections of this Section 7.0.

7.10.1 System Description

Each processing train shall be furnished with a scrubber, baghouse, ID fan, and all necessary duct work and auxiliary equipment for removal of air pollutants. The APC system shall be designed and guaranteed to meet the Environmental Guarantees stated in the Retrofit Construction and Operations and Maintenance Agreements, at all operating conditions.

7.10.2 Acid Gas Control Equipment

The Contractor shall provide one (1), 100 percent capacity scrubber for each combustion train. The scrubber shall be designed with a separate flue gas discharge and a separate discharge for solid materials that may fall out in the scrubber.

The acid gas scrubbing system shall include: pebble lime storage silo, lime feeders, lime slakers, slurry storage tanks, slurry pumps, complete piping, either single point rotary atomizers or multiple nozzles for slurry spray, reaction chambers, heat insulation, process

controls, foundations, structural supports, platforms, access walkways, stairs, ladders, and other accessories for a complete operational system. The scrubber shall be designed to treat the flue gas as it leaves the economizer section of the boiler.

7.10.2.1 Reagent Storage/Feed Equipment

The following systems are minimum requirements and should be revised to meet the Contractor's operating protocol.

The Contractor shall provide all welded, pebble lime reagent storage silo(s) sized for minimum 10 days operation at nominal waste throughput. The Contractor shall use 90 lb/cu. ft. bulk density for structural calculations and 55 lbs/cu. ft. bulk density designed for volume sizing.

The silo shall be filled utilizing a dense phase conveying system. The silo shall be outfitted with the necessary ventilation system, dust filter system, truck fill panel and fill pipe, volumetric feeder with variable speed drive, controls and instrumentation, access hatches, ladders, cages and handrails to permit access, inspection and servicing in compliance with both State and Federal safety requirements. The silo shall have an activated bottom with all necessary vibrational isolators and cycle timing controls. The lower exit of the silo shall be designed so that the exiting pebbles can feed into either of the two slakers. The Contractor shall provide the necessary connections or valving for emptying the lime silos for maintenance. The Contractor shall include a statement defining the basis for sizing the equipment with the Proposal; stating the stoichiometric ratio and hourly lime consumption.

The following minimum equipment shall be provided: Two (2) 100 percent capacity volumetric feeders shall be provided (one operating, one spare). Each feeder shall be provided with an adjustable variable speed drive, complete with a speed control station mounted in the feeder control panel.

Two (2), 100 percent capacity lime slakers, each with the necessary feeders, dust aspiration system, electric motor drives, control and instrumentation shall be provided. The slakers shall be equipped with an integral grit removal system and necessary grit conveyors to allow grit discharge into the ash removal system, and deposited in the ash pit.

Two (2) slurry tanks shall be provided. Each tank shall be sized for a minimum twelve (12) hours storage at maximum slurry demand for all units. Each tank shall be provided with an agitator sized to maintain a uniform slurry density throughout the bottom 40 percent of the tank.

Three (3), 50 percent capacity slurry pumps shall be provided. Two slurry pumps shall provide the capacity to pump slurry to all scrubber units from the slurry tanks. One pump shall serve as stand-by. Pumps shall, at a minimum, be centrifugal type appropriate for slurry service with erosion-resistant (NiHard or equal) impellers and scroll liners or approved equal. Piping system shall be designed to maintain sufficient line velocities to prevent slurry particle fallout and avoid dead legs.

An automated (one push-button start) timed flush sequence for each lime slurry line shall be provided. All flush water shall be routed back to the slurry storage tank.

The equipment shall be arranged inside a suitable enclosure, with temperature protection if required, and to mitigate lime dust problems in other areas of the Facility. Suitable curbs and a trough(s) shall be provided for cleaning purposes in the slaker and slurry feed area. The following shall be provided in the various slurry storage and pumping levels:

- Eyewash fountain
- Safety shower
- Water hose connection
- Compressed air hose connection

The slurry piping system shall be designed so that each atomizing system can be fed from at least two of the individual pumps through a valving network. The slurry piping shall incorporate quick-connect fittings to allow flushing. Tees and crosses shall be used rather than elbows to facilitate mechanical cleaning. Piping shall include all necessary control valves and connections for the introduction of flush water. Slurry piping shall be arranged for pump recirculation back to either slurry tank.

Two (2) automatic multiplex strainers, to act as a final slurry filter at each pump, shall be provided. Inlet and outlet pressure gauges with in-line seals, high differential across strainer pressure switch, and local control panel shall be provided.

All necessary controls for the continuous automatic operation of the reagent system shall be provided. Dry lime shall be slaked on an automatic continuous basis. The ratio of dry lime and dilution water shall be held constant. Total slurry flow to the feed tank shall be controlled to maintain a constant feed tank level. The system shall be designed so that it is not necessary for operators to adjust the composition of reagent slurry over the complete operating range of the scrubber. A set of alarms shall be included to provide warning for all abnormal conditions of levels, pressures, temperatures, and flow.

An automatic switch over sequence shall also be provided for the pumps upon a low outlet pressure. Control panel(s) shall be NEMA 4X construction.

7.10.2.2 Rotary Atomizer

If a rotary atomizer is used, it shall be a modular unit. The rotary atomizer spray shall not impinge on or wet the walls of the reaction tower under any operating conditions. Each atomizer unit shall be equipped with a fully automatic, forced lubrication system with oil pump and alarm for oil flow failure. The atomizers shall have vibration monitors to detect bearing failure and/or rotary wheel buildup. The penthouse of each reaction tower shall be provided with an electric hoist with trolley capable of raising and lowering the complete

modular atomizer unit to the ground to facilitate an expedient change in the event of atomizer failure and transport between scrubbers.

7.10.2.3 Multiple Nozzle Injection

If the proposed system is of a multiple nozzle type, it shall utilize concurrent gas and slurry flow. The individual nozzles shall be easily accessible and the replacement time shall be no greater than one hour. The nozzles shall be designed to permit the flow of three fluids. The two primary fluids shall be for high pressure slurry and atomizing air. The third fluid shall be a low pressure air surrounding the nozzle to prevent clog up. Each nozzle shall be supplied complete with a pre-assembled nozzle probe. The nozzle probe shall be inserted through and bolted to a dryer vessel flanged penetration. Two spare nozzle probe assemblies (of each size) shall be provided. Nozzles shall have replaceable erosion resistant wear parts in all areas where the two primary fluids are mixed. Two spare sets of all replaceable wear parts for each nozzle shall also be provided.

Each nozzle shall have an individual manual slurry and compressed air shut-off valve. Each valve shall be connected with its respective nozzles using flexible hoses and reusable compression fittings, quick disconnect (or approved equal).

The Contractor must provide, with their proposal, a description of the means used to prevent nozzle plugging and external buildup (wings).

Air Compressors

If compressed air is utilized for the atomizers, the Contractor shall furnish and install all equipment necessary to provide a compressed air system with 100 percent redundancy. The compressors shall be of the oil-less, rotary screw type with automatic pressure regulation. Since energy consumption is of prime importance, the Contractor shall determine the most cost efficient means to provide compressed air.

7.10.2.4 Scrubber Vessel

The scrubber vessel shall consist of an inlet flue gas distribution head, reaction area and a 60 degree conical product collection hopper and side flue gas exit or approved equal. The vessel design shall include provisions for cleaning solids buildup within the vessel especially at the collection hopper. The flue gas residence time shall be no less than 15 seconds (at average flue gas temperature at nominal waste throughput capacity).

If an upflow vessel is proposed, the Contractor must provide two-point discharge and a complete description of the gas distribution and solids fallout handling system.

The collection hopper shall be provided with an air lock, vibrators and crushers. Each vessel shall be supplied with hinged access doors for the flue gas distribution head, dryer vessel above the conical hopper, and hopper. Hopper cones shall be fitted with striker plates and 4 inch diameter poke holes.

The dryer vessel shall be constructed of 1/4 inch minimum plate, A-36 carbon steel, externally stiffened to withstand the vacuum created by full shutoff capability of the ID fan. The structural design shall allow the maximum flue gas temperature throughout the scrubber unit.

7.10.2.5 External Access

A service platform and a penthouse shall be provided for each scrubber to provide maintenance access to the atomization equipment and feed controls. One (1) platform/penthouse, servicing all scrubbers, may be provided.

Floor drains shall be provided. The platform design shall prevent spill over of slurry or wash water down the sides of the scrubber from the penthouse area. The service platform area shall be provided with ventilation fans.

External access platforms and ladders to access vessel doors and for the hopper live bottom maintenance shall be provided. A stair tower or ladder to access the penthouse and all access platforms shall be provided and shall be designed for movement in three directions.

7.10.2.6 Insulation/Lagging

(Refer to Section 7.19.3)

7.10.2.7 Scrubber Control

The system shall be designed to operate continuously and automatically over a range of 50-110 percent of nominal waste throughput capacity conditions. The overall scrubber control system will be through the DCS utilizing the control room interface. Total slurry feed to the scrubber shall be controlled based on the SO_2 emission levels. SO_2 emissions shall be read by continuous monitor located at the outlet of each fabric filter.

The scrubber outlet temperature shall be controlled by varying the total slurry flow rate (by varying the amount of dilution water added to the slurry being pumped) to the atomizers.

The feed control system shall be designed to operate, maintaining the guaranteed SO_2 removal rate and guaranteed absorbent utilization rates at the maximum SO_2 concentration. In no case shall it be required for the operators to adjust the concentrations of the absorbent slurry.

All automatic process slurry and water modulating flow control valves shall be controlled utilizing a panel-mounted flow indicating controller (mounted in the main scrubber-fabric filter house control panel located in the main control room). All analog controllers and/or control stations are to be located in the main scrubber-fabric filter house control panel.

