State of Florida
Division of Administrative Hearings
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Sharyn L. Smith
Director

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Clerk

December 9, 1991

Honorable Lawton Chiles
Governor
State of Florida
The Capitol
Tallahassee, FL 32399

Honorable Robert A. Butterworth
Attorney General
State of Florida
The Capitol
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Honorable Bob Crawford
Commissioner of Agriculture
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Honorable Betty Castor
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Honorable Jim Smith
Secretary of State
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Honorable Tom Gallagher
Treasurer and Insurance
Commissioner
State of Florida
The Capitol
Tallahassee, FL 32399-0300

Honorable Gerald A. Lewis
Comptroller
State of Florida
The Capitol, Plaza Level
Tallahassee, FL 32399-0350

Re: Application for power plant site certification of Lee County solid waste resource recovery facility, DOAH Case No. 90-3942EPP

Dear Siting Board:

Enclosed is my Recommended Order in the site certification hearing of the referenced case. Exhibits received in evidence and the transcript of the certification hearing have been delivered to Richard T. Donelan, Jr., at the Department of Environmental Regulation.

As required by Section 120.58(5), Florida Statutes, please provide the Division of Administrative Hearings a copy of your final order in this case within 15 days of rendition.

Sincerely,

DIANE K. KIESLING
Hearing Officer

DKK:dw
Enclosure

cc: Richard T. Donelan
David S. Dee
William W. Deane
Steve Pfeiffer
John Fumero
Ken Plante
Jim Antista
Susan Clark
Wayne Daltry
Jim Yeager
Hamilton S. Oven

STATE OF FLORIDA
DIVISION OF ADMINISTRATIVE HEARINGS

In Re:	)	
APPLICATION FOR POWER PLANT SITE CERTIFICATION OF LEE COUNTY SOLID WASTE RESOURCE RECOVERY FACILITY	)	CASE NO. 90-3942EPP

RECOMMENDED ORDER

Pursuant to notice, a formal hearing was held in this case on September 9-11, 1991, in Fort Myers, Florida, before the Division of Administrative Hearings, by its designated Hearing Officer, Diane K. Kiesling.

APPEARANCES

For Lee County (the County):	David S. Dee Robert V. Russo Attorneys at Law Carlton, Fields, Ward, Emmanuel, Smith & Cutler, P.A. Post Office Box 190 Tallahassee, FL 32302
For Department of Environmental Regulation (DER):	Richard T. Donelan, Jr. Assistant General Counsel 2600 Blair Stone Road Twin Towers Office Building Tallahassee, FL 32399
For S.F.C.A.R.E., Inc. (SFCARE):	William W. Deane Attorney at Law Suite 102 8855 Ninth Street North St. Petersburg, FL 33702

STATEMENT OF THE ISSUES

The ultimate issues for determination in this case are: (a) whether Lee County's application for certification of a

On August 30, 1991, a Prehearing Stipulation was filed by the County, DER, the Department of Community Affairs (DCA), the Department of Natural Resources (DNR), the Florida Game and Fresh Water Fish Commission (FGFWFC), and the South Florida Water Management District (SFWMD). The signatories to the Prehearing Stipulation agreed that the County demonstrated an entitlement to certification of its proposed facility, subject to the conditions of certification. On September 9, 1991, the first day of the certification hearing, SFCARE filed a prehearing statement which identified two legal issues to be resolved in this proceeding: 1) whether Best Available Control Technology (BACT) has been achieved for mercury emissions and 2) whether BACT can be determined by DER without an examination of source separation as a means of reducing emissions.

At the certification hearing, the County presented the testimony of Daniel E. Strobridge, Donald F. Elias, Ruth A Dickinson, Michael G. Cullum, Paul C. Chrostowski, William R. Cox, Lee S. Casey, and Robert Hauser, Jr. Lee County also presented the deposition testimony of Clair Fancy. Lee County's Exhibits 1-65 were admitted in evidence.

DER presented the testimony of Tom Rogers and Hamilton "Buck" S. Oven, Jr. DER's Exhibits 1 and 2 were admitted in evidence.

SFCARE presented the testimony of W. Dexter Bellamy, Craig Volland, and Richard J. Cook. SFCARE's Exhibits 1-5 were admitted in evidence.

The DCA, DNR, FGFWFC, and SFWMD did not participate in the certification hearing.

landfilling, and the use of a resource recovery (waste-to-energy) facility.

2. In June 1990, Lee County filed an application for site certification with the Florida Department of Environmental Regulation (DER) for the proposed resource recovery facility (Facility). The County also filed an application with DER for a Prevention of Significant Deterioration (PSD) permit for the Facility.

3. Lee County's Facility will produce electricity from municipal solid waste that otherwise would be discarded in a landfill. Solid waste will be brought into the Facility by truck and deposited in a large concrete pit. The refuse will be thoroughly mixed in the pit and then placed by crane in a charging hopper, which will lead into a furnace. The combustion of refuse in the furnace will create heat, which will be used to produce steam, which will be used in a steam turbine to generate electricity.

4. The County's Facility will include the energy recovery system, a scale house, cooling tower, a stack, a 138 kV transmission line, and a stormwater management system. The Facility will have two combustion units with a combined processing capacity of approximately 1200 tons per day (tpd). Theoretically, the Facility could be expanded in the future with a third 600 tpd combustion unit to reach an ultimate site capacity of 1800 tpd.

5. The Facility will generate approximately 40 megawatts (MW) of electricity at 1200 tpd and approximately 60 MW

10. The Facility will have positive economic impacts. Over 325 people will be employed during the Facility's construction. The Facility will provide jobs for 54 full-time employees during normal operations. The annual payroll of $2.5 million will contribute more than $33 million to the local economy over 20 years. The construction costs of approximately $130 million will result in a positive regional economic impact of approximately $398 million.

11. The site is undeveloped. It has been heavily impacted by past logging and agricultural activities, including ditching and cattle grazing. The site has been extensively invaded by exotic tree species such as melaleuca and Brazilian pepper. Vegetative diversity is low, offering few habitat niches for feeding or reproduction by wildlife. As a result, the numbers and diversity of wildlife on the site are extremely low due to the poor habitat conditions.

12. There are no DER jurisdictional wetland areas on the site. There are isolated wetlands within the jurisdiction of SFWMD. No jurisdictional wetlands will be affected by the construction of the resource recovery facility structure, which will be constructed in a previously disturbed sector of the site which is vegetated with wax myrtle. No more than 2.7 acres of wetlands will be affected by the construction of the new 138 kV transmission line, which is necessary to connect the Facility to FPL's adjacent Buckingham substation. The proposed location of the new transmission line next to an existing dirt road minimizes potential wetland impacts from the transmission line.

SFWMD. This wet detention area is supplemented by a dry pretreatment system approximately 4.5 times larger than required. After treatment, stormwater will be discharged into a currently stressed wetland area for additional treatment; the discharge will assist in restoring the original hydroperiod of the area.

16. The primary source of water to be used in the Facility will be the City of Fort Myers' domestic wastewater treatment plant, which currently discharges advanced-treated wastewater to the Caloosahatchee River. The Facility's cooling tower will use approximately 1.1 million gallons per day (mgd) of treated wastewater. DER and SFWMD strongly encourage reuse of wastewater in this fashion, and the use will reduce the levels of nutrients which would otherwise be discharged into the Caloosahatchee by the City of Fort Myers treatment plant.

17. The Facility will use approximately 15,000 gallons per day (gpd) of potable water for boiler makeup and household-type uses. This water will be drawn from two wells located on site, which can also supply backup water for use during emergencies. Use of potable water as backup for cooling is limited to ten days per year.

18. The Facility will not discharge any wastewater into groundwater or surface waters. Wastewater generated at the Facility will be recycled to the extent practicable and then routed by pipeline to the City of Fort Myers' wastewater treatment plant. The Facility is not expected to cause or contribute to groundwater contamination. A groundwater monitoring system will ensure that the Facility does not impact

Status of the Project

22. Lee County will own the Facility. Ogden-Martin (Ogden) will build and operate the Facility for 20 years pursuant to a contract Ogden executed with the County in 1990. Ogden was selected because it submitted the lowest and best bid for these services in a competitive bidding process.

23. Ogden is one of the largest and best vendors of resource recovery facilities in the United States. Ogden currently operates three resource recovery facilities in Florida and twelve in the United States. Ogden uses the Martin technology which has been used successfully at more than 140 facilities around the world.

24. Lee County already has secured $197 million in escrow financing for the construction of the Facility, which will take approximately 27 months to complete. The County hopes to have the Facility in operation in the spring of 1994.

EPA's 1991 New Source Performance Standards

25. In February 1991, the United States Environmental Protection Agency (EPA) promulgated New Source Performance Standards which established stringent minimum requirements for the construction and operation of new resource recovery facilities, including Lee County's Facility. Among other things, EPA's 1991 New Source Performance Standards (NSPS): (a) establish specific emission limits for a wide array of pollutants, including dioxin; (b) require facility operators to be trained and certified; and (c) require resource recovery facilities to

the injection of slaked lime to neutralize acid gases in the exhaust gas stream. Because the lime injection process effectively cools the gas stream, the scrubber system also effectively removes heavy metals except mercury; these metals adsorb to particulate matter which is removed by the fabric filter baghouse. Nitrogen oxides (NO_x) are controlled by SNCR, which involves the injection of ammonia or urea into the post-combustion zone of the boiler to dissociate NO_x, which is formed at high combustion temperatures, into nitrogen and water vapor. Good combustion practices minimize emissions of substances produced by incomplete combustion of solid waste, including carbon monoxide (CO), unburned hydrocarbons, soot, and toxic organic compounds such as dioxins, furans, and polycyclic organic matter (POM). The adherence to good combustion practices will assure that emissions of total dioxins and furans will not exceed the NSPS standard.

29. Lee County considered the possibility of using a wet scrubber system, but the wet scrubber was rejected because it suffers from a variety of problems. Wet scrubbers have never been selected as BACT for any resource recovery facility in the United States. Wet scrubbers are not BACT in this case.

Control Technology for Mercury

30. The mercury emissions from the Facility will be minimized by at least four factors. First, many sources of mercury in municipal solid waste have been or soon will be eliminated. EPA has banned the use of mercury in paints and

33. Fourth, Lee County will utilize an additional pollution control device to control mercury emissions. Specifically, Lee County will use a reagent injection system which will inject activated carbon, sodium sulfide, or other reagent into the flue gases. The mercury will adhere to the reagent and then be removed from the flue gases by the fabric filter. The reagent injection system should be very effective at capturing mercury and it also should reduce some other emissions (e.g., dioxins).

34. The reagent injection system has been used in Europe, but it has never been used on a full-time basis on any resource recovery facility in the United States. This technology is not required under any state or federal regulatory program.

35. The Facility's reagent injection system for mercury will provide the highest degree of mercury control that is technologically possible at this time. As a result of the County's extraordinary efforts to control mercury, the mercury emissions from the facility will be among the lowest in the world.

Emission Limits For Mercury

36. In August 1991, EPA completed a series of experiments with a reagent injection system at a resource recovery facility in Stanislaus, California. EPA will use its new test data from Stanislaus and its existing mercury data base to establish numerical limits for mercury emissions from new resource recovery facilities. EPA's new emission limits for

however, it would be imprudent and inappropriate to establish a mercury emission limit for the Facility that is lower than the level proposed by DER in the conditions of certification. The proposed mercury emission limit for the Facility represents a reasonable upper limit, given the available test data, and it rests on sound engineering judgment.

41. Mercury emission rates of 130 ug/dscm or 80% removal recently were proposed in two pending cases in New York, but there are no reliable data available at this time to confirm that such levels can be consistently achieved.

42. SFCARE contends that the BACT analysis should have set the Facility's mercury emission limit at 50 ug/dscm or 90% removal, however this limit is not supported by the evidence of record.

43. SFCARE's proposed emission limits have never been established as BACT for any resource recovery facility in the United States. SFCARE's witness (Craig Volland) admitted that vendors for air pollution control equipment tend to exaggerate about the capabilities of their products, but no vendor in the world would guarantee that its equipment would meet his proposed emission limit of 50 ug/dscm. No vendor in the United States would guarantee the 90% removal limit. Another SFCARE witness (Richard Cook) conceded that he was unaware of any resource recovery facility that could achieve SFCARE's proposed emission limits for mercury.

44. Nonetheless, SFCARE believes the County's mercury control system can reduce mercury emissions by 90% and limit them

47. Lee County also utilized a conservative approach (i.e, one designed to over-predict actual impacts) when determining the ambient air quality at the Site. The County used ambient air quality data from areas of heavy urban or industrial growth, which reflect levels of air pollution that are much greater than the levels expected at the County's Site.

48. The County used EPA and DER approved computer models to evaluate the Facility's air quality impacts. These computer models have been tested extensively in the field to confirm that the models will over-predict a facility's maximum impacts.

49. In accordance with DER's recommendation, the computer models used five years of consecutive hourly meteorological data from Fort Myers to calculate the Facility's impacts on air quality. As a result, the models will over-predict the Facility's maximum potential impacts at any time under any meteorological conditions.

Ambient Air Quality Standards

50. Primary ambient air quality standards are established by EPA to protect public health "with an adequate margin of safety." Primary standards are designed to protect the health of the most susceptible groups of the population, including children, the elderly, asthmatics and those with respiratory problems. Secondary ambient air quality standards are designed to protect the public welfare against "any known or anticipated adverse effects" from air pollution. Florida has

Facility's maximum impacts for non-criteria pollutants are 10 to 100 times less than DER's no-threat thresholds.

55. The Facility's maximum impacts were compared to health-based standards and guidelines adopted by New York, North Carolina, Kentucky, and the American Conference of Governmental and Industrial Hygienists. The Facility's maximum impacts for non-criteria pollutants were far below all of the applicable criteria.

56. The dioxin emissions from the Facility will be well below all of the health-based standards and guidelines that have been established by DER, EPA, the World Health Organization, and the European Community. The Facility's maximum impacts will be about 1,000 times less than the ambient air quality standard for dioxin that was established by Connecticut, the first state to adopt an ambient air quality standard for dioxin.

Prevention of Significant Deterioration

57. EPA and DER enforce the Prevention of Significant Deterioration (PSD) program, which is designed to protect existing air quality. The PSD program limits airborne emissions by establishing maximum allowable increments that can be consumed in Class I, II, and III areas by potential sources of air pollution.

58. Lee County and all adjacent areas are designated as PSD Class II areas, except for the Everglades National Park, which is a Class I area. The Facility will consume no more than 2.8% of any of the applicable PSD Class II increments. It will

County's 3000 tpd resource recovery facility. They concluded that the impacts from the Pinellas County facility were "minimal."

62. In light of this extensive data base, EPA and DER do not require applicants to conduct health risk assessments for proposed resource recovery facilities. Nonetheless, Lee County analyzed the potential health impacts of the Facility's emissions. The County's analyses demonstrated that the maximum predicted impacts from the Facility will be far below any level that might cause any human health problems.

63. Lee County evaluated the Facility's effects on human health and the environment by using standard health risk assessment techniques that were developed by EPA and other agencies. The evaluation was performed by Dr. Paul Chrostowski, a nationally recognized expert who teaches courses concerning health risk assessments for EPA and state regulatory agencies.