7.10.3 Baghouse

Each combustion train shall be equipped with a baghouse dust collection system. Each baghouse unit shall be designed to treat 100 percent of the flue gas leaving the acid gas scrubber and achieve the specified particulate outlet concentration required by the Environmental Guarantees stated in the Retrofit Construction and Operations and Maintenance Agreements.

Each baghouse unit shall be designed with a minimum of six compartments. Maximum air-to-cloth ratio, with one compartment offline for cleaning and one compartment offline for maintenance, shall be 4.0 to 1. Pulse-jet cleaning is specified hereinafter. However, reverse-air baghouse systems will also be acceptable given that it meets the performance requirements and general intent of this specification.

Baghouse compartments shall be completely independent from the gas flow to permit maintenance on any isolated compartment during full load operation of the plant.

The baghouse casing shall be of welded construction, except where impractical for access or maintenance. All seams shall be gas tight. Each compartment shall be furnished with one pyramidal shaped hopper. Baghouse shall be as selected by the Contractor for non-combustibility, abrasion and corrosion resistance, and overall durability. The baghouse shall be capable of operating at a continuous temperature of 525° F. The maximum allowable pressure drop across the baghouse shall be such that the overall pressure drop across the scrubber/baghouse does not exceed seven inches of water.

The baghouse shall be furnished with ladders, stair towers, platforms, and walkways in accordance with OSHA requirements and shall be designed for movement in three directions. Conveying equipment to convey collected particulate to the bottom ash discharger. The Contractor shall provide start-up bypass around baghouse if required.

7.10.3.1 Module Construction

The baghouse shall be designed so that bags may be removed from the "clean" side. A service platform with minimum width of 3 feet shall be included to provide access to the walk-in plenum.

Bag compartments shall be fabricated of 1/4-inch minimum A-36 steel plate stiffened to withstand -20 inch water guage ("WG"), or ID fan shutoff pressure (vacuum), whichever is more stringent. Compartments shall have a minimum of one, 20-inch by 48-inch access door at the tube sheet level.

Hoppers shall be fabricated from carbon steel plate with thickness of 1/4-inch minimum and shall have external stiffeners. The Contractor shall install abrasion resistant plating at the lower four feet of the hopper discharge throat. The hopper side angles shall not be less than 60 degrees from horizontal. The structural design, at a minimum, shall be based on an ash density of 90 pounds per cubic foot, with hoppers full of ash up to the bottom of the gas inlet. Each hopper shall be designed to support ash handling equipment in addition to the maximum loading of ash. Each hopper shall include the following: hopper vibrators, two, 4-inch minimum, capped poke holes on opposite sides near the hopper outlet and striker plates. Hopper outlets are to be 12-inch by 12-inch discharge flanges minimum.

Hinged access doors (20-inch by 30-inch minimum) shall be of quick open access design. One high ash level switch shall be provided for each hopper. Each remote electronic unit shall provide relay actuation on reaching high ash level. A separate high-level warning light is to be provided for each hopper. Thermostat controlled electric heating elements shall be attached to the outside surface between the hopper and the thermal insulation to maintain skin temperature sufficiently high enough to avoid condensation but not more than 280° F.

The baghouse roof shall be enclosed by a penthouse of sufficient height to allow for bag removal and maintenance (if designed for top removal). A gib hoist or similar means shall be provided to assist in access door removal.

7.10.3.2 Fabric/Cage Assembly

The fabric shall be capable of operating at a maximum continuous temperature of 525° F. The maximum bag length to diameter ratio shall be 28 to 1. The bag shall be installed without clamps, hold-down clips, studs, or nuts. A rigid stainless steel one-piece bag cage shall be provided for each bag. Bags shall be designed for a minimum life of 12,000 hours.

7.10.3.3 Fabric Cleaning

Bags are to be cleaned by pulse jet or reverse-air cleaning. Provisions shall be made for automatic on-line and off-line cleaning. Off-line cleaning shall occur by automatically closing the module outlet isolation damper. The Contractor shall provide adequate clean, dry compressed air at 90 psig.

Automatic controls shall be provided to clean the fabric on or off-line based on an automatic basis on initiation by:

- Timer
- High pressure drop
- Manual

All controls will be incorporated into the main system control panel in the Central Control Room and will be through the DCS.

7.10.3.4 Plenums

Each baghouse shall be supplied complete with a 1/4-inch minimum A-36 steel plate, externally stiffened inlet plenum and a 3/16-inch A-36 steel plate outlet plenum each stiffened for -20-inch W.G. pressure or the I.D. fan shutoff pressure (vacuum), whichever is more stringent. A poppet-type damper with air cylinder operator and limit switches will isolate the bypass duct from the outlet plenum.

7.10.3.5 Insulation

Each plenum shall be insulated and lagged in accordance with the requirements of Section 7.19.3.

7.10.4 Induced Draft Fans

ID fans shall be centrifugal, backward curved inclined blade, designed for continuous operation at 525°F in a dusty environment. Each boiler shall be equipped with an electrically driven ID fan. The fans shall conform to the following minimum requirements:

- Automatic controls with provision for manual capacity control
- Fan housing ASTM A 242 steel
- Rotor blades - ASTM A 242 steel, welded to both wheel cones and to scalloped center plate, with full width, welded replaceable ASTM A 242 wear liners
- Fans should be capable of withstanding temperatures of up to 525° F
- Shaft - SAE 1035-1045 steel
- Bearings - spherical roller type, grease lubricated, in split pillow blocks, mounted on independent steel pedestals (cast iron pedestals not acceptable)
- Cooling of bearings - shaft mounted heat slingers

- Fan speed not to exceed 1200 rpm
- Access doors - raised type on inlet boxes and fan scroll
- Insulation and lagging
- Test block capacity factors (over MCR) not less than:
  a. Capacity margin +15 percent
  b. Static pressure +30 percent
  c. Inlet temperature +50° F

7.10.4.1 ID Fan Drive

The ID fans shall be coupled to a constant speed electric motor drive with boiler draft control from the fan inlet dampers or the Contractor may, at its option, provide variable frequency drive.

The drive motor shall be TEFC outdoor duty with motor mounted blower. The drive horsepower shall be minimum 115 percent of the fan test block brake horsepower. The control system shall include positive acceleration on demand and deceleration by inertia.

7.10.4.2 ID Fan Inlet Dampers

The ID fan inlet housings (if ID fans not equipped with variable speed motors) shall be fitted with inlet dampers designed and manufactured for 525° F service. The dampers shall conform to the following minimum requirements:

- Blades - ASTM A-514 steel plates, air foil type, continuously welded
- Blade shaft bearings - bridge mounted with stuffing boxes
- Blade shafts continuous, C1020-1040 T.G.&P. steel
- External blade linkages - fitted with self-lubricating bronze bushings and stainless steel pins

- Damper operators - universal worm gear reducers with beveled gear attachments and limit stops

7.10.5 Breeching/Ductwork - General

The flue gas system shall consist of flue gas ducts from the economizer exit (450° F design) to the inlet of the air pollution control system, from the air pollution control exit to the ID fan, and from the ID fan to the stack. Included in the ductwork shall be all necessary stiffeners, supports, access ports, instrument nozzles and mineral wool insulation (or approved equal) with aluminum cladding and expansion joints. The design temperature shall be 525° F. Duct material shall be steel, ASTM A 242 with a minimum thickness of 1/4-inch, and shall be insulated and lagged in accordance with Section 7.19.3.

There shall be sufficient duct length between the economizer and the scrubber, and between the baghouse and ID fan to allow for installation of sampling equipment to perform air emission testing as defined in the Retrofit Construction and Operations & Maintenance Agreement. All necessary sampling ports shall also be provided. The design and construction of the Facility shall provide unobstructed access to these sampling ports.

7.10.6 Selective Non-Catalytic Reduction System

A Selective Non-Catalytic Reduction (SNCR) No_x emission control system shall be furnished and installed by the Contractor. The system shall be designed to inject ammonia into each of the furnaces. The Contractor shall provide all tanks, pumps, compressors, piping, instrumentation, and all auxiliary equipment necessary for a complete SNCR system. The SNCR system shall utilize either anhydrous ammonia, aqueous ammonia, or urea injection. The requirements for the applicable system are described herein.

7.10.6.1 Anhydrous Ammonia

The anhydrous ammonia storage shall be, at a minimum, a pressurized, horizontal cylindrical pressure vessel, sized for a minimum total effective storage of 10 days. The storage tank shall be designed, fabricated, tested, and code stamped per ASME Section VIII, Div. I requirements. The storage tank shall have pressure-relieving devices discharging ammonia at a safe location. The storage tank shall be located outside in a concrete dike sized to contain 125% of ammonia storage capacity. An earthen dike with appropriate containment provisions may be used if acceptable to state and local authorities having jurisdiction. Necessary fill connection(s), extended to the dike boundary, shall be provided. Ammonia detector tank pressure and appropriate local alarms shall be provided.

The vaporizers shall be hot water bath type, electric heated. One operating vaporizer and one spare shall be provided. The vaporizers shall be located within the diked area. Compressed air shall be used as atomizing or carrier media. Two 100 percent capacity air compressors (one operating and one spare) shall be provided. Air compressors shall be centrifugal or dry rotary type. Each compressor shall be provided with necessary instrumentation and control. The compressed air system shall be designed such that in case of loss of pressure, the spare compressor shall cut in automatically. Necessary level, pressure, and temperature indicators and transmitters shall be provided. The Contractor shall be responsible for complying with all OSHA regulations, reporting requirements, and safety planning related to using Anhydrous Ammonia.