64. Lee County's evaluation was based on a series of very conservative assumptions about the project that were intentionally designed to greatly over-predict the potential risks associated with the Facility's emissions. For example, the County's evaluation was based on the assumption that the Facility will operate at 1800 tpd, 100% of the time, for 70 years, even though Lee County only intends to build a 1200 tpd facility, which will operate approximately 85-95% of the time, over a useful life of approximately 30 years. The Facility's maximum impacts will occur relatively close to the Site in an undeveloped agricultural area, but the County assumed that hypothetical

dioxin. Accordingly, the risk from all exposure pathways for dioxin would be 3 in 10,000,000. This risk is well below any level of concern for regulatory purposes.

68. To put these risks in perspective, it should be recognized that a 1 in 1,000,000 risk would be experienced if a person smoked two cigarettes at any time during his or her life. A risk of 1 in 1,000,000 also would be encountered if a person drank one liter of wine during his or her entire lifetime. Hence, the risk from drinking one liter of wine or smoking two cigarettes during a person's lifetime is approximately 10 times greater than the risk that would be experienced if a person located at the point of maximum impact received 70 years of uninterrupted exposure to the maximum predicted dioxin emissions from an 1800 tpd facility. When the risks are considered in this context, it is clear that the Facility's dioxin emissions will pose no meaningful risk to human health.

69. Similarly, the Facility's mercury emissions pose no threat to human health. The Center for Disease Control (CDC) has developed "minimal risk levels" for short term and long term exposure to mercury. If a person's exposure is below the minimal risk level, the CDC does not anticipate any adverse health effects. In this case, the maximum short-term impact from the Facility's mercury emissions at 1800 tpd will be about 1,000 times less than the CDC's minimal risk level for short term exposure. The Facility's maximum annual impact will be many thousands of times lower than the CDC's minimal risk level for long-term exposure.

washed into the water bodies under investigation; (d) the snail kite and wood stork will only feed in the two areas that are under investigation; (e) the birds' food (i.e., snails for the snail kite; fish for the wood stork) will stay in one location where it will receive maximum exposure; and (f) the fish and snails will live 70 years and accumulate mercury over that period. The County also used the lowest sensitivity levels that could be found for any bird species and then applied a toxicological safety factor of 20.

73. The County's analyses demonstrated that after 70 years of Facility operations at 1800 tpd, the mercury concentration in snails would be three times less than any levels that might cause an impact on the snail kite. Wood storks would be exposed to even less risk than snail kites because the bioaccumulation of mercury in fish would be less than the bioaccumulation of mercury in snails. Since eagles also eat fish, this same conclusion is true for eagles.

74. Bald eagles and panthers would be at even less risk than snail kites or wood storks because they feed over a larger range than snail kites or wood storks. Panthers and eagles would not get all of their food from the area of maximum impact near the Site. Panthers and eagles are very mobile and they would not remain for a long period of time in the areas where the Facility's maximum impacts would occur.

75. Panthers can range over hundreds of square miles of land. Indeed, one young panther once moved through the general area near the Site, but since then it has spent most of its time

do not experience any effects from lead until soil concentrations reach at least 200 ppm. EPA sets a safe level of 500 ppm.

80. Similarly, after 70 years of worst case impacts, the Facility's contribution to arsenic concentrations in the soil would be 3×10^{-6} ppm. Naturally occurring levels of arsenic in Florida's soil range up to 15 ppm.

81. The Facility's maximum contribution to beryllium concentrations in the soil would be about 1,000,000 times less than the levels that naturally occur in Florida soils.

82. The Facility's maximum contribution to mercury levels in the soil would be 2×10^{-4} ppm. By comparison, sugar cane contains approximately 1.2 ppm of mercury.

83. In all of these worst case analyses, the 1800 tpd Facility's maximum contribution to soil concentrations would be at least 100 times below any level that the EPA or CDC has associated with health impacts. Indeed, the Facility's contributions to these soil concentrations could not be measured with any known analytical technique.

Air Quality Monitoring

84. Lee County will utilize sophisticated operational safeguards to ensure that the Facility is operated properly. The Facility will have continuous emission monitors (CEM) to continuously measure the levels of carbon monoxide, nitrogen oxide, sulfur dioxide, and oxygen in the Facility's emissions. Opacity and other parameters also will be monitored with CEMs. These monitors will be connected to visible and audible alarms in

small that they could not be measured with an EPA approved ambient air monitoring system located at the point of maximum impact or anywhere else in Lee County. For this reason, state and federal regulations will not require ambient air quality monitoring at or near the Site. Facility operations can be better evaluated by using CEMs and stack tests to measure the Facility's emissions, rather than ambient air monitors.

Lee County's Recycling Programs

88. Lee County has a very aggressive and innovative recycling program. Lee County expects to achieve the state recycling goal of 30% by 1994. Moreover, the County Commission established a county recycling goal of 40% and the County is doing everything practicable to achieve its 40% goal.

89. Lee County's residential curbside recycling program will serve 100% of the County by the end of 1991. The County expects to have 50% of the County's commercial businesses in its recycling program by 1992 and 100% of the businesses by 1994. The County already collects used oil, automobile batteries, and telephone books. The County is implementing a mulching program for horticultural wastes.

90. The County's recycling rates are among the best in the State of Florida. The County's overall recycling program is among the best in the nation.

91. The County received an award from EPA for its innovative approach to recycling. Among other things, the County has a contract with Goodwill Industries that allows Goodwill to

96. The County Commission reduced the size of the Facility because the County wanted to maximize its recycling programs and minimize its reliance on the Facility. As a result of the County's decision, it will be very expensive to expand the Facility. The County has created a strong financial disincentive against expansion of the Facility.

97. Resource recovery facilities normally are designed with excess capacity to provide for future growth. In this case, however, the Facility will be full when it begins commercial operations, unless the County achieves a 30% recycling rate. Even if the County achieves a 30% recycling rate, the Facility will be full within two years after it commences operation.

Source Separation As BACT

98. SFCARE contends that the BACT determination in this case should require additional recycling or source separation (i.e., the removal of certain materials from the waste stream prior to their disposal at the resource recovery facility). SFCARE's proposal is rejected.

99. Recycling and source separation programs do not significantly affect the emissions from resource recovery facilities, with two exceptions. Removing household batteries from the waste can reduce mercury emissions. Removing lead-acid batteries, as required by Florida law, can reduce lead emissions. In this case, Lee County already has taken steps to remove these two types of batteries from the waste stream.

environmental benefits (if any) would result. Thus, SFCARE's proposal is fatally defective.

SFCARE

103. SFCARE has approximately 600 people on its mailing list, but the actual number of SFCARE members is unknown. The members of SFCARE fish, jog, and otherwise enjoy the natural resources of Lee County; however, SFCARE's President readily admitted that SFCARE's members are just like all of the other citizens in Lee County in this regard.

104. The Facility will be approximately five miles from the nearest home of any SFCARE member. The evidence demonstrated that the Facility's impacts on the public will be negligible. The Facility's impacts on the members of SFCARE will be no different than its impacts on other members of the community. Several members of SFCARE complained of personal illnesses or physical infirmities, but here, too, the members of SFCARE are like any other typical cross-section of the community. The evidence did not demonstrate that any member of SFCARE would be affected in any manner that would be different than the public at large.

Notice of Certification Hearing

105. On July 27, 1990, Lee County published a large notice in the Fort Myers News-Press to announce that Lee County had filed its application for site certification. On July 23, 1991, Lee County published a full page notice in the Fort Myers

than sufficient to protect Florida's citizens and its environment.

109. The Facility will create electrical power while providing a regional solution to the solid waste needs of Lee County and Hendry County. The beneficial impacts of the Facility are substantial, while the environmental impacts resulting from the Facility's construction and operation are negligible. Indeed, the Facility will not have any meaningful impacts on Florida's air, water, soil, or wildlife.

110. The conditions of certification attached hereto as Appendix A are reasonable and appropriate to ensure that the construction and operation of the Facility will have minimal impacts on the environment and natural resources of the state and on the welfare of the citizens of Florida. Additionally, the County has agreed to comply with these conditions of certification.

CONCLUSIONS OF LAW

The Division of Administrative Hearings has jurisdiction over the parties to and subject matter of this proceeding. Section 408.508(3), Florida Statutes (Supp. 1990).

SFCARE was allowed to fully participate as a party at the certification hearing, but SFCARE failed to establish its standing in this case. SFCARE was permitted to intervene pursuant to Section 403.508(4)(e), Florida Statutes (Supp. 1990), which allows intervention if the intervenor's substantial interests are affected and being determined by the proceeding.

The County's plan to use a resource recovery facility is consistent with state and federal law. Section 377.709(1), Florida Statutes, contains the Florida Legislature's declaration that:

> [T]he combustion of refuse by solid waste facilities to supplement the electricity supply not only represents an effective conservation effort but also represents an environmentally preferred alternative to conventional solid waste disposal in this State. Therefore, the Legislature directs the Florida Public Service Commission to establish a funding program to encourage the development by local governments of solid waste facilities that use solid waste as a primary source of fuel for the production of electricity.

Hence, it is clear that the State of Florida has strongly supported the use of resource recovery facilities like the one proposed by Lee County.

Florida's State Comprehensive Plan expressly encourages the use of resource recovery facilities. Policy 13.9 in the State Comprehensive Plan provides that Florida should:

> Encourage the research, development, and implementation of recycling, resource recovery, energy recovery, and other methods of using garbage, trash, sewage, slime, sludge, hazardous wastes, and other wastes.

The use of resource recovery facilities is consistent with the policies of the United States Environmental Protection Agency and the Florida Department of Environmental Regulation. EPA generally considers landfilling and incineration to be equal disposal options. Similarly, it has been DER's policy to use recycling, resource recovery and landfilling for the disposal of equal (1/3) shares of the waste stream.

capacity at issue." AES Cedar Bay, Inc. v. Department of Environmental Regulation, DOAH Case No. 88-5740, Final Order rendered Feb. 18, 1991, slip op. at 6. Thus, the balancing test encompasses close scrutiny of whether an applicant for certification has taken pains to ameliorate potential adverse consequences which might be expected to result from its facility, even when facial compliance with agency standards might be achieved without reference to certain expected impacts.

In this case, the record is clear that the County has designed the Facility in a way which easily meets the balancing test as explicated by the Siting Board in the AES Cedar Bay case. There is no suggestion by any agency that the design of the Facility fails to meet the non-procedural standards applicable to it; no regulatory agency objects to certification of the Facility as requested by the County. Significantly, however, the evidence here shows that the County has not merely aimed its design of the Facility at satisfying minimum agency standards. Rather, in several important areas, the design of the Facility seeks to achieve the smallest environmental impacts possible, especially given the state of pollution control technology at the present time. The most noteworthy example of this effort is shown by the pollution controls which are proposed for the incinerator: SNCR for NO_x control and reagent injection for control of mercury and other volatile substances. Both of these technologies are the most stringent available to control the air emissions in question, without regard to cost.

Turning to the question of whether the expected consequences of air emissions from the Facility would mandate a denial of certification for the Facility, as SFCARE contends, the record evidence does not support a conclusion that the environmental impacts of the air emissions are so great as to outweigh the need for the Facility. The pollution control technologies which the county will be required to install under the terms of the PSD permit and conditions of certification represent the best available control technologies, regardless of cost. There is no doubt that the DER's BACT determination is correct, in the literal sense of the term as well as in the regulatory context of Rule 17-2.500, Florida Administrative Code. SFCARE's suggestion that the BACT determination is erroneous lacks merit because there is no evidence in the record that actual emissions from the Facility would be reduced by source separation as advocated by SFCARE. Moreover, there is no evidence that the level of controls required under the current BACT determination could lawfully be reduced, given the NSPS standards applicable to the facility. It must be kept in mind that the County already practices source separation via its recycling program.

As to mercury emissions, the record shows that the modeled impact of the mercury emissions of the Facility are not likely to harm the citizens or the ecosystem of South Florida; this modeling did not take into consideration the expected reductions in mercury emissions resulting from the implementation of the reagent injection control technology. Testimony adduced

RECOMMENDATION

Based on the foregoing Findings of Fact and Conclusions of Law, it is

RECOMMENDED that the Siting Board enter a Final Order and therein:

1. Grant site certification for the Lee County Solid Waste Resource Recovery Facility, subject to the conditions of certification attached hereto as Appendix A;

2. Order that the Department of Environmental Regulation issue PSD construction permit authorizing construction of the Lee County Solid Waste Resource Recovery Facility in accordance with the DER BACT determination and subject to the conditions of certification attached hereto as Appendix A; and

3. Deny and dismiss the Motion to Intervene filed by SFCARE.

DONE and ENTERED this 9th day of December, 1991, at Tallahassee, Florida.

DIANE K. KIESLING, Hearing Officer
Division of Administrative Hearings
The DeSoto Building
1230 Apalachee Parkway
Tallahassee, Florida 32399-1550
(904) 488-9675

Filed with the Clerk of the Division of Administrative Hearings this 9th day of December, 1991.

NOTICE OF RIGHT TO SUBMIT EXCEPTIONS: All parties have the right to submit written exceptions to this Recommended Order. All agencies allow each party at least 10 days in which to submit written exceptions. Some agencies allow a larger period within which to submit written exceptions. You should consult with the agency that will issue the final order in this case concerning

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Honorable Tom Gallagher
Treasurer and Insurance Commissioner
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STATE OF FLORIDA
DIVISION OF ADMINISTRATIVE HEARINGS

In Re: APPLICATION FOR POWER PLANT SITE CERTIFICATION OF LEE COUNTY SOLID WASTE RESOURCE RECOVERY FACILITY	CASE NO. 90-3942EPP

APPENDIX A

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

LEE COUNTY SOLID WASTE ENERGY RECOVERY FACILITY
CASE NO. PA 90-30

CONDITIONS OF CERTIFICATION

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Lee County Solid Waste
Energy Recovery Facility
Case No. PA 90-30

CONDITIONS OF CERTIFICATION

I. CHANGE IN DISCHARGE

All discharges or emissions authorized herein shall be consistent with the terms and conditions of this certification. The discharge of any regulated pollutant not identified in the application, or more frequent than, or at a level in excess of that authorized herein, shall constitute a violation of the certification. Any anticipated facility expansions beyond the certified initial nameplate capacity of 1,200 TPD, production increases, or process modifications which may result in new, different, or increased discharges of pollutants, change in type of fuel as described in XIV.8., or expansion in steam generation capacity shall be reported by submission of a supplemental application pursuant to Chapter 403, Florida Statues.

II. NON-COMPLIANCE NOTIFICATION

If, for any reason, the Permittee (defined as the Applicant or its successors and or assigns) does not comply with or will be unable to comply with any limitation specified in this certification, the Permittee shall notify the South District Office of the Department of Environmental Regulation by telephone within a working day that said noncompliance occurs and shall confirm this in writing within seventy-two (72) hours of becoming aware of such conditions, and shall supply the following information:

A. A description of the discharge and cause of noncompliance; and

B. The period of noncompliance, including exact dates and times; or if not corrected, the anticipated time the noncompliance is expected to continue, and steps being taken to reduce, eliminate and prevent recurrence of the noncomplying event.