7.10.6.2 Aqueous Ammonia

The Contractor may provide an aqueous ammonia injection system. The design shall include storage capacity of aqueous ammonia for 10 days, safe handling and transfer systems, instrumentation and controls, and injection system redundancy, as intended in the previous Section 7.11.6.1. Locations, quantity and orientation of injection ports shall be properly

coordinated with the boiler retrofit (Section 7.8). The ammonia storage tank shall be constructed of carbon steel, and shall be equipped with ammonia detection at four locations.

7.10.6.3 Urea

The Contractor may provide a urea injection based SNCR system. The design shall include storage capacity 10 days, safe handling and transfer systems, instrumentation and controls, and injection system redundancy, as intended in the previous Section 7.10.6.1. Locations, quantity and orientation of injection ports shall be properly coordinated with the boiler retrofit (Section 7.8).

7.10.7 Carbon Injection System

A carbon injection system shall be provided by the Contractor for the removal of mercury and VOC's. The design shall include storage capacity for 10 days. The carbon injection system shall be designed to inject activated carbon or similar product into the scrubber, flue gas ductwork, or lime slurry, before the baghouse. The system shall be designed to receive activated carbon delivered either by bulk bag or pneumatically from bulk tank trucks into a storage silo. The silo shall be provided with level instrumentation and a bin vent filter system.

Carbon product shall be fed in a controlled manner from the single storage silo into the injection system for each unit. One complete positive pressure pneumatic injection system shall be provided for each combustion train. Each injection system shall consist of the feeding device with air lock and seals and an air supply. Pneumatic transport shall be through pneumatic pipe and/or hoses. Sufficient blow out connections shall be provided to permit clearing the line quickly and clearly in the event of pluggage. Volumetric feeder and dosage counts (calibrated for weight) shall be provided for each unit. One installed spare feeder system shall be provided.

The Contractor may provide at his option, a wet slurry feed system to deliver activated carbon to the scrubber. The system shall be monitored through the Facility DCS, and it shall be capable of being started or shut down from the control room, through the DCS. Alarms shall be provided to indicate carbon feed hopper level, plugs in the transport line, and loss of air pressure. The carbon injection system shall be fully enclosed.

7.10.8 Stack

The existing two stacks shall be demolished and replaced by a new stack arrangement as described below.

7.10.8.1 Stack Design Requirements

The Contractor shall have an option of providing either one concrete stack with four separate steel insulated steel flue liners or a four dual-walled clustered steel stack. The stack(s) shall be designed and erected in accordance with "Steel Stacks" (ASME STS-1-92) as published by the American Society of Mechanical Engineers ("ASME") and "Minimum Design Loads for Buildings and other Structures" (ASCE-7-95) as published by the American Society of Civil Engineers ("ASCE") and in accordance with all other applicable codes and regulations. The liners shall be insulated with a minimum 2-inch thick fiberglass (8 lb/cu. ft. density). All exposed insulation is to be protected with box-ribbed aluminum lagging (minimum 0.032 inch thickness). Each line shall have false bottom sloped to a 4-inch size stainless steel drain. The top 10 feet of flue liners shall be of 316 L stainless steel (¼ inch minimum thickness). If a dual-walled clustered design is supplied, the outer shells may be laterally braced but shall have sufficient flexibility to allow for differential expansion. The liners shall be self-venting (i.e., no positive pressures) at all loads. The stack(s) shall include access platforms and ladders with stainless steel safety railings and cages, a test platform located at a point required by the testing procedures, test ports, access door at the base of

each flue, lightning protection and aviation lighting in accordance with the latest FAA requirements, and electrical service consisting of lighting and electrical receptacle at the sampling platform location and at the base. Exposed steel shall be sandblasted to SS PC-6 and coated with one coat of inorganic zinc primer (minimum dry film thickness (DFT) 2.0 - 3.0 mils). Finish coating shall be minimum two coats water-borne acrylic minimum DFT 6 to 8 mils. The location and number of sample ports in either the approaching ductwork and/or the stack shall be as required by Appendix § A of 40 CFR 60 and as required to conduct all environmental testing. The Contractor shall provide unobstructed access to all sample ports. The Contractor shall install caged access ladder with approved OSHA safety belt attachments and to the top of stack of maintenance. A 360° platform shall be installed for stack sampling steel if required. If the Contractor can demonstrate compliance with EPA required sampling port location guidelines without use of a sampling platform, then such platform shall not be required. Substantiation should be provided for such claim.

Technical Data

Stack design shall meet the following technical requirements:

- Top of stack elevation may not exceed 211' above mean sea level
- Stack height above base (10'): 201 feet
- Flue liner inside diameter: 4.2 feet maximum
- Minimum flue gas exit velocity: 66 fps at MCR
- Flue gas exit temperature: 290°F

All stack accessories, painting, and appurtenances, including breeching openings, shall be coordinated by the the Contractor.

7.11 CONTINUOUS EMISSION MONITORING SYSTEM (CEMS)

The Contractor shall provide a CEMS including all necessary equipment, instrumentation, and controls to continuously monitor the specified flue gas concentrations and opacity in each combustion train flue. All equipment shall be housed in an environmentally controlled CEMS building and installed and calibrated in accordance with manufacturers standards to meet the Environmental Guarantees.

7.11.1 General

The Contractor shall provide a microcomputer based CEMS for four boilers which shall measure visible emissions (opacity), CO, SO_2, NO_x, and CO_2 after the baghouses and O_2, SO_2 and CO_2 at the inlet of the flue gas scrubbers. The CEM system shall maintain calibration and generate periodic logs and reports in accordance with Appendix B of 40 § CFR 60 and permit requirements and formats.

The Contractor shall provide all software necessary for the correct operation, fault detection, automatic zero and span calibration, measurement unit conversion and report format programming. The computer system shall include magnetic media mass storage, internal hard disk drive, diskette drive, and compact disk drive.

The Contractor shall provide all necessary sample conditioning equipment including heat tracing and control panels suitably mounted and wired within local panels.

The Contractor shall provide all CEM panels and enclosures in accordance with the applicable NEMA classification.

The Contractor shall provide a printer complete with software required to generate all logs and reports to meet the requirements specified by the EPA in Appendix B of 40 CFR

60. The printer shall be mounted on a cabinet or console suitable for the storage and automatic feed of the printer paper.

The Contractor shall provide acceptance and certification by the State of Florida of the CEM design and hardware.

7.11.1.1 CEMS Shelter

A weatherproof, environmentally controlled (HVAC system) walk-in enclosure, to house the flue gas and opacity monitors and associated electronics, shall be provided by the Contractor. The Contractor may provide two separate enclosures to house CEM equipment completed during the phased retrofit. The shelters shall be completely prewired and tubed, self-contained monitor enclosures. Both enclosures should be complete with pull terminating field cables and umbilicals for connecting or disconnecting the enclosures. Base floor elevation of CEM shelters shall be a minimum of 6" above surrounding floor or grade.

7.11.1.2 Boiler Outlet Cabinet

A NEMA-4X enclosure to house the boiler outlet gas monitors and associated electronics shall be provided by the Contractor.

7.11.2 System Description

Each of the monitored emissions shall be recorded by a dedicated data acquisition system ("DAS") computer. Analog data shall be converted to digital and sent to the computer through an RS422 interconnection. The DAS computer shall provide isolated analog output to the plant DCS.

Dedicated gas conditioning systems to monitor SO_2, CO_2, CO, and NO_x emissions from the stack and SO_2 from the boiler outlet duct shall be provided for each boiler. The

necessary equipment, installation supervision, training program and guaranteed system certification for the systems shall be provided.

The sample gas conditioning system shall be supplied with a heated probe, heated course particulate filters and water removal system probes for the duct work. The probes shall be linked to the control/analysis equipment via umbilicals. The umbilicals shall be heat traced to maintain a minimum 100° C temperature. All materials contacting sample gases shall be hastelloy or Teflon. The system shall not cause pollutant or combustion gases to be lost to the analysis system by adsorption, reaction leakage or other mechanisms.

The probes are to be controlled via separate probe controllers for pressure, vacuum, and temperature (heated probes only). The Contractor shall supply and install an instrument air conditioning/drying system to provide clean, dry, pollutant-free air for the system.

Each boiler shall have an opacity monitor for measurement of opacity on a 0-100 percent range. These units shall be single/dual blower units. The transceiver shall be connected to a remote control unit via multiconductor cable. The DAS and opacity control units shall be located in the plant control room.

Zirconium oxide O_2 analyzers shall be provided for the purpose of combustion trim control for each boiler. The analyzers must provide O_2 readings on a dry basis. 4-20 mA outputs shall be provided at the boiler-mounted analyzer for customer connection to the plant DCS system.

The systems shall be automatically calibrated (zero and span) on a daily (24 hour) cycle basis and on demand calibration shall be provided.

7.11.3 Applicable Codes and Standards

The CEMS shall meet or exceed the requirements of Appendix B of 40 CFR 60 and permit conditions.

a. Performance Specification 1 - Specifications and test procedure for opacity continuous emission monitoring system.

b. Performance Specification 2 - Specification and test procedure for SO_2 and NO_x continuous emission monitoring system.

c. Performance Specification 3 - Specification and test procedure for O_2 and CO_2 continuous emission monitoring system.

7.12 RESIDUE HANDLING SYSTEM

The existing residue handling system shall remain in service during a portion of the retrofit while the existing furnace/boiler trains are in operation. The existing submerged drag chain conveyors shall be modified by the Contractor as necessary to facilitate the retrofit.

7.12.1 Ash System

The Contractor shall replace the existing residue handling system consisting of bottom ash drag chain conveyors and a ferrous recovery system. Ash management shall consist of the collection of ash from the furnace bottom ash discharger, grate siftings, boiler ash hoppers, scrubbers, baghouses, and ferrous metal recovery.

The ash handling system collects the post-incineration ash including: grate siftings, bottom ash, boiler fly-ash, scrubber residue and baghouse fly-ash. All of the ash shall be combined and quenched in each processing units furnace ash discharger and discharged into the ash conveyor system and transported to an enclosed ash management building for further processing and storage. The ash shall be removed from the ash discharger by means of a hydraulic operated pushing system. The Contractor shall specify water usage for ash residue quenching. Waste water, cooling tower blowdown, or boiler blowdown, shall be used for residue quenching.

The combined bottom ash and fly-ash from the ash discharger shall be discharged to one of two main residue conveyors and transported to the scalper building. One conveyor shall provide bypass capabilities by dumping into a roll off container in the scalper building. The second conveyor shall discharge onto a scalper where oversize material (+ 8 inches) falls into a roll off container or dedicated area for later transport. The minus 8 inch material shall

discharge onto a fully enclosed inclined belt conveyor for delivery to the ash management building for further processing.

Submerged drag conveyors shall not be permitted for the boiler ash. All conveyors shall be equipped with safety switches, safety stops (pull cords), and zero speed switches. The Ash Residue handling system design shall include provisions for future modifications and/or additions to provide for optional separate handling of fly-ash and bottom ash streams.

Stoker/grate siftings consist of residue that falls through the grate bars and into the under grate air plenums which is an integral part of the sifting hoppers. The composition of the stoker/grate siftings includes items such as: broken glass, dirt, molten aluminum, rocks, metal, water, oils, tars, etc. The sifting hoppers/air plenums shall be partitioned from other grate zones; therefore, and air lock or water seal is required to contain furnace gases and air pressures between the multiple under grate air plenums and the outside of the furnace. Air locks and hoppers shall be designed for 30 inch water gauge pressure. The siftings removal sequence involves submersion quenching of the siftings, removal be submerged drag conveyor or similar method, and mixing with the bottom ash.

The Contractor shall install, at a minimum, ash handling conveyors and equipment whose components have the following requirements depending on the system selected.

7.12.1.1 Vibrating Conveyor

Vibrating conveyors, if used, shall be natural frequency, balanced type, not requiring special foundations. Minimum design requirements shall be as follows or approved equal:

- Conveyor trough - 1/4-inch thick AISI 1020 steel
- Liners - 3/16-inch thick AR-240 steel
- Drive shafts - SAE 1141 cold drawn
- Drive motors - 1800 RPM fan-cooled, squirrel cage induction type; starting torque not less than 725 percent of full load value

Operating parameters:

- Stroke - approx. 2-inch
- Frequency - approx. 470 RPM
- Angle of attack - approx. 30 degrees
- Safety devices - overstroke proximity switches; zero speed switches

7.12.1.2 Belt Conveyors

The general mechanical design criteria to be used for belt conveyors and all mechanical equipment associated with conveyors shall be per CEMA. Mechanical component selection and number of components shall be the responsibility of the vendor. All conveyors shall be fully enclosed. The residue handling belt conveyors shall be designed for continuous operation to transfer materials at rates described without stalling, slipping or spilling. The belt conveyor speed shall be limited to 100 FPM. To minimize field work, all conveyors shall be shop assembled to the maximum extent possible. Shop assembly shall include structural steel support legs, chutes, idlers, and installation of conveyor components unless noted. All parts shall be provided with ample bearing surfaces and shall be of proper strength to ensure safe, reliable and economical operation. All parts shall be designed so that they can be easily assembled, adjusted and accessible for inspection and maintenance. ASTM standards as listed shall be used whenever possible for general materials, castings, and shafting. Bearings, couplings, etc. shall be as per AFBMA standards. All gearing shall be furnished according to AGMA standards.

All components shall be designed for ease of maintenance and minimal requirements for housekeeping. All conveyor designs shall aim toward eliminating potential material hangups, bridging, and spillage. No metallic portion of the conveyor structures, including chutes, shall be closer to the edge of the carrying or return belt than the distances specified

by CEMA. Minimum clearance for cleanup below the conveyor shall be 12 inches. Access to equipment shall be provided at each pulley and around all drives.

Motors shall be 460 volt/3 phase/60 hertz, TEFC. Motor horsepower shall be suitable for the intended service, and capable of fully loaded starting conditions. Motor/drive systems for similar equipment shall be standardized as practical to minimize spare parts inventory. Motor HP shall be calculated using the CEMA long form method. Instruments and controls shall be in accordance with control system requirements of this specification.

7.12.1.3 Screw Conveyors

Screw Conveyors used for the transport of boiler ash, fly-ash, scrubber ash and baghouse ash shall be designed as follows:

- The flighting shall be continuously welded on one (1) side to carbon steel pipe bushed for the proper size shaft. The carrying side of the outer periphery of the flights will be furnished with steady or equal hard surfacing.

- The troughs shall be of the flared style fabricated from minimum 7 ga. thick A-36 carbon steel. The trough covers shall be made from No. 10 gauge thick A-36 carbon steel. The trough covers and troughs shall be gasketed using closed cell neoprene held in place by bolts or removable clips. The conveyor troughs shall be totally enclosed and dust tight. The trough end seals shall consist of a gray iron on steel seal housing with waste pack type sealing material.
- All shafting shall be of C1018 carbon steel. The end bearings shall be of the sealed, anti-friction, ball bearing type. Intermediate support bearings shall be split replaceable wood bearings.

- Each conveyor shall be driven by an enclosed, fan cooled type motor. The motor shall be connected to an AGMA Class II, flange mounted helical gear reducer by means of v-belts and sheaves. The drive unit shall be complete with an OSHA approved v-belt guard. Each Conveyor shall be furnished with one (1) zero speed switch. Conveyors shall be electrically interlocked to provide correct start-up and shut-down sequence.

7.12.1.4 Scalper (Bulk Metals/Oversized Material Separation)

One 100-percent vibratory shaker shall be provided to remove oversize materials (+ 8" inches or larger). The shaker shall receive the combined ash discharge from the four furnaces, separate the oversize material, and discharge the oversize to a roll off container or bunker. The minus 8" inch fraction shall discharge onto a belt conveyor for delivery to the ash management building.

The shaker shall be provided with self cleaning capabilities. Shaker supplier shall provide electrical controls in accordance with Section 7.12.5 for start/stop/interlock protection and four spare auxiliary contacts for instrumentation/alarm connections. Electrical connections to shaker motors and instrumentation shall be designed for expected vibration of the shaker.

7.12.2 Fly-ash Collection

The fly-ash handling system shall include, but is not limited to, rotary or double flap air lock valves and screw conveyors, transporting the fly ash to the boiler ash dischargers. Fly-ash collection shall be provided to collect the boiler fly-ash, scrubber fly-ash and baghouse fly-ash. Screw conveyors for fly-ash systems shall have external mounted bearings for ease of maintenance.

7.12.3 Ferrous Metal Recovery

The Contractor shall provide a ferrous metals recovery system that shall be capable of recovering a minimum of 80 percent of the magnetic ferrous materials contained in the ash residue including ferrous metal removed by the scalper. The ferrous metals recovery system shall be located in the ash management building. The separation and recovery system shall include at least one permanent magnet, drum separator trommel or equal (finger screen), and one shaker table. The Contractor may, at its option provide a rotary screen for ash removal

from recovered ferrous materials. Transfer conveyors shall be provided as required to transport ferrous metals and remaining ash residue to separate storage bunkers.

7.12.4 Ash Treatment

The Contractor shall be required to continue treatment of the ash while the existing furnace/boiler trains are in operation. Ash generated from the retrofitted units will require testing and characterization to confirm compliance with applicable regulations. The Contractor shall be responsible for designing, installing, and operating a treatment system if so required. The Contractor shall meet all requirements to insure that ash is considered non-hazardous during initial demonstration test of the retrofitted units and subsequent operations.

Ash residue shall be handled, treated and disposed of in accordance with applicable regulations and permits. Ash residue leaving the Facility shall discharge no free moisture from the ash residue transport container. The Contractor shall incorporate into the design of the ash residue handling system and its materials of construction, adequate measures to ensure that the system shall operate continuously in both acidic and alkaline environments caused by the presence of the boiler/scrubber and baghouse residue.

7.12.5 Electrical

The ash handling equipment supplier shall furnish and install an MCC for this equipment to be supplied for installation in the ash management building described in Section 7.6. Electrical equipment, motors, wiring, instrumentation, and controls mounted on vibratory equipment shall meet the requirements of 7.13.

A programmable logic controller ("PLC") shall be used to provide sequence starting/stopping and interlock protection of conveying system. Conveyors may also be started manually in proper sequence. Maintenance keys shall be provided to prevent

accidental starting of equipment. The Contractor shall provide a mimic board of the process on the MCC.

7.13 ELECTRICAL DISTRIBUTION SYSTEM (SCOPE OF WORK)

The scope of the electrical work shall include replacement of the Motor Control Centers (MCCs) and interconnecting wiring (power and control) associated with the equipment provided as part of the Retrofit scope. All new MCCs provided for equipment furnished shall be of the same type and U.S. manufacturer and shall be designed for water tight conditions. MCCs shall be properly ventilated and provided with filters designed for the application. All equipment, cabling, raceways, and terminations shall be installed in accordance with all applicable codes and standards, the local authority having jurisdiction, and the manufacturers specifications. Spare or replacement parts for all electrical equipment furnished shall be readily available (within 48 hours) in the Tampa, Florida area.