III. FACILITIES OPERATION

The Permittee shall at all times maintain in good working

B. To have access during normal business hours (Mon.-Fri., 9:00 a.m. to 5:00 p.m.) to any records required to be kept under the conditions of this certification for examination and copying, and:

C. To inspect and test any monitoring equipment or monitoring method required in this certification and to sample any discharge or pollutants, and:

D. To assess any damage to the environment or violation of ambient standards.

VI. REVOCATION OR SUSPENSION

This certification may be suspended or revoked for violations of any of its conditions pursuant to Section 403.512, Florida Statutes.

VII. CIVIL AND CRIMINAL LIABILITY

This certification does not relieve the Permittee from civil or criminal penalties for noncompliance with any conditions of this certification, applicable rules or regulations of the Department or Chapter 403, Florida Statutes, or regulations thereunder.

Subject to Section 403.511, Florida Statutes, this certification shall not preclude the institution of any legal action or relieve the Permittee from any responsibilities or penalties established pursuant to any other applicable State Statues, or regulations.

VIII. PROPERTY RIGHTS

The issuance of this certification does not convey any property rights in either real or personal property, nor any exclusive privileges, nor does it authorize any injury to public or private property or any invasion of personal rights nor any infringement of Federal, State or local laws or regulations.

IX. SEVERABILITY

The provisions of this certification are severable, and if any provision of this certification or the application of any provision of this certification to any circumstances, is held invalid, the application of such provisions to other

the South District Office at least 90 days prior to construction of those portions of the facility for which the plans are then being submitted. Specific South District Office acceptance of plans will be required based upon a determination of consistency with approved design concepts, regulations and these Conditions prior to initiating construction of the: off-site water and wastewater pipelines; transmission line; stormwater run-off system; and hazardous, toxic or pathological handling facilities or areas. Review and action by the South District Office on said plans shall be accomplished in a timely fashion in accordance with Chapter 120, F.S. from the date of a complete submittal of such plans and any action may be subject to review pursuant to Chapter 120, Florida Statutes.

A. Control Measures

1. Stormwater Run-off

To control run-off during construction which may reach and thereby pollute Waters of the State, necessary measures shall be utilized to settle, filter, treat or absorb silt-containing or pollutant-laden storm water to ensure against spillage or discharge of excavated material that may cause turbidity in excess of 29 Nephelometric Turbidity Units above background in Waters of the State. Control measures may consist of sediment traps, barriers, berms, and vegetation plantings. Exposed or disturbed soil shall be protected and stabilized as soon as possible to minimize silt and sediment laden run-off. The pH of the run-off shall be kept within the range of 6.0 to 8.5. The Permittee shall comply with Florida Administrative Code Chapters 17-25, 40E-2, and 40E-4. The Permittee shall complete the forms required by 17-25.09(1) and 40E-4 and submit those forms and the required information to the SFWMD for any modifications that might occur.

2. Open Burning

Open burning in connection with initial land clearing shall be in accordance with Chapter 17-256, F.A.C., Chapter 5I-2, F.A.C., Uniform Fire Code Section 33.101 Addendum, and any other applicable County regulation.

Any burning of construction generated material, after initial land clearing that is allowed to be burned in accordance with Chapter 17-256, F.A.C., shall be approved by the South District Office in conjunction with the Division of Forestry and any other County regulations that may apply. Burning shall not occur unless approved by the appropriate agency or if the Department or the Division of Forestry has issued a ban on burning due to fire safety conditions or due to air pollution conditions.

Department and SFWMD.

B. Environmental Control Program

An environmental control program shall be established under the supervision of a Florida registered professional engineer to assure that all construction activities conform to applicable environmental regulations and the applicable Conditions of Certification. If a violation of standards, harmful effects or irreversible environmental damage not anticipated by the application or the evidence presented at the certification hearing are detected during construction, the Permittee shall notify the South District Office as required by Condition II.

C. Reporting

1. Notice of commencement of construction shall be submitted to the South District Office within 15 days of initiation. Starting three (3) months after construction commences, a quarterly construction status report shall be submitted to the South District Office. The report shall be a short narrative describing the progress of construction.

2. Upon or immediately prior to completion of construction of the Energy Recovery Facility or a phase thereof and upon or immediately prior to completion of all necessary preparation for the operation of the off-site landfill, the South District Office will be notified of a date on which a site or facility inspection can be performed in accordance with Condition V.

XIV. OPERATION

A. Air

The operation of the Solid Waste Energy Recovery Facility shall be in accordance with all applicable provisions of Chapter 17-2, 17-256, and 17-702, Florida Administrative Code.

The construction of the Lee County Solid Waste Energy Recovery Facility in Fort Myers, Florida shall consist of three mass-burn Municipal Waste Combustors (MWC) with two units to be constructed initially and the third unit to be installed in the future. These mass-burn units shall be of Stoker Waterwall Combustor design (or equivalent) with a maximum heat input of 275 MMBtu per hour per unit or a total heat input for the facility of 825 MMBtu per hour based on a municipal solid waste average heating value of 5000 Btu per pound.

Each combustor unit is designed to produce a maximum of

block average (midnight to midnight), 0.29 lb/MMBtu, 80 lbs/hr per unit, and 320 tons/yr per unit.

(6) *Carbon Monoxide: 100 ppmdv at 7% O_2, 4-hour block average beginning at midnight, 0.099 lb/MMBtu, 27.23 lbs/hr/unit, and 108 tons/year per unit.

(7) *VOC (Hydrocarbons): 37 ppmdv at 7% O_2, 0.0211 lb/MMBtu, 5.80 lbs/hr/unit and 23 tons/yr. per unit.

(8) HCl: 25 ppmdv at 7% O_2, or at least 95% removal, which ever is least restrictive (not to exeed 0.0644 lb/MMBtu or 17.7 lbs/hr/unit), and 70.7 tons/yr per unit.

(9) H_2SO_4 (sulfuric acid mist): 0.0358 lb/MMBtu, or 9.85 lbs/hr/unit and 39.3 tons/year per unit.

(10) *F (fluoride): 5.0 ppmdv at 7% O_2, 0.0035 lb/MMBtu, or 0.96 lbs/hr/unit, and 3.8 tons/year per unit.

(11) *Pb (lead): Lead emission shall not exceed 0.0006 lbs/MBtu, .165 lbs/hr/unit and .66 tons/yr per unit.

(12) *Be: Beryllium emissions shall not exceed 1.35 x 10^{-7} lbs/MMBtu, 3.7 x 10^{-5} lbs/hr/unit, and 1.47 x 10^{-4} tons/yr per unit.

(13) *Hg: Mercury emissions shall not exceed .0006 lbs/MMBtu, 0.165 lbs/hr/unit, and .66 tons/yr per unit.

(14) As: Arsenic emissions shall not exceed 9.1 x 10^{-6} lbs/MMBtu, 2.5 x 10^{-3} lbs/hr/unit, and 0.01 tons/yr per unit.

(15) *Dioxins/Furans: Emissions of total (tetra thru octa-chlorinated dibenzo-p dioxins and dibenzofurans) shall not exceed 30.0 ng/dscm @ 7% O_2, 2.54 x 10^{-8} lbs/MMBtu, 7.0 x 10^{-6} lbs/hr/unit, and 2.8 x 10^{-5} tons/yr per unit.

(16) NH_3: Ammonia slip from exhaust gases shall not exceed 50 ppmv.

(17) There shall be no visible emissions during the lime silo loading operations (i.e., less than 5% opacity).

	sources.
7, 7C, or 19	Nitrogen oxide emissions from stationary sources.
9	Visible emission determination of opacity. - At least three one hour runs to be conducted simultaneously with particulate testing for the emissions from dry scrubber/baghouse, and ash handling building baghouse. - At least one lime truck unloading into the lime silo (from start to finish).
10	Carbon monoxide emissions from stationary sources.
12 or 101A	Lead concentration from stationary sources.
13A or 13B	Fluoride emissions from stationary sources.
23	Dioxin/furan concentration.
18, or 25,	Volatile organic compounds concentration.
26	HCl emissions or other methods approved by EPA or DER.
101A or 108	Mercury, Antimony, Arsenic, and Cadmium emissions.
104	Beryllium emission rate and associated moisture content.

Note: The weight of MSW being fed to each combustor during the stack test shall be continuously monitored and recorded by a weighing device which is properly calibrated. Stack test shall be conducted upstream and downstream of the applicable control device for the following pollutants, SO_2, Hg and HCl. Soot blowers shall be operated in a mode consistent with normal cleaning requirements of the system during the compliance testing.

b. Continuous Emissions Monitoring

Continuous emission monitors with recorders shall be installed, calibrated, maintained and operated subject to approval by the Department for the following:

Carbon Monoxide, Oxygen, Nitrogen Oxide,

approval at least 60 days prior to construction of the sampling ports and stack.

e. Record Keeping

Lee County Solid Waste Energy Recovery Facility shall maintain a central file containing all measurements, records, and other data that are required to be collected pursuant to the various specific conditions of this permit. This file shall include but not be limited to: i) the data collected from in-stack monitoring instruments, ii) the records on MSW input rate, iii) the amount of propane gas burned per unit, iv) the results of all source tests or performance tests, v) the amount of ammonia, activated carbon, sodium sulfide or other chemicals used for NOx and mercury control, vi) calibration logs for all instruments, vii) maintenance/ repair logs for any work performed which is subject to this permit. All measurements, records, and other data required to be maintained by SWERF shall be retained for at least two years following the date on which such measurements, records, or data are recorded and made available to the Department upon request. The South District office of the Department shall be notified in writing at least 15 days prior to any testing of any instrument to allow witnessing.

3. Miscellaneous Requirements

a. Start-up and Shut-down Procedures

During start-up procedures, propane gas shall be used to preheat the combustion zone to achieve a furnace roof temperature of 1270°F and a minimum temperature of 1800°F above the grate (at a height to be specified by the vendor) prior to the ignition of MSW.

During all shut-down procedures, propane gas shall be used to ensure that the temperature above the grate, as specified above, does not drop below 1800°F and the furnace roof temperature is maintained above 1270° while any MSW is still burning.

b. Operating Procedures

Operating procedures shall include good combustion practices and proper training and certification of all operators. The good combustion practices shall meet the guidelines established in 40 CFR 60, Subpart Ea and procedures as established by the equipment manufacturers. All operators (including supervisors) of air pollution control devices shall be properly trained and certified in accordance with the manufacturers guidelines. A list of all such certified personnel shall be submitted to the South District Office.

prior to start of construction, to further minimize mercury emissions. Chromium compounds shall not be used as an additive in the cooling tower water.

g. Fugitive (Unconfined) Emissions

Fugitive emissions at this facility shall be adequately controlled at all times. All roads shall be adequately paved and vacuum swept if appropriate, to keep free of visible dust. Speed limit signs shall be posted. Residue from the grates, grate siftings, and ash from the combustor/boiler and fabric filter hoppers during normal operations shall be discharged into the ash quenching system so as to minimize visible dust. The ash/residue in the ash handling building shall remain sufficiently moist to prevent dust during storage and handling operations.

h. The height of the boiler exhaust stack shall not be less than 275 feet above grade or the height determined to be Good Engineering Practice.

i. The SWERF's boilers shall not be loaded in excess of their permitted capacity of or 275 x 10^6 Btu per hour, each unit, based on heating value of 5000 Btu/lb of MSW.

j. The combustor boilers shall have a metal name plate affixed in a conspicuous place on the shell showing manufacturer, model number, type waste, and rated capacity.

k. Combustion efficiency shall be calculated by: $\%CE = (1/(1+(CO/CO_2))) \times 100$, and shall be at least 99.5% for an 8 hour average.

4. Emission Control Equipment

a. The combustor's particulate control baghouse shall be designed, constructed and operated to achieve a maximum emission rate of 0.010 grains per dscf corrected to 7% O_2.

b. The facility shall be equipped with dry scrubbers which are designed, constructed and operated to remove SO_2 at an efficiency of 80% by weight or to achieve an emission rate of 30 ppmdv at 7% O_2 which ever is less stringent and to cool the flue gases to an average temperature not to exceed 300°F (3-hour rolling average).

c. The Permittee shall submit to the Bureau of Air Regulation within thirty (30) days after it becomes available, copies of technical data pertaining to the selected emissions control systems. These data should include, but not be limited to, guaranteed efficiency and emission rates, and major design parameters.

Weather Bureau Technical Paper No. 40, or the DOT drainage manual, or similar documents) shall meet applicable State Water Quality Standards, Chapter 17-302, F.A.C., the Standards of Chapter 17-25, F.A.C., and Chapter 40-E, F.A.C.

2. Groundwaters

All discharges to groundwaters shall be collected and treated as necessary, or otherwise be of high enough quality, to be able to meet the applicable Water Quality Standards of Sections 17-301.402 and 17-301.404, F.A.C., at the boundary of a zone of discharge approved for each potential pollution source. If monitoring should indicate a violation of the standards, the Permittee shall immediately notify the South District office and SFWMD and institute remedial action.

3. Groundwater Monitoring Program

a. Sampling of the shallow aquifer groundwater quality shall be conducted in at least six well clusters in the site vicinity. At least one of these wells shall be up the hydrologic slope from the landfill area to provide current background data. Other wells shall be located down the hydrologic slope from the ground water discharge areas. Specific location of any new wells or modifications to the monitoring program may be proposed by the applicant, but shall be approved by the South District Office prior to the construction of the new monitoring wells.

b. A ground water monitoring plan shall be submitted within 120 days of certification in accordance with Rule 17-28.700 F.A.C., for approval by the South District Office.

c. Upon completion of construction of the groundwater monitoring system, the following information shall be submitted to the South District Office for all ground water monitoring wells and any new well(s) constructed:

Well identification	Drillers log
Latitude/Longitude	Total depth of well
Aquifer monitored	Casing diameter
Screen type & slot size	Casing type and length
Screen length	SFWMD well construction
Elevation at top of pipe	permit numbers
Elevation at land surface	

c. Upon completion of construction of the groundwater monitoring system, but no less than 12 months before the commencement of operation the Permittee shall sample all ground water monitoring wells for the Primary and Secondary

of Agriculture and Consumer Services.

4. Storage of putrescible waste for processing shall not exceed storage capacity of the refuse bunker or tipping floor as designed on the approved plan.

5. Ash prior to transport to the landfill shall be stored in an enclosed building on an impervious surface. Final disposal of the ash shall be into the lined landfill or other method approved by the South District Office. Any leachate generated within the building shall be collected and disposed of by a method approved by the South District Office. The South District Office shall notify the SFWMD of the plans and specifications regarding the above referenced method.

6. A monthly report shall be prepared detailing the amount and type (putrescible, special wastes, boiler residue, etc.) of materials processed at the site. (see condition XIV.E.2. above). These reports shall be furnished to the South District Office quarterly, commencing 120 days after the SWERF becomes operational and is producing residues.

7. Unless approved by the Department with subsequent modification of conditions, this facility shall not accept materials defined by applicable Federal, State or local statutes, rules, regulations or ordinances as "Hazardous Wastes".