7.13.1 Existing Electrical Systems

This section describes the following existing electrical systems:

- The interconnection system between the Facility and TECO, includes the outdoor switching substation consisting of circuit breakers, metering and 13.8 kV/69 kV power transformer and equipment, all associated protection and synchronizing equipment, and the transmission feeders between switching station and the TECO transmission line including three-phase current limiting reactors
- 13.8 kV system consists of synchronization equipment, generator breaker, 13.8 kV-4.16kV station service transformer, non-segregated phase bus, and associated relays and metering
- 4.16 kV system for auxiliary services consisting of 4.16 kV switchgear, 4.16 kV motors, and associated starters

- 480 volt system consisting of the 480 volt switchgear, the 4.16 kV/0.48 kV power transformers, motor control centers, electrical motors, and relay protection
- Indoor relay and control switchboards for the plant's electric systems
- 125 volt DC system consisting of 125 volt DC battery, charger, and the DC distribution switchboard
- Cable and wiring system, raceways, cable trays, and rigid galvanized steel conduits

7.13.2 Electrical System Design, Installation, and General Requirements

7.13.2.1 Design

The electrical system shall be designed and installed in accordance with the National Electric Code (NEC) and all other applicable codes and regulations. The Contractor shall design the system with special emphasis as to the Facility location and environment. (seaside location, lightning, humidity, rainfall, and chemical attack from the process)

When located in high alkalinity atmospheres and other corrosive environments, the material used for raceways, cable trays/covers, junction boxes, supports, etc. shall be PVC coated and in conformance with the NEC. In addition, for areas where the potential exists for falling debris, hot materials, or fluids, etc., permanent matching aluminum covers shall be installed.

Raceways for feeders for switchgear MCC's and major equipment shall not penetrate floor or exterior grade except directly under said equipment. MCC's, 4.16KV load centers and transformers, etc. shall be installed on 12" high concrete housekeeping pads. Where located in high alkalinity atmospheres, corrosive environments and exterior locations, enclosures shall be stainless steel, NEMA 4X. The minimum elevation of this equipment shall be no less than 12 inches above the flood plain elevation prescribed for this Facility.

7.13.2.2 Motor Control Centers

The Contractor shall remove the following MCCs:

- Incinerator No. 1, MCC #1NHA11
- Incinerator No. 2, MCC #2NHA12
- Incinerator No. 3, MCC #3NHA21
- Incinerator No. 4, MCC #4NHA22
- Precipitator A, MCC #9NHA32
- Precipitator B, MCC #9NHA42
- ID Fans, MCC #9NGA50

The Contractor shall provide, at a minimum, the following new MCCs:

- Furnace/Boilers/Combustion Air Fans
- Air Pollution Control Equipment
- Ash Handling System
- Induced Draft Fans
- Ash Management Building
- Maintenance/Warehouse Building
- CEM's Shelter and Equipment

The Contractor shall remove and provide a new enclosure for the Cooling Tower area MCC #9NHA41 and the adjacent main feeder pull box.

7.13.2.3 Uninterruptible Power Supply System (UPS)

The Contractor shall furnish and install an Uninterruptible Power Supply (UPS) system to power the DCS and Instrumentation System to provide monitoring and control of critical plant functions during power interruptions. The system may be coordinated with the existing 125V DC system.

7.13.2.4 Grounding/Lightning Protection

The Contractor shall perform tests on the existing ground system and upgrade as required necessary for the retrofit. The system shall include grounding of buildings, electrical equipment, metallic raceways, mechanical equipment/structures, DCS, the lightning protection system and the existing substation/fencing. The system shall consist of copper conductors, copper ground rods and welded (exothermic reaction) connections. The DCS system, including DCU, DPU, and marshaling cabinets, shall be installed with an isolated insulated ground which connects to a certified testwell/grounding rod and is connected to the main grounding grid at one location only.

7.13.2.5 Communications System

The Contractor shall install a communications system throughout the Facility that shall be capable of providing immediate emergency instructions and general communication services. The communication system shall be installed in dedicated conduit runs and, at a minimum, shall be capable of providing 2-way communications from the control room to the following areas: steam drum elevation, boiler ash elevation, APC control house, CEM shelter, ash management building, turbine deck, boiler feed pump area, water treatment area, Facility entrance gate, tipping building, and the shift supervisor's office.

7.13.2.6 Closed Circuit Television System

The Contractor shall install a closed circuit television system for surveillance of plant activities by the control room operators. The system, at a minimum, shall provide viewing of the entrance gate area, tipping floor/receiving area, charging hoppers (4) feed area (at charging floor elevation), stoker combustion process (4), and ash management area (ferrous removal). This system shall have the capabilities consisting of zoom, pan and tilt with scanning, automatic iris control, and be provided with appropriate weather protection/harsh conditions appurtenances.

7.13.3 Temporary and Interim Electric Work

The Contractor shall provide temporary, electrical services required for construction of the Retrofit, including all fees to the Tampa Electric Co., Inc. (TECO) for their work associated with such electrical services and connections. TECO energy charges shall be paid for by the Contractor.

The installation shall conform to the requirements of TECO and shall include poles, post, fence, grounding, terminations, meter cabinets, meter and secondary feeder and branch wiring and conduits, circuit breakers, panel boards, lights, wiring devices, wiring, motor connections and supports.

The Electrical continuity to equipment remaining, temporarily or permanently, shall be maintained. For example, existing ID fans shall be provided with existing 480V load center/MCC services until new 4,160V switchgear supplies power to the new ID fans.

The Contractor shall insure the integrity of the grounding system and lightning protection system is maintained during all phases of the retrofit.

7.14 POWER GENERATION SYSTEM

This section describes power generation system components that require maintenance/repair during the Interim Operations of the Facility. The repair/replacement cost of these systems shall be included in the Proposal Form specific to this Section.

7.14.1 Turbine-Generator

The Contractor shall determine the appropriate time to perform (as a part of Interim Operation) the next 5 year overhaul/inspection of the turbine-generator (T-G) in conjunction with retrofit outages (currently scheduled for November 1999). The Contractor shall review the General Electric T-G inspection report dated November 1994 and schedule the General Electric recommended repairs for the next outage during the retrofit Construction. The turbine has three extraction points. The non-return valves on each extraction shall be rebuilt.

7.14.2 Surface and Bypass Condensers

The Contractor shall (prior to the completion of the Retrofit) perform a detailed inspection and cleaning of the condensers. It is anticipated that this will be performed during the T-G overhaul/inspection outage but shall be performed prior to the completion of the Facility Retrofit. The Contractor shall plan and budget for any anticipated repairs that may be necessary to ensure that these components will be able to handle, at a minimum, their original design capacity.

7.14.3 Circulating Water System

The Contractor shall (prior to the completion of the Retrofit) perform a thorough inspection of the circulating water system and perform the following repairs and maintenance tasks on the cooling towers at a minimum.

- Clean basins
- Repair and, if necessary, replace the cooling tower fill/pack material
- Clean distribution nozzles/replace damaged nozzles as necessary
- Replace flange gasket as needed on inlet isolation valves on top of the tower
- Replace deteriorated wood structures
- Clean, adjust, and balance cooling tower fans

7.14.4 Condensate System

The Contractor shall (prior to the completion of the Retrofit) inspect pumps, valves, controls and perform repairs as required to minimize condensate loss and maintain operational integrity of system. Condensate system losses through pumps, valve shaft seals, leaking valves and steam traps shall be repaired.

7.14.5 Feedwater System

The Contractor shall (prior to the completion of the Retrofit) inspect pumps, valves, controls and perform repairs as required to provide for continual reliable service of system. Valves with tag numbers V 029 and V 031 (both 4 inch) currently installed with temporary repairs shall be replaced. Provisions for connecting new furnace feedwater and boiler feedwater system shall be provided.

7.14.6 Feedwater Heaters

The Contractor shall perform a detailed required inspection and cleaning of feedwater heaters and storage tanks during outage. The Contractor shall plan and budget for any anticipated repairs that may be necessary to ensure that these components will be able to handle, at a minimum, their original design capacity

7.14.7 Main Steam Piping, Valves, and Supports

The Contractor shall (prior to the completion of the Retrofit) resize and replace any piping and valves that are deemed necessary by the Contractor to meet the technical requirements of this Section 7.0. The Contractor shall repair or replace existing valves in superheated steam service V 043 (8 inch steam) and V 048 (3 inch steam) during Facility outage. (These valves were temporarily repaired using an on-line system to stop steam leaks.) The Contractor shall also replace any additional valves or flanges, in which temporary repairs were made, that are discovered during the retrofit. The Contractor shall affix a 1.5 inch diameter stainless steel tag with the corresponding P&ID tag number stamped on the tag with 3/8 inch high letters on all existing valves and instruments added as part of the retrofit or on unmarked valves discovered during the retrofit.

The Contractor shall (prior to the completion of the Retrofit) inspect all piping, flanges, valves, steam traps, controls, instrument connections, and insulation and perform repairs as required to minimize steam and heat loss, provide personnel protection, and maintain operational integrity of system. All spring supports shall be checked and adjusted for proper loading after thermal stress and static loading calculations have been performed. New piping installed shall conform to all applicable codes and standards as per Section 7.19.2. All steam and feedwater piping and valves shall be insulated/lagged as per Section 7.19.3. Uninsulated steel piping shall be properly surface treated and painted as per Section 7.23.

7.15 WATER TREATMENT SYSTEM

The existing water treatment system is comprised of a two step system. The first is a reverse osmosis system which pre-filters the incoming City potable water and second, a demineralizer rated for 60,000 gallons (nominal) capacity at a flow rate of 50 GPM. The quality, capacity, and reliability of this system shall be evaluated to meet the Retrofitted Facility requirements.