8. There shall be no discharge to waters of the State of polychlorinated biphenyl compounds.

9. The design, operation, and monitoring of disposal or control of any "special wastes" shall be in accordance with F.A.C. Section 17-702.060, and any other applicable department rules, to protect the public safety, health and welfare. "Special wastes" means those wastes that require extraordinary management. They include but are not limited to abandoned automobiles, white goods, used tires, waste oil, sludges, dead animals, agricultural and industrial wastes, septic tank pumpings, and infections and hazardous wastes. Sludges which may be hazardous due to their chemical composition shall be disposed of in accordance with F.A.C. Section 17-7.040(4). Disposal of Grade III Domestic Wastewater Treatment Sludge, disposal of domestic septage, and disposal of food service sludge, shall be in accordance with F.A.C. Section 17-7.540(6).

F. Operational Safeguards

The overall design and layout of the facilities shall be such as to mitigate potential adverse effects to humans and the environment. Security control measures shall be utilized to prevent exposure of the public to hazardous conditions. The

1. General

a. Responsible Entity

The Permittee, defined as Lee County or any full-service vendor/contractor under contract to the County, shall be responsible for the implementation of the Certification Conditions. If contractual rights, duties, or obligations are transferred under this Certification, notice of such transfer or assignment shall immediately be submitted to the Florida Department of Environmental Regulation and the SFWMD by the previous certification holder (Permittee) and the Assignee. Included in the notice shall be the identification of the entity responsible for compliance with the Certification. Any assignment or transfer shall carry with it the full responsibility for the limitations and conditions of this Certification. Reference: Sections 373.223 and 373.413, F.S.; Rules 40E-2.091(1)(a), 40E-2.301, 40E-2.381(1), 40E-4.091(1)(a), and 40E-4.301, F.A.C.

b. Minimum Standards

This Certification is based on the Permittee's submitted information to the SFWMD which reasonably demonstrates that adverse off-site water resource related impacts will not be caused by the authorized activities. The plans, drawings and design specifications submitted by the Permittee shall be considered the minimum standards for compliance. Reference: Sections 373.219, 373.223, 373.229, 373.308, 373.316, 373.413(1) and 373.416(1), F.S.; Rules 40E-2.091(1)(a), 40E-2.301(1), 40E-2.381, 40E-3.500-531, 40E-4.091(1)(a), 40E-4.301(1), and 40E-4.381, F.A.C.

c. Compliance Requirements

This project must be constructed, operated and maintained in compliance with and meet all non-procedural requirements set forth in Chapter 373, F.S., and Chapters 40E-2 (Consumptive Use), 40E-3 (Water Wells), and 40E-4 (Surface Water Management), F.A.C.

d. Off-site Impacts

It is the responsibility of the Permittee to ensure that adverse off-site water resource related impacts do not occur during the construction, operation, and maintenance of the project. Reference: Sections 373.223 and 373.413(1); Rules 40E-2.091(1)(a), 40E-2.381(d), 40E-2.381(e), 40E-4.091(1)(a), 40E-4.301, and 40E-4.381(2)(k), F.A.C.

e. Liability

activities authorized by the Certification Order. Reference: Sections 373.239 and 373.429, F.S.; Rules 40E-2.331 and 40E-4.331, F.A.C.

j. Post Certification Construction Notifications

At least 30 days prior to the commencement of construction, the Permittee or Project Engineer shall notify the SFWMD Field Engineering Division of the construction start date. Annual construction status reports shall be submitted by the Permittee to the SFWMD Engineering Division beginning with the initial construction start date. Reference: Sections 373.413(1) and 373.416(1), F.S.; Rules 40E-4.091(1)(a), 40E-4.301, and 40E-4.381(2)(h), F.A.C.

k. Operation Authorization

Authorization for the proposed energy recovery facility to begin operating shall not be granted by the Florida Department of Environmental Regulation until it has received and approved an executed contract between Lee County and an entity capable or receiving and disposing of the ash residue and other waste products to be generated by the proposed facility. Reference: Sections 373.043 and 403.504, F.S.

l. Enforcement

The SFWMD may take any and all lawful actions to enforce any condition of this Certification that is based on the rules of the agency. Prior to initiating such actions, the SFWMD shall notify the Secretary of DER of the proposed actions. The SFWMD may seek modification of this Certification for any change in any activity resulting from the SFWMD's enforcement of this Certification which change will have a duration longer than 60 days. Reference: Sections 373.2223, 373.319, 373.423, and 373.603, F.S.; Rules 40E-2.091(1)(a), 40E-2.301, 40E-2.381(2)(f), 40E-3.461, 40E-4.091(1)(a), and 40E-4.301, F.A.C.

2. Processing of Informational Requests

a. At least ninety (90) days prior to the commencement of construction of any portion of the proposed project, the Permittee shall submit to SFWMD staff, for a completeness and sufficiency review, any pertinent additional information required under the SFWMD's site specific standards and the Conditions of Certification for that portion proposed for construction. If SFWMD staff does not issue a written request for additional information within thirty (30) days, the information will be presumed to be complete and sufficient. Reference: Section 373.413(2), F.S.

The Permittee shall be responsible for mitigating to the satisfaction of the SFWMD any adverse impacts on existing legal uses caused by the groundwater withdrawals authorized by this Certification. If adverse impacts occur, or are imminent, SFWMD reserves the right to curtail withdrawal rates pursuant to the enforcement provisions of Condition XV.A.1.1 of these conditions. The adverse impacts can include:

(1) A reduction in well water levels that impairs the ability of an adjacent well to produce water (an adjacent well may be a domestic well, lawn irrigation well, public water supply well, etc.);

(2) A significant reduction in water levels in an adjacent water body such as a lake, pond, wetland, or canal system;

(3) Saline water intrusion or induction of pollutants into the water supply of an adjacent water user, resulting in a significant reduction in water quality; and/or

(4) A change in water quality that causes impairment or loss of use of well or water body.

Reference: Section 373.223,,F.S.; Rules 40E-2.091(1)(a), 40E-2.301(1), and 40E-2.381(2)(d),' F.A.C.

c. Impacts on Existing Off-Site Land Uses

The Permittee shall be responsible for mitigating to the satisfaction of the SFWMD any adverse impacts on existing off-site land uses as a consequence of the groundwater water withdrawals authorized by this Certification. If the withdrawals cause an adverse impact on existing land uses, the SFWMD reserves the right to curtail future withdrawal rates pursuant to the enforcement provisions of condition IV.a.1.1 of these conditions. Adverse impacts can include:

(1) A significant reduction in water levels in an adjacent water body such as a lake, pond, wetland, or canal system;

(2) Land collapse or subsidence caused by a reduction in water levels;

(3) Damage to crops and other vegetation, causing financial harm to the landowner; and/or

(4) Damage to the habitat of rare, endangered or threatened species.

request an extension of this authorization prior to the expiration of the five (5) year period.

Reference: Sections 373.223 and 373.236, F.S.; Rules 40E-2.091(1)(a), 40E-2.301, 40E-2.321(1)(e), and 40E-2.381, F.A.C.

3. Additional Information Requirements

a. Dewatering Operations

Prior to the commencement of construction of those portions of the project which involve dewatering activities, a detailed plan for the proposed dewatering activities must be reviewed by the SFWMD for a determination of compliance with the non-procedural provisions of Chapter 40E-2, 40E-3, and 40E-4, F.A.C. The following information must be submitted:

(1) A detailed site plan which shows the locations(s) for the proposed dewatering area(s);

(2) The method(s) of dewatering operations;

(3) The maximum depth for each dewatering operation;

(4) The location and specifications for all proposed wells and/or pumps associated with each dewatering operation;

(5) The discharge method, route, and location of receiving waters generated by each dewatering operation, including the measures (Best Management Practices) to be taken to prevent water quality problems in the receiving waters;

(6) The duration of each dewatering operation;

(7) An analysis of the impacts of the proposed dewatering operations which indicates that no significant impacts will occur to any existing on-site and/or off-site legal users, wetlands, or any existing plume of groundwater contamination;

(8) The location of any infiltration trench(es); and

(9) All plans must be signed and sealed by a State of Florida registered Professional Engineer and a State of Florida registered Professional Geologist.

Reference: Sections 373.229, 373.308, and 373.413, F.S.., Rules 40E-2.091(1), 40E-2.301, 40E-3.500-531, and 40E-4.381(2)(1), F.A.C.

b. Monthly Reporting Requirements

inspection and approval. Such notification shall include as-built drawings of the site which shall include elevations, locations, and dimensions of components of the surface water management system. Reference: Sections 373.117 and 373.419, F.S.; Rules 40E-4.091(1)(a), 40E-4.301(2), and 40E-4.381(2)(d), F.A.C.

b. Impacts on Fish, Wildlife, Natural Environment Values and Water Quality

The Permittee shall prosecute the work authorized under this Certification in a manner so as to minimize any adverse impacts of the authorized works on fish, wildlife, natural environment values, and water quality. The Permittee shall institute necessary measures during the construction period, including necessary compaction of any fill materials placed around newly installed structures and/or the use of silt screens, hay bales, seeding and mulching, and/or other similar techniques, to reduce erosion, turbidity, nutrient loading and sedimentation in the receiving waters. Reference: Sections 373.413(1) and 373.416(1) F.S.; Rules 40E-4.091(1)(a), 40E-4.301, and 40E-4.381(2)(a), F.A.C.

c. Access Roads

The Permittee shall, whenever available, utilize adjacent existing roads for access to the transmission line and potable water, reclaimed water and wastewater transmission line rights-of-way for construction, operation and/or maintenance purposes. Finger roads connecting the existing roads to the structure pads and access roads which must be constructed in areas where an existing road is not available shall be constructed in a manner which does not impede natural drainage flows and minimizes impacts to on-site and adjacent wetlands. Reference: Sections 373.41391), 373.414, 373.416(1); Rules 40E-4.301, and 40E-4.381, F.A.C.

d. Off-site Discharges

Off-site discharges during construction and development shall be made only through the discharge facilities authorized by this Certification. No roadway or building construction shall commence on-site until completion of the permitted discharge structure and detention areas. Water discharged from the project shall be through structures having a mechanism suitable for regulating upstream water stages. Stages may be subject to operating schedules satisfactory to the SFWMD. Reference: Sections 373.413(1) and 373.416(1), F.S.; Rules 40E-091(1)(a), 40E-4.301, and 40E-4.381(2)(g), F.A.C.

e. Discharge Structures

d. Authorized Control Elevation

20.5 Feet NGVD.

e. Should Lee County determine that this project should discharge to the Orange River, it may be necessary to revise these facilities in order to bring them into compliance with the appropriate drainage criteria. Reference: Section 373.413 and 373.414, F.S.; Rules 40E-4.091, 40E-301, and 40E-4.381, F.A.C.

3. Additional Information Requirements

a. Surface Water Management System Construction Plans

Prior to the commencement of construction of any portion of the project which affects the movement of waters, all construction activities for that portion of the proposed project which may obstruct, divert, control, impound or cross waters of the state must be reviewed by the SFWMD for a determination of compliance with the non-procedural requirements of Chapters 40E-2 and 40E-4, F.A.C. All plans, detail sheets and calculations shall be signed and sealed by a Florida Registered professional Engineer. For all construction activities, the following information shall be submitted:

(1) Detailed paving, grading and drainage plans, including on-site water management areas and on-site and perimeter site grades, which clearly indicate how run-off will be routed within and discharged from the site, demonstrate that the design storm will be held on-site, and verify the stage/storage assumptions;

(2) If control elevations are revised for any portion of the proposed surface water management system, revised calculations which demonstrate compliance with the SFWMD's retention/detention criteria for both quantity and quality purposes;

(3) If control elevations are revised for any portion of the proposed surface water management system, revise soil storage calculations;

(4) Detailed plans of all proposed roads, parking lots and building pads which demonstrate compliance with Lee County and SFWMD flood protection criteria;

(5) Cross-section of all proposed control structures which demonstrate compliance with SFWMD water quality and quantity criteria;

calculations, showing the type and size of water control structures (pipe, culvert, equalizer, etc.) to be used, with proposed flowline elevations marked, drainage areas identified and design capacity verified;

(6) A cross-section of all proposed excavation areas showing the proposed depth of excavation;

(7) Calculations and the supporting documentation which demonstrate compliance with all applicable criteria, particularly as they relate to allowable discharge;

(8) Identification of wet season water table elevations for each basin in which facilities will be located;

(9) Calculations and supporting documentation which demonstrate that the proposed construction activities associated with the transmission line or potable water, reclaimed water, and/or wastewater transmission line will not have an adverse water quantity and/or water quality impact on existing and/or permitted surface water management systems; and

(10) If construction of the proposed transmission line or potable water, reclaimed water, and/or wastewater transmission lines contributes to the necessity for future modifications to adjacent/existing roads, water quality treatment of the requested modifications must be addressed in the surface water management system design for the transmission line or potable water, reclaimed water, and/or wastewater transmission lines.

Reference: Sections 373.413(1), 373.413(2), and 373.41691), F.S.; Rules 40E-4.091(1)(a), 40E-4.301, and 40E-4.381, F.A.C.

c. Surface Water Quality Monitoring Program

Within three months of issuance of this Certification, the Permittee shall submit for review by the SFWMD a surface water quality monitoring program which monitors all discharges from the surface water management system into the Buckingham Road drainage system.

(1) While the program may incorporate additional monitoring requirements and parameters as required by other agencies, it shall include the following parameters and time frames at a minimum:

sufficient reasonable assurances to support a reduction, the SFWMD reserves the right to require that the original water quality monitoring program be continued.

Reference: Section 373.413(1), 373.413(2), and 373.416(1), F.S.; Rules 40E-4.091(1)(a), 40E-4.301, and 40E-4.381, F.A.C.

d. Hazardous Materials Management

Prior to the commencement of construction of this project, the Permittee shall submit a copy of the Comprehensive Oil, Hazardous Materials, and Waste Management Plan for the Lee County Energy Recovery Facility to the SFWMD for a determination of compliance with the requirements of Chapter 40E-4, F.A.C. The plan shall provide an adequate level of detail for early warning and detection of hazardous materials within the shallow groundwater. At a minimum, the plan shall include a groundwater monitoring network, including proposed up-gradient and down-gradient locations of monitoring wells, prepared by a hydrogeology consultant. Reference: Section 373.413(1), 373.413(2), and 373.416(1), F.S.; Rules 40E-4.091(1)(a), 40E-4.301, and 40E-4.381, F.A.C.

D. Environmental Conditions

1. General

a. Wetland Avoidance

The Permittee shall avoid impacting wetlands within the plant site and transmission line and potable water, reclaimed water and wastewater transmission line corridors wherever practicable. Where necessary and feasible the location and span between power poles and the location of the potable water, reclaimed water and wastewater transmission lines within the right-of-way shall be varied to eliminate or reduce wetland impacts. Reference: Sections 373.413(1), 373.414, and 373.416(1) F.S.; Rules 40E-4.091(1)(a), 40E-4.301, and 40E-4.381, F.A.C.

b. Fill Materials

No fill materials shall be obtained from excavated wetlands within the project site, unless in accordance with a mitigation plan submitted in compliance with the conditions of this Certification. Reference: Sections 373.413(1), 373.414, and 373.416(1) F.S.; Rules 40E-4.091(1)(a), 40E-4.301, and 40E-4.381, F.A.C.

c. Additional Wetlands Mitigation

to be undertaken, including the location of all mitigation areas and a description of the manner in which these areas will be created, restored or enhanced;

(6) A timetable for accomplishing the proposed mitigation activities prior to, or concurrent with, the construction of the proposed power plant facilities and any associated wetland impacts, unless documentation for doing otherwise is submitted and approved in writing prior to the commencement of construction;

(7) Documentation that the mitigation areas and preserved wetlands, with buffer zones, have been legally reserved such that they will be managed in a manner consistent with their proposed use as conservation areas;

(8) A detailed monitoring and maintenance program designed to ensure the survival and success of any created, restored, or enhanced wetlands, which is predicated on a guaranteed survival or coverage of 80% of the appropriate vegetation. At a minimum, the monitoring program shall be conducted for a period of five years, with reports submitted to SFWMD staff annually, and all monitoring stations identified on a plan view.

Reference: Sections 373.413(1), 373.413(2), 373.414, 373.416(1), and 373.59, F.S.; Rules 40E-4.091(1)(a), 40E-4.301, and 40E-4.381, F.A.C.

c. Transmission Line and Potable Water, Reclaimed Water, and Wastewater Transmission Lines Mitigation Plans

Prior to the commencement of construction of any portion of the proposed transmission line or potable water, reclaimed water and/or wastewater transmission lines, a mitigation plan to offset any wetland impacts associated with that portion of the transmission line or potable water, reclaimed water and/or wastewater transmission lines must be submitted to the SFWMD for a determination of compliance with Chapters 40E-2 and 40E-4, F.A.C., including Appendix 7 (Isolated Wetlands Rule) of the Basis of Review for Surface Water Management Permit application within the SFWMD. The plan shall include the following:

(1) Specific acreage figures and locations of all wetlands, both within the transmission line and potable water, reclaimed water and wastewater

annually, and all monitoring stations identified on a plan view.

Reference: Sections 373.413(1), 373.413(2), 373.414, and 373.416(1), F.S.; Rules 40E-4.091(1)(a), 40E-4.301, and 40E-4.381, F.A.C.

XVI. OPERATIONAL CONTINGENCY PLANS

A. Operating Procedures

The permittee shall develop and furnish the South District Office a copy of written operating instructions for all aspects of the operations which are critical to keeping the facility working properly. The instructions shall also include procedures for the handling of suspected hazardous, toxic and infections wastes.

B. Contingency Plans

The Permittee shall develop and furnish the South District Office written contingency plans for the continued operation of the system in event of breakdown. Stoppages which compromise the integrity of the operations must have appropriate contingency plans. Such contingency plans shall identify critical spare parts to be readily available.

C. Current Engineering Plans

The Permittee shall maintain a complete current set of modified engineering plans, equipment data books, catalogs and documents in order to facilitate the smooth acquisition or fabrication of spare parts or mechanical modifications.

D. Application Modifications

The Permittee shall furnish appropriate modifications to drawings and plot plans submitted as part of the application, including operational procedures for isolation and containment of hazardous wastes.

XVII. TRANSFER AND OR ASSIGNMENT

If contractual rights, duties or obligations are proposed under this certification, notice of such transfer or assignment shall immediately be submitted to the Department and SFWMD by the certification holder (Permittee) and the Assignee. Included within the notice shall be the identification of the entity responsible for compliance with the certification. The Department may approve such transfer or assignment by

The Permittee shall perform a survey of the project site for endangered and threatened plants and animals according to Florida Game and Fresh Water Fish Commission specifications prior to initiation of construction. If it is determined that any of these species will be adversely affected by the construction, the Permittee shall consult with the Commission to determine the appropriate steps to be taken to minimize or mitigate any adverse impacts.

C. Exotic Plant Removal

All Brazilian pepper, Australian pine, and melaleuca shall be removed from the site during construction or the trees shall be cut and the stumps treated with an approved herbicide. Removal shall be in a manner that minimizes seed dispersal. Removal of these species shall be a part of the regular maintenance of these areas.

D. Air Pollution Control

1. The County shall add a mercury control device to the project that is guaranteed by its manufacturer to remove 70 percent of the mercury in the exhaust gases.

2. The County shall operate a household battery collection program to remove batteries from the waste stream.

3. The Permittee shall undertake and implement any additional processes and procedures to control emissions of regulated pollutants which are determined necessary by the Department of Environmental Regulation or the U.S. Environmental Protection Agency (EPA). This shall specifically include the new EPA emission limitations to be promulgated later this year, as required under the Clean Air Act Amendments of 1990.

4. The Permittee shall increase the planting of trees on county properties and encourage the planting of trees throughout the county. The objective is to offset the energy recovery facility's release of carbon dioxide from the combustion of fossil-fuel-derived materials.

5. The Permittee shall monitor mercury emissions from the energy recovery facility to ascertain the efficiency of its mercury-control equipment. The results shall be reported to the DER.

E. Ash Marketing

The Permittee shall endeavor to market the energy recovery facility's ash residue. The Permittee shall file an annual report with the Department of Environmental Regulation

construction and operation of the facility.

2. The Permittee shall provide innovative arrangements such as flexible hours of employment, as appropriate, to increase the access of working parents to employment at the facility.

XXI. SOUTHWEST FLORIDA REGIONAL PLANNING COUNCIL

A. Waste Management

1. Lee County shall amend the application to include the additional control device for mercury removal (as described in the March 8, 1991 letter to FDER) or comply with any future requirement for mercury emission controls of the United States Environmental Protection Agency, whichever is more restrictive.

2. Lee County shall implement a battery recycling program.

3. Lee County shall implement a commercial recycling program. The aim of the program should be to separate recyclable materials from the commercial waste stream.

4. The project will be required to ensure that no objectionable smell will be produced in areas downwind of the facility, or in the adjacent park site.

B. Water Resources

1. All impacted wetlands, whether on-site or off-site, shall be buffered from impacts of construction or operation of the proposed facility. Such buffers may be natural or structural, but should extend between 15 feet and 25 feet from the edge of each impacted wetland to comply with the requirements of the SFWMD and Lee County.

2. The applicant will be required to ensure that the recycled wastewater and circulation systems do not impact surface or groundwater quality, and that the water from the cooling tower blowdown (via the dry scrubber and residue quench tanks), does not discharge to surface or ground waters. The applicant shall provide safeguards to prevent any leakage from these systems form impacting surface water or groundwater.

3. The applicant shall ensure that the moist residue from the residue quench system does not contaminate surface water or groundwater.

4. The construction, operation and maintenance of

accurately measure) and ensure that the removal levels are being attained.

E. Hazardous and Nonhazardous Materials and Waste

1. The hazardous waste and recycling programs identified by Lee County within the letter to the SWFRPC, dated Nov. 5, 1990, and the mercury control strategy identified in the March 8, 1991, letter to FDER shall be implemented.

2. The applicant will take steps and precautions to ensure that commercial and industrial wastes accepted at the facility as a fuel source do not contain hazardous materials or wastes, and that such materials and wastes do not enter the processing stream.

F. Transportation

1. The construction phases for the facility have the potential to produce more traffic than the facility when operational. Prior to approval of building permits, an analysis of the traffic produced during construction should be performed.

2. A reanalysis of the traffic impacts of the facility should be performed prior to approval of building permits. The analysis should address the following:

a. Turn lane improvements to accommodate the trucks accessing the facility both on site and at the intersection of Buckingham Road with State Road 82/Immokalee Road and other impacted intersections.

b. Access to the proposed joint Hendry/Lee County landfill in Hendry County.

c. Potential widening of Buckingham Road and State Road 82/Immokalee Road and other impacted roadways to accommodate truck traffic.

d. The trucks accessing the site will be heavily loaded; projections are between 30 and 35 tons apiece. The additional roadway and bridge maintenance or reconstruction costs associated with the weights of the trucks should be reviewed.

3. The traffic analysis assumes that the ash residue will be taken by truck form the resource recovery facility to a disposal site in Hendry County via SR 82. If the route to the disposal site changes in the future, Lee County shall be required to submit a revised analysis of traffic impacts and

STATE OF FLORIDA
DIVISION OF ADMINISTRATIVE HEARINGS

In Re:	)	
APPLICATION FOR POWER PLANT SITE CERTIFICATION OF LEE COUNTY SOLID WASTE RESOURCE RECOVERY FACILITY	)	CASE NO. 90-3942EPP

APPENDIX B

APPENDIX TO RECOMMENDED ORDER IN CASE NO. 90-3942EPP

The following constitutes my specific rulings pursuant to Section 120.59(2), Florida Statutes, on the proposed findings of fact submitted by the parties in this case.

Specific Rulings on Proposed Findings of Fact Submitted by Lee County

1. Each of the following proposed findings of fact is adopted in substance as modified in the Recommended Order. The number in parentheses is the Finding of Fact which so adopts the proposed finding of fact: 1-10(1-10) and 11-98(22-109).

Specific Rulings on Proposed Findings of Fact Submitted by the Department of Environmental Regulation

1. Each of the following proposed findings of fact is adopted in substance as modified in the Recommended Order. The number in parentheses is the Finding of Fact which so adopts the proposed finding of fact: 2-6(11-15); 7(3); 8(4); 10-15(16-21); 16(25); 17(26&27); and 18-20(28).

2. Proposed findings of fact 1, 2, 9, and 21-26 are subordinate to the facts actually found in this Recommended Order.

Specific Rulings on Proposed Findings of Fact Submitted by SFCARE, Inc.

1. Each of the following proposed findings of fact is adopted in substance as modified in the Recommended Order. The number in parentheses is the Finding of Fact which so adopts the proposed finding of fact: 7(16-18).

2. Proposed findings of fact 1-6, 8, 10, 11, and 15 are subordinate to the facts actually found in this Recommended Order.

3. Proposed findings of fact 9, 12, 13, 14, and 16, in whole or in part, are unsupported by the credible, competent, and substantial evidence.

OGDEN MARTIN SYSTEMS
of LEE, Inc.

SPEC NO. SM-101
ISSUE 011
DATE 10-31-91

TECHNICAL SPECIFICATION

FOR

(MSW) MUNICIPAL SOLID WASTE STEAM GENERATORS

Facility Name: LEE COUNTY SOLID WASTE RESOURCE RECOVERY FACILITY

Location: LEE COUNTY, FLORIDA

****

****

Specification Prepared By:

Name: OGDEN MARTIN SYSTEMS, INC

Address: 40 LANE ROAD
FAIRFIELD, NJ 07007

Telephone: 201 - 882 - 9000

Approved for Release:

	Printed Name	Signature	Date
1.	R. TERRAMOCCIA	R Terramoccia	6/25/92
2.	R. TERRAMOCCIA	R. Terramoccia	10/26/92
3.	R. TERRAMOCCIA	R. Terramoccia	2/5/93
4.			
5.			

Revision

001	Initial Issue	01/01/87
002	Revision	07/01/87
003	Revision	10/21/87
004	Revision	10/29/87
005	Revision	11/04/87
006	Revision	05/26/88
007	Revision	08/05/88
008	Revision	09/14/89
009	Revision	10/09/90
010	Revision	01/31/91
011	Revision	10/31/91

OGDEN PROJECTS, INC.

TECHNICAL SPECIFICATION
FOR
MSW STEAM GENERATORS

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1.0 GENERAL

1.1 Scope

This Specification covers requirements for the design, manufacture, delivery, erection, field adjustment, calibration and testing of bulk municipal refuse fired steam generators complete with accessories. Refuse will be fired on Martin stokers furnished by the Purchaser and erected by the Contractor.

The Contractor shall establish the boiler configuration, the heating surface requirements and tube geometry using the enclosed Martin data sheets and drawing. If the Contractor's proposed heating surface requirements are different from those presented in the Martin data, the Contractor shall provide the Purchaser with complete technical details of the differences as well as complete proposals for both schemes.

The Contractor shall include in his scope the building support steel, purlins, girts, roof deck support steel, roof trusses, parapet, misellaneous steel at wall openings/penetrations, roof access hatch framing and silencer support framing, etc., for the boilerhouse envelopes which shall be integrated with the boiler support steel. The steel shall be erected on foundations supplied by the Purchaser.

The Attachments including all Specifications are part of this Boiler Specification and shall govern the purchase of material, equipment or services specified herein.

Where conflicts exist between the requirements of this Specification and the attachments, they shall be brought to the attention of the Purchaser for final resolution.

1.2 Work to be Provided

1.2.1 Furnished and Installed by the Contractor

The Contractor shall furnish and install equipment and materials consisting of but not limited to the following:

Prime Paint Coat on all Structural Steel, Uninsulated Pipe, Ductwork and Supports
Steam Generator Pressure Parts
Steam Purifier
Superheater
Attemperator(s)
Economizer
Air Heater(s) (Steam Coil)

Inner Casing
Insulation and Lagging
Refractory
Boiler Structures
Building Steel - including girts and subgirts designed to meet spacing requirements of Owner's siding and roof deck support steel
Accessory Structures
Platforms and Ladders
Framing for Doors, Louvers, A/C Ducts, Silencers and Roof Hatches
Ash Hoppers
Framing and Support for Elevator and Lobby, if Required
Framing and Supports for Ducts, Piping, Conveyors, Electrical Cable, etc.
Penetrations in roof and walls
Ash Chute(s) from Boiler Convection Pass Hopper to Stoker Ash Chute Area
Ash Dischargers Bypass or Diverter Gate Support
Air Ducts, Dampers and Flow Elements
Desuperheater Control Valves
Trim, Piping and Valving
Miscellaneous Boiler Instrumentation
Safety Valves and Power-Activated Relief Valves (including vent stacks, silencers, Vents, Drains)
F.D. Fan(s) (including flow control equipment as specified)
F.D. Fan Drive(s)
O.F.A. Fan(s) (including flow control equipment as specified)
O.F.A. Fan Drive(s)
O.F.A. Fan Supports (as required)
Seal Air Fan(s)
Seal Air Fan Drive(s)
Seal Air Fan Silencer
Fan Silencer Support(s)
Fan Pedestal Concrete Fill (if required)
Fan Isolation/Vibration Dampers (if required)
Soot Blowers (complete system, including insert panel, controls, piping and starters)
Auxiliary Fuel Burner(s) (complete system including piping and fuel safety valves, vent piping to roof and ignition system)
Auxiliary Fuel Burner Purge System (including fans, motors, if required)
Burner Fuel and Air Flow Positioning System
Burner Management System
Lagging, Insulation and Setting
Stoker Casing Enclosure and Seals, including Stoker Support Beams
Erection Supervision (including boil-out and refractory curing)
Field Erection Labor

Service Representative
Test Engineer
Freight
Unloading, Storage and Handling of Contractor Installed Equipment
Plywood Covering of Stokers
Special Tools
Hydrostatic Testing
Spare Parts (optional price)

1.2.2 Services

Erection Service

The Contractor shall receive, unload, store and remove from storage, erect, install and prepare for operation all equipment and materials furnished by the Contractor and stoker system equipment supplied by the Purchaser for erection by the Contractor. The Contractor shall follow all instructions by the stoker supplier (Martin GmbH) including covering the finished stokers with plywood protection before refractory installation and regarding storage and handling of stoker system equipment.

The Contractor shall furnish all supervision, labor, tools, rigging, and incidental material necessary for the complete installation of the specified materials and equipment.