7.16 CHEMICAL FEED SYSTEM

The existing boiler chemical feed system including pumping and metering equipment, may be reused, relocated or replaced at the Contractor's option. The chemical feed system shall be protected by a framed structure and provided with a metal roof. This system shall be accessible by fork truck and shall have a minimum storage capacity for four 55 gallon drums and associated pumping/metering equipment.

7.17 FIRE PROTECTION SYSTEM (ABOVE GRADE)

The retrofit includes the reviewing, designing, furnishing, installing, cleaning, inspecting, testing, start-up (commissioning), and certifying the existing Fire Protection System and supplying new systems as defined herein.

7.17.1 General

The following Fire Protection System equipment covered by this specification may be installed either indoors or outdoors in the open atmosphere providing that the piping, meters and valves meet the environmental conditions and have the necessary, applicable protective coating system. Installation of piping, fire dampers, equipment and materials shall be accordance with manufacturers recommendations and standards. The Fire Protection System documents are to be used in conjunction with the architectural documents and with any other related technical performance specifications in this RFP. All Fire Protection System installations and materials shall be in strict accordance with the current edition of the Standard Building Code, NFPA Standards, all local ordinances, State of Florida and Federal codes, regulations, and Local Authorities having jurisdiction over this project.

7.17.2 Existing Fire Protection and Alarm System

The Contractor shall perform inspection, testing and maintenance on the entire existing fire protection systems pursuant to NFPA requirements and Local Authority having jurisdiction.

The existing fire protection system consists of the following:

- Existing fire mains and fire hydrants
- Automatic deluge system for the cooling tower
- Standpipe and hose stations
- Portable CO_2 and dry chemical extinguishers
- Turbine area fire protection system including main turbine bearings
- Halon 1300 fire suppression system for the cable spreading room area
- Two water cannons for the refuse pit area
- Fire protection system booster pump for the water cannons
- Associated piping, valves, instrumentation and controls
- Tipping Building sprinkler system
- Refuse Pit Building sprinkler system
- Main Plant Fire Alarm System
- Chemical Storage Building Fire Protection Sprinkler System
- Administration Building partial sprinkler system (lower level)
- Main and Auxiliary Transformer Deluge System
- Turbine Area Emergency Shower and Eyewash Stations
- Receiving Warehouse Building Fire Alarm System

The Fire Protection System can be identified in its graphical schematic form on P&I Diagram Fire Protection System, Bechtel drawing number M74-KC01, Revision 2, 6-25-84,

Commercial Fire Protection and Communications Fire Alarm System Drawing 6123-D, Revision 1, 6-4-92, and the Hartford Steam Boiler Inspection and Insurance Company Fire Protection Diagram, Drawing, Number D0220-1, Revision 2, 9-27-89. All referenced drawings are located in the Project Library or available from Florida Reprographics.

7.17.3 New Installation

The Contractor shall locate all new equipment which must be serviced, operated or maintained in fully accessible locations. Equipment shall include (but not be limited to) valves, shock absorbers, traps, cleanouts, fire dampers, pumps, motors, controllers, switchgear and drain points. The Contractor shall provide vibration isolators for motor driven mechanical equipment as recommended by the equipment manufacturer unless specifically noted otherwise. The Contractor shall provide for expansion of piping. Use expansion loops, anchors, guides, expansion joints, etc. as required. The Contractor shall offset piping below floor slab to avoid footing penetrations. Cutting and patching shall be minimized.

The Contractor shall provide additional sprinkler systems for the new buildings and equipment as required.

7.17.3.1 Hydrants

The Contractor shall provide additional hydrants near the new maintenance/warehouse and ash management building and other areas as required.

7.17.3.2 Fire Alarm System

TheContractor shall upgrade or replace the existing fire alarm systems in accordance with NFPA and insurance requirements.

7.17.3.3 Fire Pump

The Contractor shall upgrade the existing fire pump system as may be required to meet NFPA and insurance requirements.

7.17.3.4 Control Room

The Contractor shall provide a double interlock preaction system with heat detectors (135°F) and quick response automatic sprinklers with frangible glass ampules rated at (155°F) to replace the existing Halon 1300 fire suppression system in the raised cable spreading room area in the control room.

7.17.3.5 Standpipes

The Contractor shall provide standpipe and hose systems as required by NFPA and insurance requirements.

7.17.3.6 Sprinkler System

The Contractor shall provide, at a minimum, sprinkler systems for new buildings as may be required by NFPA and insurance requirements.

7.17.3.7 Portable Fire Extinguishers

The Contractor shall furnish and install portable fire extinguishers as required by NFPA and insurance requirements.

7.17.3.8 Miscellaneous

The Contractor shall furnish and install all other components not specifically mentioned herein, but necessary for the proper operation and maintenance of the fire protection system equipment.

7.17.4 Temporary and Interim Fire Protection System Work

The Contractor shall provide temporary, fire protection services required for construction of the retrofit, including all applicable federal, state and local fees for their work associated with such services and connections if any are required. Any temporary or interim Fire Protection System installations required shall conform to the same codes, regulations and requirements for a permanent Fire Protection System.

7.17.5 Reference Documents

Reference Documents include all Code and Standards identified in Section 7.1.3 plus other applicable drawings, specifications and other documents identified in the RFP.

7.18 WASTEWATER REUSE AND TREATMENT/PLATFORMS/LADDERS

A new wastewater collection and treatment system shall be provided or the existing wastewater treatment system modified to meet the wastewater discharge quality limit for the retrofitted Facility. The Facility wastewater system shall be designed to maximize reuse to reduce discharges of wastewater. The Contractor shall include in his design, specific restriction of discharge of ash contaminated storm water. All storm water collected in the "Boiler - APC leachate collection area" as shown on Sheet C-4 (the Paving, Grading, and Drainage Plan in Appendix H of this RFP) shall drain to a 10,000 gallon below ground concrete storage basin. This water shall serve as primary make-up quench water for the boiler bottom ash discharger and scrubber cooling water. The basin shall have provisions for removing sediment. The below ground basin shall be designed with removable double weirs and shall slope to grade to provide front end loader access for cleaning. A fixed handrail shall be installed on three sides and a removable or hinged handrail shall be installed at the area sloped to grade for loader access.

An above ground storage tank shall be designed and installed by the Contractor to store water that is discharged from the two vertical submerged grinder pumps installed in the APC-leachate collection basin. No leachate water may be discharged off site.

7.19 MECHANICAL

7.19.1 Heating/Ventilation/Air Conditioning Systems (HVAC)

7.19.1.1 General

The Contractor shall clean and provide maintenance/replacement as required on existing HVAC systems pursuant to NFPA and ASHRAE requirements. The Contractor shall provide vibration isolators as recommended by equipment manufacturers and provide allowance for piping expansion. The Contractor shall provide energy and ventilation calculations based on shop drawing layout and design criteria for new installations. Where ceiling space is used as a return air plenum, the Contractor shall follow all applicable codes as to materials allowed for use in air plenums. The Contractor shall provide adequate return air out of all spaces back to the appropriate air handling unit. The Contractor shall provide security barriers or fire dampers as required by the type of construction. Return air velocity through openings shall not exceed 500 feet per minute if required.

The ambient temperature in each room shall be maintained between 70 and 76°F for air conditioned spaces, but in no case shall the temperature within any equipment cabinet be allowed to exceed manufacturers' recommendations. All design work must take into consideration the potential for extraordinary dust and odor control requirements.

7.19.1.2 Existing HVAC System

The scope of this section shall cover the maintenance/repair/modifications of existing HVAC Systems as required by the retrofit. The existing HVAC Systems consists of the following:

- Administration Offices Split HVAC System
- Showers/bathroom Ventilation System
- Break room HVAC Split System
- I&C Shop Split HVAC System
- City Engineer's Office Wall Unit
- Sample Room Wall Unit
- Receiving Warehouse Storage Facility Office Wall Unit
- Clerks Office adjacent to Sample Room Wall Unit
- Toilet Exhaust Fans in Administration Building
- Machine Shop/Maintenance Shop Wall and Split HVAC System
- Conference Room HVAC Split System
- Main Control Room HVAC Split System
- Battery Room Ventilation
- Crane Electrical Control Room Air Conditioning and Ventilation
- Electrical Switchgear Room Ventilation
- Reverse Osmosis Building Ventilation Fan
- Turbine/Generator Island Mezzanine Level Switchgear/Load center Room Ventilation
- Turbine/Generator Island Mezzanine Level Equipment Ventilation Fans
- Precipitator Control Rooms (2 window units)

- Elevator Equipment Room Fan
- Hydraulic Pump Room Ventilation Fan
- Fabrication Shop Ventilation Fan

The Contractor shall test, clean and repair existing HVAC equipment to meet the ventilation requirements of the Facility.

7.19.1.3 New HVAC Installation/Design Requirements

New buildings requiring HVAC Systems are as follows:

- Maintenance/Warehouse Building
- Ash Management Building
- Electrical MCC Rooms added for retrofit
- Continuous Emission Monitor Shelters

7.19.1.3.1 Maintenance/Warehouse Building

The Contractor shall design, furnish, and install new HVAC systems for the new maintenance/warehouse building. Air conditioning and heating shall be provided for the offices, lunchroom, locker room, and store room.

7.19.1.3.2 Control Room

The Contractor shall design, furnish, and install a new, Liebert or equally approved HVAC split system for the control room with associated controls, piping, ductwork, etc. HVAC system shall utilize a positive room pressure design with outside air and appropriate building pressurization techniques to control odor.