Start-Up and Testing Services

The Contractor shall furnish all labor, supervision, materials and equipment required to perform hydrostatic testing of equipment furnished under this Specification.

The Contractor shall furnish service and testing advisors to assist the Purchaser for the following functions and durations. Costs for addition and deletion of service advisor time shall be included in the proposal:

1. Chemical Cleaning - 5 man-days per steam generator

2. Startup and Field Operations Tests - 30 man-days per steam generator.

1.3 Work by Others

1.3.1 Furnished and Installed by the Purchaser

The Purchaser will furnish and install the following materials and equipment:

Ash handling chutes, valves and conveyors (except convection pass chute(s)
Flue gas ducts (from economizer outlet flange)
Starters (except for sootblowers)
Wiring (except for superheater thermocouple wiring from headers to junction box)
Building siding

Building roof deck and framing for roof penetrations (except for silencers and access hatches)
Miscellaneous roof framing for smoke hatches, ducts and exhaust fans.
Elevator
Foundations and anchor bolts
Boiler cleaning (boil-out, including special chemicals and disposal thereof)
I.D. Fan(s) (including flow control equipment as specified)
I.D. Fan Drive(s)
Grouting
Finish painting of all structural steel

1.3.2 Furnished by the Purchaser and Installed by the Contractor

The Purchaser will furnish the following materials and equipment for installation by the Contractor.

Martin Stoker components basically consisting of:

Refuse feed hopper and chute assembly
Chute shutoff gates
Stoker grate assemblies
Feed rams/tables
Ram ash discharger and connecting piece
Hydraulic cylinders for stoker, ash discharger, overfire and underfire air dampers (including hydraulic piping)
Hydraulic pumping station
Electronic and hydraulic control cabinets
Undergrate air control system including dampers, orifices, pressure gauges and piping
Undergrate air hoppers and air plenums
Overfire air nozzles
Automatic central lubrication system

1.4 Terminal Points

It is the intent of this Specification that the Contractor shall furnish and install all piping, valves, instruments, and other appurtenances within the jurisdictional limits of the ASME, Section I, Boiler and Pressure Vessel Code, latest edition, as well as other scope items detailed herein.

In addition to the above requirements, the following shall also apply.

The Contractor's supply shall terminate at the points listed below:

A. Water Connections

1. Inlet to chemical feed valve(s).
2. Outlet of water wall and economizer blow-off valves.
3. Outlet of continuous blowdown valve(s).
4. Outlet of gauge glass and water column drain valves. These valves are located at the operating level.
5. Outlet of pressure test valve at the economizer.
6. Feedwater regulating station at feedwater block and by-pass valve (valves included in Contractor's scope)
7. Outlet of intermittant bottom drum blowdown valve(s).
8. Inlet to desuperheater spray regulator.
9. Safety valve drip pan and stack drains to operating/grade level.

B. Steam Connections

1. Outlet of superheater up to and including the second stop/check valve and the free-blow drain valve.
2. Silencer outlet of drum and superheater safety valves.
3. Silencer outlet of power activated relief valve.
4. Silencer outlet of drum and superheater vents.
5. Outlet of all vents (double valved by Contractor).
6. Outlet of all drains (double valved by Contractor).
7. Outlet of steam sampling valves.
8. Outlet of pressure test shut-off valves at drum and superheater.
9. Pressure and temperature connections as specified herein.
10. Inlet and outlet connections of steam coil airheater(s).
11. Outlet of traps and strainers or drain valves in sootblower piping.
12. Outlet of boiler drum trim shut-off and drain valves, as specified.
13. Sootblower piping connection to main steam pipe or to interstage (including flow element and taps).

C. Air Inlet Connections

1. Forced Draft (FD) and Overfire Air fan (OFA) inlet ducts and screens at top of refuse receiving pit.
2. Forced draft fan duct connections to Purchaser supplied stokers.
3. Seal air fan inlet(s) and silencer(s).
4. Auxiliary burner FD fan(s) inlet(s) including dampers.

D. Flue Gas Connections

1. Economizer outlet duct, complete with flange.

E. Ash Connections

1. Outlet discharge flanges at ash hoppers for superheater and economizer.
2. Stoker discharge chute.

F. Stoker Equipment

1. Brickwork, tile, refractory, insulation, lagging, casing enclosure for stoker(s), including insulation for the siftings hoppers, all to be supplied and installed by Contractor.

2. Seal air pipe system terminal connections at stoker transverse frame.

3. Connection for driving beam support roller seal air pipe system below stoker.

4. Openings for 3' x 4' access door, observation ports at stoker discharge rear wall and furnace side walls (waterwalls).

G. Electrical

1. Sootblower panel insert, motor starters and pushbutton stations with local disconnect switches.
2. 125 volt D.C. power relief valve controller connection.
3. Forced draft fan motor.
4. Overfire air fan motor.
5. Seal air fan motor.
6. Auxiliary fuel burner forced draft fan motor.
7. Auxiliary fuel burner purge air fan motor.
8. Auxiliary fuel burner panel and/or inserts.
9. Instrument and control terminal strips

H. Auxiliary Burner Fuel

1. Flanged valves, at inlet connection to burner front package (gas or fuel oil)

2. Atomizing air inlet connection (if applicable)

Note: If steam is used for fuel atomization the Contractor shall design and install the complete steam system.

1.5 Applicable Codes, Standards and Specifications

The latest edition and addenda of the following publications, effective on the date of Contract Award, are part of this Specification and, whether referred to by title or by designation only, are applicable to the extent indicated by the specific reference.

ASME - American Society of Mechanical Engineers

ASME I	Boiler and Pressure Vessel Code, Section I, Power Boilers, and all addenda thereto
ASME II	Boiler and Pressure Vessel Code, Section II, Material Specifications, and all addenda thereto
ASME IX	Boiler and Pressure Vessel Code, Section IX, Welding and Brazing Qualifications, and all addenda thereto
ASME PTC 4.1	Power Test Code - Steam Generating Units

ASTM - American Society for Testing and Materials

ASTM	Material Specifications
ASTM	Special Technical Publication 442, Manual on Water
D-1066	Standard Method of Sampling Steam
D-2186	Standard Methods of test for Deposit Forming Impurities in Steam
D-3370	Standard Methods of Sampling Water
A-123	Standard Specification for Zinc (Hot-Galvinized) Coatings on Products Fabricated from Rolled, Pressed, and Forged Steel Shapes, Plates, Bars, and Strips
B-209	Aluminum Alloy Steel and Plate

ANSI - American National Standards Institute

B 16.5	Steel Pipe Flanges and Flanged Fittings

B 31.1 Code for Pressure Piping, Power Piping

Other standards not listed herein but referenced in this specification shall be the edition specified in Appendix F of ANSI B31.1.

AWS - American Welding Society

AWS D1.1 Structural Welding Code

ABMA - American Boiler Manufacturers Association

Industry Standards

NFPA - National Fire Protection Association

NFPA 85A Prevention of Furnace Explosions in Fuel Oil - Natural Gas - Fired Single Burner Boiler Furnaces

NFPA 85B Prevention of Furnace Explosions in Natural Gas - Fired Multiple Burner Boiler-Furnaces

NFPA 85D Boiler-Furnaces

NFPA 85G Prevention of Furnace Implosions in Multiple Burner Boiler - Furnaces

AISC - American Institute of Steel Construction

Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings

Code of Standard Practice for Steel Buildings and Bridges

Building Code

All applicable requirements of the local, state and national building codes shall apply for the state in which construction will be performed

OSHA - Occupational Safety and Health Act

29 CFR 1910 Occupational Safety and Health Standards

29 CFR 1926 Safety and Health Regulations for Construction

SSPC - Steel Structures Painting Council

SSPC-SP6 Commercial Blast Cleaning

ASHRAE - Handbook and Standards

NEMA - National Electrical Manufacturers Association

NEC - National Electrical Code

IEEE - Institute of Electrical and Electronic Engineers

IPCEA - Insulated Power Cable Engineers Association

NESC - National Electric Safety Code

UL - Underwriter's Laboratory, Inc.

Should there be a conflict between various codes and/or specifications the Contractor shall refer it to Purchaser for resolution, but in principle it will be resolved in this order:

ASME Pressure Vessel Code
Other legal requirements, including state and local building codes
This specification
The more stringent requirements, should two or more specifications or areas within a specification differ in degree of severity

2.0 TECHNICAL REQUIREMENTS

2.1 Design Requirements

The steam generator and auxiliary equipment shall be designed to meet all general conditions and requirements of this specification, and the project specific requirements listed in the Design Conditions.

The steam generator shall be designed and fabricated in accordance with ASME Boiler and Pressure Vessel Code, Section I., latest edition. All boiler external piping being provided and not falling

within the scope of ASME Boiler and Pressure Vessel Code Section I shall be designed and fabricated in accordance with ANSI B31.1. The steam generators shall be of welded-wall, balanced draft design, suitable for continuous operation while fired by municipal solid waste (MSW) with the fuel and flue gas compositions as stated in the Martin Furnace Design Data.

The steam generators and auxiliary equipment shall be designed for indoor or outdoor installation as stated in the Design Conditions.

The design of the unit shall ensure maximum economizer flue gas outlet temperature rise of 75°F after 4,000 hours of continuous operation without shutdown for manual cleaning of fireside surfaces.

2.1.1 Furnace Pressure (Structural)

The furnace and boiler enclosure shall be designed as per NFPA 85G or 20 inches w.g., whichever is more stringent.

2.1.2 Martin Design Data

A set of Martin design data (Attachment 4) has been included with this Specification. It contains the following sections:

a) Furnace Design Data
b) Boiler Design Data
c) Stoker Capacity Diagram
d) Boiler Sketch
e) Load Plan

2.2 Pressure Part Materials - Tubes, Headers and Drums

The following minimum requirements are specified for the boiler pressure part materials:

	Dia. (in. O.D.)	Minimum Thk (in.)	Material (min. reqmts.)
Furnace waterwall	*	0.180	SA-178 A
Furnace Arch (above refractory)	*	0.220	SA-178 A
Furnace Exit Screen	As Req'd	0.380	SA-178 A or SA-106 B
Convection Evaporator	*	0.180	SA-178 A
Secondary Superheater T-11**	*	0.180	SA-210 A1/SA-213
Primary Superheater A1**	*	0.180	SA-178 A/SA-210

Superheater enclosure	As Req'd	0.180	& SA-213 T-11 SA-178 A
Economizer	*	0.150	SA-178 A
All waterwall headers***	10 (min.)	Per ASME	SA-106 B
Superheater headers	10 (min.)	Per ASME	As Req'd**
Economizer header	6 (min.)	Per ASME	SA-106 B
Steam drum	54 (min. I.D.)	Per ASME	SA-299 or SA-515 GR 70 or SA-516 GR 70
Water drum	36 (min. I.D.)	Per ASME	

* Per attached Martin Boiler Design Data

** Use of carbon steel materials is permissible up to a 750°F metal temperature. Above that temperature, a Cr-Mo material must be used.

*** Chillwall tube headaers may be 8 inches O.D.

All waterwall, evaporator, economizer and superheater headers shall be provided with inspection nipples with welded caps or welded hand hole plates as appropriate.

Vents and drains shall be provided on all high and low points of boiler pressure parts.

Tube shields shall be provided at the following locations:

Inlet to curtain wall panel, (dividing wall) first into second pass (1 row, full length of the exposed part of the first tube)

Inlet to convection banks including screen tubes (2 rows, full length)

Convection bank evaporator tubes facing sootblower, whole length and around outside bend if less than 6 feet from sootblower.

Inlet to superheater (2 rows, full length)

Economizer-inlet only (1 row, full length)

First tubes on either side of every sootblower cavity immediately facing the sootblowers (each tube bank and screen, full-length, except in the economizer where only the first row at the inlet shall be provided with tube shields).

Tube Shield Requirements:

Manufacturer:	Helmick or Purchaser approved equal
Material:	According to temperature (stainless steel) 3rd pass evaporator shall be minimum Type 310 stainless steel. Superheater and economizer shall be minimum Type 304 stainless steel.
Style:	-F and 180 degrees for straight tubes -CCI or CCO for curved tubes
Thickness:	Ten (10) Gauge
Length:	Maximum 48 inches per shield
Installation:	To ensure a tight fit, a clamping device must be used while the clips are welded to the shields. Each shield shall be tack-welded to the tube at one clip location only. Shields must cover the pipe also at the location of any tube welds. Max. 24" between clips. Sootblower supports or guides shall not be welded to tube shields

2.3 Steam Generating Section

2.3.1 Boiler Drums

The boiler drums shall be of fusion welded construction, complete with dished ends, 16 x 12 inches eliptical manholes and hinged covers in each end.

The steam drums shall be equipped with drum internals consisting of vortex type steam separators and steam dryers designed to ensure the steam purity (total dissolved solids in the steam) in accordance with the ABMA recommendations and this specification.

The required steam purity is to be achieved at all boiler loads and full steam drum water level operating range, when the boiler water quality is maintained within ABMA recommended limits. All drum internals shall be secured by bolts with acorn style nuts.

The steam drum shall be fitted with, at least, the following nozzles and connections:

a) Feed water nozzle
b) Chemical injection
c) Continuous blowdown
d) Intermittant blowdown
e) Safety valves
f) Water column with gage glass and remote reading level device
g) Probe water column
h) Water level transmitter
i) Pressure gauge and switch
j) Pressure transmitter
k) Saturated steam connection (to the superheater)
l) Spare nozzles (2 x 2 inches NPS, location on shell vertical centerline-saturated steam)

The feedwater and the chemical injection nozzles are to be fitted with thermal sleeves to minimize the local thermal stresses. The feedwater, blowdown and chemical injection shall be provided with suitably drilled, internal distribution pipes.

In general, most pipe connections to the steam drum nozzles shall be provided with butt-weld ends. Flanged connections are only required for safety valves, and probe water column, items e), and g).

2.3.2 Furnace and Waterwalls

The multiple pass unit shall be enclosed by gas-tight, fully welded waterwalls. These walls shall be shop fabricated, welded, panel type, tube-and-web design. The tubes shall be attached to the respective headers by welding. All bottom headers will be equipped with drains. The minimum drain size is 1-1/2 inches NPS. If required due to the relief tube layout, the top headers shall be provided with vents.

Should other design be offered as an alternative, for example, at the boiler bank side walls or superheater roof, the Contractor shall clearly identify this in his proposal together with detailed explanation of this alternative offer.

To minimize the slag and ash accumulation, the screens between first and second radiant passes shall be arranged with inlet headers and formed from a small number of relatively large bore pipes (minimum 4 inches in diameter) arranged with wide spacing (1-2 feet).

The furnace waterwalls shall be covered with SiC refractory up to a height of not less than 30 feet above the grate. To support this refractory, closely spaced stainless steel studs shall be shop welded onto the wall panels, as follows:

Stud material	430 SS
Stud dimensions	3/8 inch/diameter x 3/4 inch/long
Stud density	660/sq meter

In addition, 2 7/8 inches long 430 stainless steel Y-anchors (130/sq meter) and 4 1/4 inches long, 430 SS Y-anchors (also 130/sq meter) will be welded to the front wall ignition roof to support the castable alumina refractory.