7.19.1.3.3 Conference Room

The fourth floor of the east side of the operations building contains the conference room, training room, kitchen, restroom, and adjacent motor control center room for the refuse cranes. This area often has an odor from the refuse storage pit due to the unbalance and location of the HVAC system and ventilation requirements of the MCC.

The Contractor shall design and install a HVAC system to insure an odor free environment is maintained at all times in the conference room and adjoining areas.

7.19.1.3.4 Facility Load Center

The Contractor shall install a new ventilation system for the Facility load center and adjacent storeroom located on first floor of operations/administration building.

7.19.1.4 Temporary and Interim HVAC System Work

The Contractor shall provide temporary HVAC services required for construction of the retrofit; e.g., control room during retrofit activities.

All temporary or interim HVAC system installation shall conform to the same codes, regulations and requirements as the permanent HVAC system, and shall be approved by the local authority having jurisdiction. Temporary work includes the following equipment but is not limited to ductwork, fire dampers, meters, valves, piping, pumps, generators, connections and supports.

7.19.1.5 Reference Documents

Reference Documents include all Code and Standards identified in Section 7.1.3 plus other applicable drawings, specifications and other documents identified in this RFP.

7.19.2 Piping and Valves

7.19.2.1 General

The scope of this section shall cover the General Piping Systems work consisting of reviewing, designing, detailing, fabricating, furnishing, installing, erecting, cleaning, inspecting, testing, start-up, certifying, operating and maintaining all necessary piping, valves and equipment during the Retrofit Construction and O&M Agreement. The Contractor shall be responsible for providing the piping systems associated with any retrofitted or replaced equipment and when existing piping is not reused. Determination of suitability of reuse of any existing piping shall be the sole responsibility of the Contractor. This Section excludes process piping that falls within the ASME Boiler and Pressure Vessel Code jurisdictions.

7.19.2.2 Existing Piping Systems

The existing piping systems affected by the retrofit are:

- Main Steam Piping
- Waste Neutralization
- Feedwater Piping
- Condensate Piping
- Service Water
- Compressed Air
- Fire Water
- Boiler Vents & Drains
- Boiler Chemical Feed

- Boiler Blowdown

7.19.2.3 New Piping Systems

New piping systems to be added during the retrofit are:

- Leachate Storage/Pumping System
- Lime/Slurry Piping
- $DeNO_x$ Piping System
- Activated Carbon Injection System
- CEM's Sampling System

7.19.2.4 Document Submittals

The Contractor shall submit to the City a table and list (Piping Systems Schedule and Service Index) for all piping associated with the retrofitted Facility. The table and list shall include identification nomenclature of each piping system, size, design and operating conditions, materials of construction, protective coating system, insulation requirements, gasket type, joint system, any special conditions and reference standards associated with the piping components.

7.19.2.5 Design/Fabrication/Installation

The Contractor has responsibility for designing, fabricating, installing, erecting, testing, and start-up of all piping systems. When new piping is connected to an existing piping system, the entire piping system shall be inspected and tested in accordance with all applicable codes and regulations.

Design pressures and temperatures of various piping systems shall be selected based on their operating conditions with the appropriate design margin. Piping systems shall be designed for proper drainage, venting, flow velocities, and supporting systems. Piping loads

shall not be transferred to connected equipment. The Contractor shall provide for thermal expansion of piping and use expansion loops, expansion joints, anchors, guides, etc. as required.

The Contractor shall install all piping systems and components in accordance with all applicable codes referenced in Section 7.1.3. All Facility piping systems shall be clearly identified with the conveying fluid and flow direction per applicable standards.

7.19.2.6 Welding

TheContractor shall perform all welding in accordance with all applicable codes and Standards referenced in Section 7.1.3. All welding processes and electrodes used shall be in accordance with the Contractor's Quality Assurance/Quality Control Plan Procedures approved by their insurance carrier. All welders shall be prequalified prior to commencement of any welding.

7.19.2.7 Quality Assurance/Quality Control/Records

The Contractor shall be responsible for the quality of material furnished and services to meet the requirements of this specification and applicable codes and standards. The Contractor shall maintain a Quality Assurance/Quality Control (QA/QC) Program throughout the design, fabrication, installation, cleaning, testing, and acceptance of all systems.

The Contractor shall maintain records of all hydrostatic testing, non-destructive examinations, material test reports, weld certifications, heat treatment records and fabrication reports. These records shall be available for inspection by the City, or it's authorized representative.

7.19.3 Insulation of Piping and Equipment

The Contractor shall furnish and install insulation and lagging in accordance with the manufacturer's recommendations. Insulation shall be provided for personnel safety and to limit heat loss in the thermal systems. Insulation and lagging shall be added where required to all surfaces to limit the exposed metal temperature exceeds 130 degrees F at 90 degrees F still ambient air temperature. Pipe insulation shall conform to Pipe Insulation Thickness Table specified herein for types and thickness. Insulation shall not be applied to piping and equipment until pressure testing of each system has been completed. The insulation and lagging of equipment and piping systems including valves (at a minimum) is a follows:

- Furnaces/Boilers/Hoppers
- Scrubbers/Hoppers
- Baghouses/Hoppers
- ID Fans
- Air Preheaters
- Heated Duct Work
- Steam Piping
- Feedwater Piping
- Boiler Vents & Drains
- Extraction Steam Piping
- Condensate Piping
- Boiler Blowdown Piping
- CEM's Sampling System

7.19.3.1 Piping Insulation

All insulation shall be applied over clean, dry surfaces, with all joints firmly butted together. The pipe or equipment surfaces shall be cleaned by brushing off all dirt and wiping off oil, water and foreign matter before any insulation is applied. All insulation shall be protected from moisture before, during and after installation. Insulation which does become wet shall be dried out. All insulation shall be continuous through wall and ceiling openings and sleeves.

Insulation on all cold surfaces where vapor barrier jackets are used shall be applied with a continuous, unbroken, vapor seal. Hangers, supports, and anchors that are secured directly to cold surfaces shall be adequately insulated and vapor sealed to prevent condensation.

All piping with insulation shall be covered by a minimum of 0.016" thick aluminum lagging, at a minimum. Piping insulation thickness should follow the values provided in the following Section 7.19.3.3.

7.19.3.2 Equipment Insulation

All exterior equipment, ducts and fans shall be covered with a minimum of 0.020 inch matte finished corrugated aluminum to meet architectural finish requirements established in Section 7.4. All interior lagging shall be 0.020 inch matte finished aluminum lagging. Any roof surface shall be designed as a walking surface. All furnace, boiler, scrubber, baghouse, and silo roofs shall be provided with roof drains that drain the collected rain water away from the leachate collection basin.

All joints and flanges shall be constructed to prevent water infiltration. Access doors, maintenance panels, instrumentation penetrations, and ash handling equipment shall be provided with snap connect removable panels to allow ease of access and replacement.

Insulation shall be mineral wool block or fiberglass blanket, applied directly onto the exterior casing. Stiffeners and other structural members attached to the casing shall be wrapped with insulating blanket. Lagging shall consist of aluminum panels that match the architectural theme of the Facility excepting for the equipment roofs. Roof insulation shall be protected by corrugated galvanized sheet metal gauge panels supported by purlins. Panels and purlins shall be designed for a minimum 50 pounds per square foot live load. Roof shall be designed to collect and route rain water to an area outside of the leachate collection area.

Preassembled insulated panels resulting in air space between insulation and reaction tower casing are not acceptable.

7.19.3.3 Pipe Insulation Thickness Table

PIPE INSULATION THICKNESS (INCHES)						
		PIPE SIZE (inches)				
Service	Material	¼ - 1-¼	1-½ - 3	4 - 5	6 - 10	12 - 24
Medium Temp. 120°F - 230°F	Calcium Silicate *	1	1	1	1-½	1-½
High Temp. 231°F - 365°F	Calcium Silicate *	1	1-½	1-½	2	2-½
High Temp. 366°F - 700°F	Calcium Silicate *	1-½	1-½	2	2-½	2-½

* 13 lbs/ft^3 density asbestos free molded hydrous calcium silicate with a K factor of 0.41 at 200°F mean temperature.

7.19.4 Elevator

The Contractor shall have the existing service elevator inspected and repaired by a licensed elevator inspection firm. Elevator shall be rebuilt/replaced as necessary to add the additional service life as required by this RFP. The Contractor at a minimum, shall perform a modernization program and replace the electrical control system and hoisting mechanism with readily available components.

Door hardware, vertical guide rollers, cables, limit switches, brake assembly, push buttons, etc. shall be inspected and replaced as required.

7.20 MISCELLANEOUS STEEL

All existing structural steel, deck gratings, ladders, hand rails, and platforms in the Balance of Plant area shall be inspected for corrosion or mechanical damage and repaired accordingly. All fasteners should be checked and replaced as needed. All external surfaces of steel showing signs of rust, corrosion, and peeling shall be cleaned and painted in accordance with Section 7.23.

All platforms, ladders, hand rails, and stairs provided for the retrofit shall meet the latest OSHA Regulations and AISI standards.

7.20.1 Structural Steel

General Requirements: The current rules and practices set forth in the "Code of Standard Practice for Steel Buildings and Bridges" and the "Specification for the Design, Fabrication, and Erection of Structural Steel Construction" of the American Institute of Steel Construction (AISC) shall apply to the work performed.

Quality Criteria and Inspection Standards shall conform to the AISC publication "Quality Criteria and Inspection Standards" latest edition.