The lower front wall header shall be provided with Y-anchors in sufficient number and size to support a 2 inch thick refractory liner.

Two inch long 430 SS Y-anchors (260/sq. meter) shall be welded to the chilled tube wall to side wall intersection. This intersection shall be designed to keep the uncooled area to an absolute minimum.

Proper studding shall be provided for all wall openings and penetrations. The studded areas shall be provided with a protective coating which must be carefully and completely removed by appropriate means (e.g., sandblasting) before the refractory may be applied.

The waterwall surface that forms the rear sidewalls and rear stoker roof, from 3 feet below the lower panel bend that houses the overfire air nozzles to the chill tube and bridgewall headers, shall be bare.

For all headers exposed to direct heat from combustion, the necessary protection shall be provided, including studs, bracing, anchors, sleeves, etc.

A suitable number of access door and observation port openings as well as sufficient number of scaffold cable openings in the roof of the first and second boiler passes shall be provided. Openings shall also be provided for the furnace temperature and pressure probes and the auxiliary fuel burner(s). The burner openings shall be water cooled and fitted with suitably reinforced rings and mounting flanges with minimum thickness of 1/4 inch and 3/8 inch respectively.

As a minimum, the following doors and observation ports are necessary in the first boiler pass:

	Up to 3 Stoker Runs	More than 3 Stoker Runs
Martin supplied observation ports	One side only: one near rear overfire air nozzles; two near burner at "end of refractory" level (angled to look down) Ignition door, near feed table edge	LH and RH side, same locations
Contractor supplied observation ports	As many as require to observe burner flame in from wall and opposite of burner(s)	
Contractor supplied access door near screen and header between 1st and 2nd pass (could be in 2nd pass also)	One side only	LH and RH side, same locations
Martin supplied access doors to stoker	One in rear wall	Two in rear wall
Martin supplied observation ports in rear wall	One stoker run Two stoker runs Three stoker runs Four stoker runs Five stoker runs Six stoker runs	0 1 2 2 3 4

High pressure overfire air nozzles shall be installed in the lower front and rear walls. These stainless steel nozzles will be supplied by the Purchaser and the Contractor shall provide the necessary waterwall openings and to install these nozzles.

Boiler buckstays and hangers shall be designed for independent support of each unit and also for applicable seismic loading. The buckstays and hangers shall allow free and unrestricted expansions under all operating conditions. Boiler bumpers and guides off boiler support steel shall also be provided.

Contractor shall provide chill wall restraints, tied to the stoker casing frame.

2.3.3 Convection Evaporator

In order to control the thermal performance of the unit, a convection evaporator is required. This evaporator shall be situated in the third boiler pass and arranged for upward flue gas flow.

The evaporator shall be arranged with adequate spacing to minimize fouling, for ease of cleaning and access. The necessary supports and spacers shall be designed to minimize metal temperatures, allow for sufficient expansion/thermal movements under all operating conditions and to minimize the dust accumulation. The design shall also ensure that the longitudinal and transverse alignments are kept during operation. Tubes shall be adequately braced to prevent excessive lateral movement during sootblowing.

The evaporator shall be of natural circulation design and shall be fully drainable. The minimum drain size is 1-1/2 inches NPS. Evaporator tubes must slope a minimum of 2 degrees.

Inlet and outlet of evaporator banks for two drum boilers shall be furnished with off-set screen tubes, arranged in-line.

The Contractor shall supply sufficient number of access door and sootblower openings and instrument connections, as required for operation, cleaning and monitoring of the unit.

As a minimum, each sootblower cavity shall be equipped with an access door that allows entry to the cavity for sootblower inspection. All access doors shall be positioned to facilitate entry into the boiler and be located near supporting surfaces (e.g. headers, tube banks, ledges, hoppers, etc) and the lower ledge of the door be not less than 1 foot or more than 3 feet above an access platform, unless a dedicated ladder with a step is provided to allow for easy access. Each access door shall have a handhold at the outside and the inside of the boiler. Access doors shall have integrated refractory where needed. Blocking of the opening with refractory bricks is not allowed.

2.3.4 Boiler Circulation System

The correct design of the circulation system is the sole responsibility of the Contractor. All sections, including downcomers, feeders, risers, relief tubes, all headers, distributors and collectors and drum separators shall be properly sized with low restrictions for high flow (circulation) rates to ensure low metal temperatures, especially of the radiant tube sections.

Boiler water shall enter downcomers arranged at the low point of the drum. To ensure steam free circulating water, steam and water separators shall be used and the incoming feed water shall be distributed to allow all downcomers to obtain proportioned flow. Downcomers larger than 10 inches NPS shall be fitted with anti-vortex devices. The downcomer system shall be fully drainable with minimum drain size of 1-1/2 inch NPS.

Due consideration shall be given to achieve proper circulation in the radiation and convection evaporating sections operating in parallel with different flow characteristics. If necessary, separate downcommers and relief pipes, header membranes (separating discs), orifices, distributors, etc. shall be provided.

2.4 Superheater

A multistage superheater shall be provided. It shall be arranged downstream of the convection evaporator for maximum protection from corrosion by hot fluegasses and ash particles. The superheater shall be designed to maintain the outlet steam temperature over the specified control range (steam generation).

2.4.1 Superheater Tube Banks

The tube banks shall be designed for high steam velocities to ensure proper steam distribution and to minimize superheater tube metal temperatures. The minimum steam mass flow rate shall be 220,000 lb/sq ft.-hr at MCR condition. The multistage design is required to ensure proper thermal performance under all operating conditions. Individual superheater tube banks shall not exceed 5 feet overall depth, measured between first and last tube centerlines in the direction of the gas flow.

The superheater shall be arranged with adequate spacing to minimize fouling, for ease of cleaning and access. The necessary supports and spacers shall be designed to minimize metal temperatures, allow for sufficient expansion/thermal movements under all operating conditions and to minimize the dust accumulation (e.g. design crossbracing and tube spacers at different elevations). The design

shall also ensure that the longitudinal and transverse alignments are kept during operation. Tubes shall be adequately braced to prevent excessive lateral movement during sootblowing.

The Contractor shall supply sufficient number of access door and sootblower openings and instrument connections, as required for operation, cleaning and monitoring of the unit.

As a minimum, each sootblower cavity shall be equipped with an access door that allows entry to the cavity for sootblower inspection. All access doors shall be positioned to facilitate entry into the boiler and be located near supporting surfaces (e.g. headers, tube banks, ledges, hoppers, etc.).

2.4.2 Spray Attemperator(s)

The Contractor shall furnish the required number of interstage, spray type, attemperator(s) as specified. In general, units with the final steam outlet temperature up to 750°F will use single stage attemperator and units with steam temperature above 750°F will use two stage attemperators.

These interstage attemperators shall be complete units with spray water assemblies, including spray nozzle(s) and orifice plate(s) as required and alloy steel, shop assembled spray header liner(s).

The Contractor shall furnish desuperheater control valve(s) including 4-20 mA I/P converters and airsets.

2.5 Economizer

Each boiler shall be provided with a bare tube economizer of counter flow design, preferably arranged with fluegas downflow and water upflow. The economizer shall be fully drainable and all tubes shall be attached to the headers by welding. Minimum drain size shall be 1-1/2 inch NPS. It shall have a gas-tight steel casing, minimum of 3/16 inch thick.

The economizer tube banks shall be designed for high water velocities to ensure proper water distributions and prevent steaming. The minimum water mass flow rate shall be 400,000 lb/sq. ft.-hr at MCR conditions. It should be noted that the individual economizer tube banks shall not exceed 5 feet overall depth, measured between first and last tube centerlines in the direction of the gas flow.

The economizer shall be arranged with adequate spacing for cleaning and access. The necessary supports and spacers shall be designed to minimize metal temperatures, allow for sufficient

expansion/thermal movements under all operating conditions and to minimize the dust accumulation. The design shall also ensure that the longitudinal and transverse alignments are kept during operation. Tubes shall be adequately braced to prevent excessive lateral movement during sootblowing.

The Contractor shall supply sufficient number of access door and sootblower openings and instrument connections, as required for operation, cleaning and monitoring of the unit. If hangers, supports or other obstacles limit access to certain areas, additional doors will be needed to allow unobstructed access to all parts of the economizer.

As a minimum, each sootblower cavity shall be equipped with an access door that allows entry to the cavity for sootblower inspection. All access doors shall be positioned to facilitate entry into the boiler and be located near supporting surfaces (e.g. headers, tube banks, ledges, hoppers, etc.).

2.6 Boiler Appurtenances, Instrumentation, Valves and Piping

The Contractor shall supply all specified boiler mountings and fittings, instrumentation, valves and piping within all terminal points of supply. All items shall be selected for the specified pressure and temperature conditions and in accordance with the ASME, Section I or ANSI B31.1 as applicable. The trim shall be selected for a minimum of 125% of the normal operating pressure (psig).

All instruments that are inserts to be mounted in the Purchasers control panels shall be shipped directly to the Purchaser's panel manufacturers shop. Examples include the miniature multi-light level indicator and sootblower insert panel.

2.6.1 Boiler Appurtenances and Instrumentation

All instrument locations must be provided with access and platforms for ease of maintenance or observation.

Steam Drum Instrumentation

- Pressure:

  One pressure tap and valve shall be provided for use by others to monitor drum pressure. An additional tap, valve and pressure gage shall be furnished and installed for local readout of drum pressure. Separate instrumentation and taps are to be provided as required for the auxiliary burner safety system.

- Level

  Drum level trim and accessories shall be furnished as specified below and as illustrated on Attachment 3. Gage glass isolation valves are to be of the angle, outside screw type.

Quantities below are typical for one (1) steam generator.

Near End:

Quantity		Item
1	a)	Direct vision illuminated water gauge with gauge valves and blowdown valves.
1	b)	Electro Eye-Hye system (or equal) consisting of the following:
1	b1)	Multi probe electrolev flanged water column with isolation, blowdown valves and NEMA 4 junction box.
2	b2)	Multi-light indicators with a range of not less than the trip point and not more than +3, -1.5 inches wider than the high and low trip ranges, one (miniature) to be located in control room and one (standard) to be mounted on the operating floor.
1	b3)	NEMA 4 control unit with optional test switch and relays. Unit shall have relays and contacts for the following outputs: Hi-Hi, Hi,Lo and Lo-Lo Alarms and cut-offs
4	b4)	Primary isolating valves.
1		Holding switch (located next to the blowdown valve of item b1) to prevent trip when blowing down.

Far End:

Quantity		Item
1	a)	Probe safety column consisting of the following:
1	a1)	Water column with isolation and blowdown valves
1	a2)	One set of probes positioned in water column cap

1 a3) NEMA 4 control unit with relays and supply transformer; following outputs (as dry contacts) are required:

LWL Output (4 contacts)
HWL Turbine Trip (1 contact)

1 b) One holding switch (located next to the blowdown valve of item a1) to prevent trip when blowing down the water column

1 c) Direct vision illuminated watergauge with gage valves and blowdown valves

2 d) Isolating valves (for water column connection)

2 e) Isolating valves (for feedwater level transmitter connection)

Furnace and Fluegas Instrumentation

Temperature taps - All temperature taps shall be 2 inch NPT and shall penetrate horizontally from outside of the lagging or vertically from above the roof, into the flue gas path.

Taps shall be provided at the following locations:

a) One on each side just above the refractory (max. 3 ft). Exact location(s) per the stoker manufacturer (Martin GmbH).

b) One on each side just above the bull nose. Exact location per the stoker manufacturer (Martin GmbH).

c) A specific number of taps across the roof of the first pass above the nose, equally spaced; the quantity based upon the following: boiler width-less than 20 ft, three taps; up to 40 ft, four taps; and up to 60 ft, five taps. The taps must be accessible from the top of the penthouse roof to be able to exchange thermocouples while the boiler is in operation. The taps shall be tapered at the bottom to guide the probes to the opening in the membrane wall roof.

d) On one side near the bottom of the second pass before the convection section. Exact location(s) to be provided by stoker manufacturer.

e) On one side before and after each superheater tube bank.

f) On one side before and after each economizer tube bank.

For items (d), (e), and (f), the temperature taps shall be on one side of the steam generator unless the steam generators are equipped with stokers of more than 3 runs in which case temperature taps shall be provided on both sides.

Pressure taps - All pressure taps shall be 2 inch NPT and shall penetrate from the outside of the lagging into the gas path at a 45° angle downward. The instrument connection on the outside will terminate in a 2" x 2" x 1" tee with a plug in order to allow for rodding out. It is essential that the tee and the instrument are not more than 5 feet above the access platform.

Taps shall be provided at the following locations:

a) One on each side just above the refractory (max. 3 ft). Exact location per the stoker manufacturer (Martin GmbH).

b) One on each side above the nose at a point where the furnace pressure is expected to be approximately zero.

c) One at each location designated under item d), e) and f) for temperature taps

Oxygen - 4 inch flanged connection with access and maintenance platform shall be provided upstream of the economizer in the center and on top of the inlet duct in conformance with Martin's instructions.

Metal Temperatures - Metal temperature thermocouples are to be installed in accordance with the boiler manufacturers recommendation. As a minimum, thermocouples shall be located at the superheater sections before each attemperator and at the final section. Thermocouples shall be wired out to a NEMA 4 junction box for monitoring by others.

Refractory Temperature - Thermocouples shall be buried near the top of the refractory. The number shall be as required by the refractory supplier to monitor the curing process. They shall be brought out to an accessible location on the main firing aisle (elv. 28.5) and terminated in a NEMA 4 junction box. They shall be clearly identified and protected as necessary.

CO Test Taps

To perform CO testing, furnace sampling penetrations are required on each boiler sidewall above the refractory, at two elevations. Each elevation shall contain three individual sampling points; at the center line of the furnace and the two quarter points. The location of these six (6) penetrations per sidewall shall be accessible from platforms or walkways. Each sampling point will

consist of 1/4 inch, schedule 40 carbon steel pipe welded to the tube fin. The tube fin penetration must be large enough to allow 1/4 inch stainless tubing to pass through (Refer to Attachment 11).

Air and Gas Duct Instrumentation

All taps shall be 1" NPT for flow, pressure and temperature.

Pressure - The following pressure taps shall be provided:

a) FD fan discharge pressure
b) Air heater inlet and outlet pressure
c) Underfire air pressure just prior to the stoker duct work interface point
d) Overfire air fan discharge pressure
e) OFA ducts, downstream of each damper and in each OFA header.

Temperature - Temperature taps shall be provided at the steam coil air heater inlet and outlet.

Flow - Flow elements shall be provided at the following locations:

a) FD fan inlet ductwork
b) OFA fan inlet ductwork

Flow elements shall be of low loss, venturi type with adequate (ASME) straight run and measurement taps furnished. The Contractor shall inform the Purchaser should insufficient straight run be available, so the Purchaser can arrange site calibration.