Materials: Structural steel shall conform to or exceed ASTM A36. High strength bolts, with suitable nuts and washers, shall conform to ASTM A325. Welding electrodes shall conform to AWS D1.1. Stud shear connectors shall conform to AWS D.1.1. The following list indicates the minimum requirements for specific steel items:

- Mild Steel Plates: Special Shapes for structural quality - ASTM A26.
- Steel Sheets: Structural quality - ASTM A36.
- Steel Pipe: ASTM A501, fittings for steel pipe shall be standard malleable iron.

- Fabrication: Fabrication shall be in accordance with the applicable provisions of the AISC Specification for the Design, Fabrication, and Erection of Structural Steel for Buildings.

- Connections: Standard type connections shall comply with the appropriate tables entitled "Framed Beam Connections" of the AISC "Manual of Steel Construction" and shall be used wherever possible to employ such connections.

- Bolting: Assembly of structural joints using high strength steel bolts shall be in accordance with the RCRBSJ Specification for "Structural joints using ASTM A325 or A490 bolts".

- Welding: Welding of structural steel work and sturdy shear connectors shall be in accordance with AWS D1.1.

- Shop and field welding shall be performed only by certified welders qualified in accordance with AWS D1.1

- Field Erection: All members shall be aligned, leveled, and adjusted accurately prior to final fastening. Tolerances shall conform to the AISC "Code of Standard Practice".

7.20.2 Miscellaneous Metals

Miscellaneous metals shall include such items as:

- Gratings (aluminum, fiberglass, and galvanized steel)
- Metal Floor Plates
- Railings
- Loose Lintels and Miscellaneous Framing
- Ladders

Specific requirements for miscellaneous metals include the following:

- Grating: Grating depending upon the type chosen by the Contractor shall conform to ASTM, National Association of American Metal Manufactures (NAAMM), Standard of the Reinforced Plastic/Composites Institute (RPCI) or National Bureau of Standards (NBS) Standards.

- Ladders and Railings: Vertical ladders, cages and railings (posts, rails, and toe plates) shall conform to applicable OSHA regulations.

- Metal Floor Plate: All metal floor plate shall form to the applicable provisions and accommodations of the following:

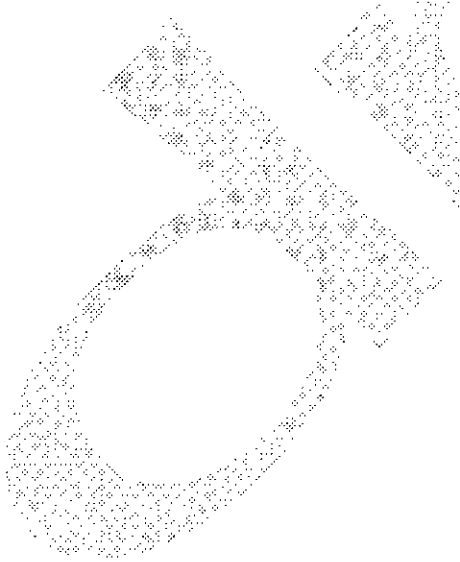
  - ASTM A36, Structural Steel.

  - ASTM B209, Aluminum-Alloy Sheet and Plate.

  - ASTM A123, zinc (hot-galvanized) coatings on products fabricated from rolled, pressed, and forged steel shapes, plates, bars and strip.

7.21 MAINTENANCE MACHINERY/SHOP REQUIREMENTS/SPARE PARTS

The Contractor shall define the locations and use of all maintenance shops and equipment provided therein. The Contractor shall furnish and supply the required maintenance shop(s), maintenance equipment, and any special tools required for the proper maintenance of the Facility. This includes replacement spare parts, materials, and supplies. The Contractor shall furnish a list of all supplies, spare parts inventory, machinery and tools required for initial stocking of the Facility. The Contractor shall maintain this list and update accordingly throughout the life of the Retrofit Construction and O&M Agreement. This list shall include description of the current value of the spare parts stocked. An update copy of this list shall be transmitted quarterly to the City.



7.22 OPERATIONS ROLLING STOCK / TOOLS REQUIREMENTS

The Contractor is responsible for furnishing and suppling rolling stock and machinery, as may be required to operate and maintain the Facility during the Retrofit and for the life or the O&M Agreement. This includes hand tools, chemicals, lubricants, portable equipment such as pumps, hoists, slings, etc., and any temporary equipment required due to construction activities during interim phases of the construction period. The Contractor, at a minimum, shall furnish the following equipment at all times during Interim Operations.

Quantity	Item
(2)	Front End Loaders, Caterpillar 950 or equal with Teflon protective cover for blade edges on the bucket
(1)	5 ton off road type fork truck
(1)	2 ton fork truck
(1)	Street sweeper
(1)	Pick up truck

7.23 SURFACE PROTECTION

Unless otherwise required with the equipment, all steel surfaces, with the exception of galvanized steel, stainless steel, and insulated surfaces, shall be protected with surface preparation and coating system as described in the following sections.

7.23.1 Existing Steel Structures and Miscellaneous Steel

Existing steel structures shall be pressure cleaned and inspected. All visible signs of corrosion, scratches, stains, peeling, and discoloration shall be repaired and repainted. Repairing shall consist of mechanical cleaning, chemical cleaning, sand blasting or hydroblasting as necessary to prepare steel for priming and painting. Affected areas shall be cleaned to bare metal, primed and surface painted with alkyd enamel - 2 mils Dry Film Thickness ("DFT").

7.23.2 New Steel Structures and Miscellaneous Steel

New steel structures shall be shop sandblasted to SSPC-SP6 followed by rust inhibiting primer - 2 mils DFT. Once installed in the field, all scratches and welds shall be wire brushed and primed and the entire structure field painted with Alkyd Enamel - 2 mils DFT.

7.23.3 Hot Surfaces (Uninsulated New and Existing)

Hot surfaces over 150 degrees F shall be prepared as outlined above, however heat resistant primer and enamel designed for the temperature application shall be used.

7.23.4 Corrosive Environments

Areas which are subjected to high moisture, standing water, acids, salts, and alkalis that require additional protection shall be provided with corrosive resistant coatings such as PVC.

Kim - File with Tampa MacKay

Date: 11/10/97 8:43:18 AM
From: Alvaro Linero TAL 904/921-9532
Subject: Reconstruction under 112(g)

Mr. Strobridge. In reviewing the question of whether the project is a reconstruction, please take a look at whether it fits the definition of reconstruction under Section 112(g). If you wish to discuss the issue, please call Lennon Anderson of this Bureau at (350)488-1344. For reference Reconstruction under 112(g) means:

The replacement of components at an existing process or production unit that in and of itself emits or has the potential to emit 10 TPY of any HAP or 25 tons TPY of any combination of HAP, whenever:

(1) The fixed capital cost of the new components exceeds 50 percent of the fixed capital cost that would be required to construct a comparable process or production unit; and

(2) It is technically and economically feasible for the reconstructed major source to meet the applicable maximum achievable control technology for new sources established under this subpart.

Lennon is a member of the Air Toxics Sections in the Title V Program. They comment on all application involving HAPS. His supervisor is Cindy Phillips. Joe Kahn is still the main contact on the permit application. Thanks. Al Linero.

Date: 11/9/97 11:40:34 PM
From: Daniel Strobridge
Subject: Re: Reconstruction under 112(g)
To: LINERO_A
CC: PHILLIPS_C

Al,

We did a quick check with Walt Stevenson, USEPA to discuss the applicability of 112g to resource recovery facilities, in response to your E-mail. The exemption for resource recovery facilities is found in the CLean Air Act section 129(h)(2). It reads as follows: "...except that no solid waste incineration unit subject to performance standards under this section and section 7411 shall be subject to standards under section 7412(d) of this act."

Section 7411 of the U.S. Code is the NSPS section CAA section11 and section 7412(d) is the Section 112d, which are the HAP enission standards. Since emission standards under 112 are specifically nat applicable, it is obvious that 112g does not apply.

If you have further questions, please do not hesitate to contact me.

Date: 11/9/97 11:40:34 PM
From: Daniel Strobridge
Subject: Re: Reconstruction under 112(g)
To: LINERO_A
CC: PHILLIPS_C

Al,

We did a quick check with Walt Stevenson, USEPA to discuss the applicability of 112g to resource recovery facilities, in response to your E-mail. The exemption for resource recovery facilities is found in the CLean Air Act section 129(h)(2). It reads as follows: "...except that no solid waste incineration unit subject to performance standards under this section and section 7411 shall be subject to standards under section 7412(d) of this act."

Section 7411 of the U.S. Code is the NSPS section CAA section11 and section 7412(d) is the Section 112d, which are the HAP enission standards. Since emission standards under 112 are specifically nat applicable, it is obvious that 112g does not apply.

If you have further questions, please do not hesitate to contact me.

Date: 11/10/97 8:43:18 AM
From: Alvaro Linero TAL 904/921-9532
Subject: Reconstruction under 112(g)

Mr. Strobridge. In reviewing the question of whether the project is a reconstruction, please take a look at whether it fits the definition of reconstruction under Section 112(g). If you wish to discuss the issue, please call Lennon Anderson of this Bureau at (850)488-1344. For reference Reconstruction under 112(g) means:

The replacement of components at an existing process or production unit that in and of itself emits or has the potential to emit 10 TPY of any HAP or 25 tons TPY of any combination of HAP, whenever:

(1) The fixed capital cost of the new components exceeds 50 percent of the fixed capital cost that would be required to construct a comparable process or production unit; and

(2) It is technically and economically feasible for the reconstructed major source to meet the applicable maximum achievable control technology for new sources established under this subpart.

Lennon is a member of the Air Toxics Sections in the Title V Program. They comment on all application involving HAPS. His supervisor is Cindy Phillips. Joe Kahn is still the main contact on the permit application. Thanks. Al Linero.