Feedwater and Steam Line Instrumentation

Temperature - The following temperature test points are to be provided complete with thermowells, cap and chain.

a) Economizer inlet
b) Superheater outlet

The following local temperature indicators complete with wells are to be provided:

a) Economizer inlet
b) Economizer outlet
c) Attemperator(s) inlet
d) Attemperator(s) outlet
e) Superheater outlet

The following temperature points are to be monitored by others. Thermowells for 1/4 inch diameter elements are to be provided by Contractor for the following:

a) Economizer inlet
b) Economizer outlet
c) Superheater inlet
d) Attemperator(s) inlet
e) Attemperator(s) outlet
f) Superheater outlet

Pressure - All pressure connections shall be 3/4 inch NPT complete with isolation valves.

The following local pressure indicators are to be provided.

a) Drum pressure
b) Superheater outlet

The following taps are to be provided for use by others.

a) Drum pressure (transmitter)
b) Superheater outlet (test tap and transmitter tap)
c) Economizer inlet (test tap)

Separate taps shall be provided for burner controls and power operated relief valves as required.

Steam and Water Sampling

Sampling probes shall be installed to sample the following:

a) Boiler blowdown (Stainless steel)
b) Saturated steam (stainless steel)
c) Superheated steam (stainless steel)

All steam probes shall be per ASTM D 1066

Damper Drives

The following dampers shall have drives furnished and installed, in accordance with the requirements of the fan specification SM-104, Attachments 3-2 & 3-3. They shall include inter-connecting linkages, current to pneumatic converters, positioners, limit switches for damper position indication, tubing, filter, regulators, solenoids and any accessories as required to have the dampers fail to the defined position. Drives shall be manufactured by Bailey Controls.

a) FD fan inlet vane, fail close.
b) OFA fan inlet vane, fail close.

The overfire air distribution dampers will be fitted with drives furnished by Purchaser. Contractor shall furnish the interconnecting linkages and the supports and mounting brackets in

accordance with Martin's drawings and instructions for these drives. All dampers and drives have to be provided with access for maintenance.

Fan Instrumentation

Fan instrumentation shall be furnished and installed in accordance with the requirements of the fan specification, SM-104.

2.6.2 Valves and Piping

A full complement of trim piping and valving shall provided. All boiler blowdown, vents and drains, including drains from drum instruments and all sampling lines, shall be double-valved, with the downstream valve located at the stoker operating level, grouped together for ease of operator access.

Feedwater piping shall be furnished from the economizer to a point in the piping at the inlet to the feedwater block and bypass valves (boiler external piping). Feedwater line sizing shall be in the range of 12 fps to 15 fps (max.).

Steam line sizing shall be in the range of 100 fps to 120 fps (max.).

Safety valves shall be furnished in accordance with ASME Section I with capacities certified by National Board of Boiler and Pressure vessel inspectors. All safety valves shall be flanged and furnished with vent stacks, silencers and drip pans. These valves shall be of rugged construction with tight shut-off. Thermally compensated design shall be used to ensure stability of set pressure and to minimize temperature distortion. The safety valves shall be Consolidated "Maxiflow", Crosby "HC/HCA" or Purchaser approved equal. A 125V D.C. electrically controlled relief valve and manual block valve shall be furnished at the superheater outlet piping, in addition to the code required relief valves. The relieving capacity of the electrically controlled valve shall not be less than 20 percent of the steam generator maximum continuous rating. The valve shall be provided with controls and subpanel for remote mounting by the Purchaser and shall be Crosby type "Pressurmatic" or Purchaser approved equal and shall be furnished with vent stack and silencer.

Silencers must be properly sized to avoid excessive back pressure on the safety valve causing improper valve action or reducing relieving capacity. Vent stacks, silencers and related piping shall be properly supported to avoid excessive loading on the valve discharge flanges.

All valves are to be selected for the intended service. Gate valves shall be used unless otherwise specified or agreed by Purchaser. Drain and vent valves shall be Hancock, Rockwell-Edward, Yarway, or Purchaser approved equal. Continuous blowdown valves shall be Yarway "Hy-drop" throttling valve designed for continuous blowdown rates of 0.2% to 2.0% of MCR steam flow (typical). Intermittent bottom blow-off valves for steam drum, bottom drum (for two drum boilers), and waterwall headers, shall be Yarway "Unit Tandem", Edward "Univalve" tandem blow-off valves, or approved equal. All valves shall be of the back-seat type and supplied with bolted bonnet, rising stem and stainless steel trim, repairable or replaceable without removing valve from the line. Valves two (2) inches and smaller, except control valves, shall be as a minimum 600 lb. std. forged steel with socket weld ends. Valves two and a half (2-1/2) inches and larger, shall be as a minimum 600 lb. std. cast steel with raised face flange or butt-weld ends. Four (4) inches and larger steam valves shall be provided with an integral valved by-pass for warm up. Safety valves shall be supplied with test gags. Feedwater and main steam non-return valve shall be furnished and be Rockwell-Edwards or Purchaser approved equal. Angle type check valves shall be furnished as required by the arrangement of the piping.

As far as possible, all valves supplied shall be of a single manufacturer. All valves of a single classification shall be identical and interchangeable.

The selection of pneumatic valve operators shall be subject to approval by the Purchaser. A handwheel and a position indicator shall be provided for manual operation of control valves. Interlocking shall be provided to prevent engagement of the handwheel when the operator is energized. Control valves shall be supplied with open and close limit switches for remote control and indication. Control valves shall be Fisher Controls or Purchases approved equal.

Pipe material shall be seamless, carbon steel ASTM A-106 B or ASTM A-53 B, or chrome-moly ASTM A335 P11, subjected to pressure and temperature limitations. Piping two (2) inch and smaller shall be as a minimum schedule 80. Pipes two (2) inches and smaller shall have socket weld joints and all pipes two and a half (2-1/2) inches and larger shall have butt-weld joints.

Fittings two (2) inches and smaller shall be 3,000 lb. forged carbon steel ASTM A-105 II, or forged alloy steel, ASTM A182 F11, socket type. Fittings two and a half (2-1/2) inches and larger shall be forged carbon steel ASTM A-234 WPA or WPB, or forged alloy steel, ASTM A182 F11, butt-weld joints.

All butt weld connections shall be provided with butt-weld ends in accordance with ANSI B 16.25.

The Contractor shall verify all flap gate valve sizes and dimensions with the Engineer for interfacing with the boiler steel, platform and stoker equipment.

2.6.3 Vents and Drains

Vents must be terminated through the roof. Drains (including safety valve drip pan drain and sootblower drains) shall be brought to a common "zero expansion" header at operating/grade level unless specifically requested otherwise.

Superheater and drum vents shall be routed into the nearest safety valve vent silencer or a separate silencer shall be mounted on each superheater and drum vent line.

2.7 Casing, Hoppers and Ducting

The Contractor shall supply all casing, hoppers and ducting with expansion joints within the scope of supply limits. These shall be of welded steel plate construction, designed and fabricated, including all supports, in accordance with applicable rules of the AISC. All material required to support these casings, hoppers and ducting, including all brackets, hangers, frames, etc., shall also be supplied by the Contractor.

2.7.1 Casing/Ducting

The Contractor shall include the economizer casing, boiler penthouse, and stoker front, sides and rear casing. Stoker casing shall be in accordance with Martin GmbH drawings and instructions.

The casing/ducting which is in direct contact with fluegas, i.e., economizer casing, shall be designed for the maximum expected flue gas temperature and for full internal design pressure. The maximum flue gas temperature must be assumed in the maximum fouled condition (e.g., + 75°). Carbon steel material is permissible up to a maximum expected flue gas temperature of 750°. For higher temperatures, appropriate alloy steels must be applied. It shall be adequately stiffened by externally welded steel reinforcements. The deflection of the casing stiffeners shall not exceed 1/360 of the span and the deflection of the plates shall not exceed 1/120 of the span between stiffeners. It shall be seal welded as required to obtain gas-tight design.

All plates used shall be of suitable carbon (A-36) or alloy steel, manufactured in accordance with ASTM specifications and shall not be less than 3/16 inch in thickness.

2.7.2 Hoppers

The Contractor shall furnish ash hoppers for the convection, superheater and economizer passes. Hoppers shall be of pyramidal configuration with minimum valley angle of 55 degrees. Hoppers shall be furnished with access doors, poke holes and strike plates. Hopper outlets shall be provided with 16 inch square openings for the convection pass hoppers and 12 inch square openings for all other hoppers. Minimum 3/8 inch thick square flanges shall be provided for connection to and to support the Purchaser's ash removal equipment. The hoppers shall be designed as a minimum for full ash loading based on density of 90 lb/cu. ft.

Convection pass hoppers shall connect through the rear membrane wall roof with a flanged insulated duct or be ducted into the rear furnace wall, in accordance with Martin's drawings and instructions. In each case the hopper exit opening and the connecting ductwork shall be no less than 16 x 16 inch inner dimension.

All plates used shall be A-36 carbon steel, manufactured in accordance with ASTM specifications and shall not be less than 1/4 inch in thickness. Alloy steel (A387 Grade 11, Class 1 or better) suitable for the maximum design temperature shall be used for the superheater hoppers.

The clearance between the economizer hopper(s) and ground floor elevation shall be minimum 16 feet for single hoppers and minimum 18 feet for multiple hoppers.

Where multiple hoppers are required across the width of the unit, the number of these shall be minimized as far as the minimum valley angle of 55 degrees allows.

2.7.3 Air Ducts and Dampers

Combustion air ducts with air intake screens shall be provided, which extend from the refuse pit intake to the forced draft (FD) and overfire air (OFA) fan inlets. The inlet duct shall be provided with a sealed penetration through the refuse storage/boiler area separation wall and an inlet screen of wire mesh (wire 1/8 inch diameter, mesh opening 3/8 inch square). The penetration detail shall be coordinated with the Purchaser to insure proper interface with building steel and siding. Ducting shall be 3/16 inch thickness (minimum) and designed with either single inlet which then splits into individual ducts to the FD and OFA fans, or completely independent inlet ducts to the fans. In either case, ducts shall be sized for a maximum local intake velocity through the screen of 800 fpm and maximum transport velocity of 3,000 fpm. The intake plenum shall allow for gradual increase in velocity to keep pressure drop to a minimum.

All ducts shall be adequately stiffened by externally welded steel reinforcements. Internal stiffeners are not acceptable. The deflection of the duct stiffeners shall not exceed 1/360 of the span and the deflection of the plates shall not exceed 1/120 of the span between stiffeners. Ducts shall be seal welded as required to obtain air-tight design. Turning vanes shall be furnished if required by the Contractor's design to reduce pressure loss.

The Contractor shall furnish flow balancing dampers in individual ducts to the overfire air nozzles. Each damper shall be provided with a control lever and linkage for connection to Purchaser furnished hydraulic activators. Dampers shall be equipped with end stops at their open end position. The Contractor shall provide all mounting hardware and installation including the mounting brackets to support the drive cylinders in accordance with Martin drawings and instructions. Dampers shall be of the multiple opposed blade type, with flanged connections to the ductwork.

Overfire air ducts shall be designed for low pressure drop. Velocities in the overfire air ducts shall not exceed 2000 fpm when 60% of the overfire air fan capacity is supplied to either the front or the rear row of nozzles. All stokers with more than 2 grate runs must feed the overfire air headers from each side of the boiler or have branch headers designed with a continuously reduced cross-section to assure even pressure aross the boiler width. Special arrangements must be made to ensure equal flow to all nozzles, e.g., gradually decreasing header size or multiple feed to header. Headers shall not be fed in line with nozzle centerline to avoid "blow through." Headers shall be fed perpendicular to the nozzle centerlines.

The sealing air from the seal air fan shall be supplied to one connection on each side of the stoker transverse frame, to the stoker observation ports (peepholes) and to the wallboxes of all retractable, and rotary sootblowers in the superheater and boiler convection passes. The sealing air to the filter for the driving beam support rollers may be supplied from the FD fan discharge. For stokers with 4 runs or more, seal air is required to be supplied to both sides of the stoker in separate air supply ducts or pipes.

Manual dampers shall also be furnished in the seal air distribution ductwork for balancing and isolation of flow paths.

All dampers shall be marked on the outside to clearly indicate the position of each damper blade and endstops shall be provided to avoid overturning of the blades.

2.8 Steam Coil Air Heater

The Contractor shall provide for each unit, for installation in the underfire air duct, a minimum of five (5) drainable steam coil air heater assemblies, mounted in airtight heavy duty frame casings, with removable core feature. The assemblies shall be arranged in series to provide at least five (5) separate stages of heating. A ductwork section with a minimum 18" x 48" quick opening type access door for cleaning shall be provided between the second and third stages. In addition, minimm 18" x 48" quick opening type access doors shall be provided in ductwork upstream of the first stage, and downstream of the last stage. Also, air heaters must be cleanable without removing the coils from the ductwork. Four inch diameter, capped drains in the ductwork shall be provided at the low point of the heater, spaced every 3 ft. across the width of the duct.

Finned steel tubes shall be schedule 40, with .036" minimum thickness steel fins, 4 fins per inch maximum. Tubes shall be arranged with in-line pitch. Offset tube arrangements are not acceptable.

Steam coil design shall be horizontal coils. Vertical coils, if required due to space and arrangement restrictions, shall be subject to Purchaser's approval.

Horizontal coils shall be inclined with internal steam distribution tubes. Flanged single inlet and outlet connections for each heater coil stage shall be provided on the same side of the coil. Coils shall be horizontally removable from the end opposite the piping connections. Piping, valves, traps, etc. for the steam supply and condensate return lines will be furnished by the Purchaser.

The steam coil air heater shall be designed to operate with the turbine extraction steam conditions specified in the Design Conditions. The following criteria shall also be used for coil design:

Air side fouling factor	-	0.01 $hr\text{-}ft^2\text{-}^\circ F/Btu$
Steam side fouling factor	-	0.001 $hr\text{-}ft^2\text{-}^\circ F/Btu$
Maximum allowable face velocity	-	900 ft/min.

For boilers with heated overfire air the Contractor shall furnish and install a similar type air heater and duct arrangement in the overfire air duct with a minimum of 4 separate stages.

The steam coil air heater(s) shall be designed to preheat the underfire combustion air (UFA) and overfire air (OFA) flow specified in Attachment 1, Design Conditions as follows:

HHV of Refuse	Temperature of UFA	
	Inlet	Outlet
up to 5250 Btu/lb	60°F	300°F
5250-5500 Btu/lb	60°F	250°F
over 5500 Btu/lb	60°F	200°F

Steam coils shall be manufactured by Armstrong-Hunt, Yuba Heat Transfer, Aerofin or Purchaser approved equal.

2.9 Lagging, Insulation and Setting

The Contractor shall furnish and install the complete brickwork, refractory, insulation and lagging for each steam generator and stoker unit.

2.9.1 Insulation and Lagging

All hot surfaces, including the boiler settings, and hot air ducts, plenums, piping, all hoppers including stoker siftings hopper, those parts of the Martin stoker supply as indicated on Martin's drawings, etc. shall be insulated and aluminum lagged. Outside skin temperature shall be no more than 130°F based on 80°F ambient temperature. Hot piping and equipment which are not in operation which are potentially subject to contact by personnel shall be insulated and lagged for personnel protection. Setting, ductwork and equipment lagging shall be 0.040 inch ribbed aluminum. For outdoor boiler units, lagging shall be provided with a shop applied enamel finish in a color and panel configuration to be determined by the Purchaser.

Piping insulation shall be mineral wool or fiberglass suitable for the operating temperature of the piping. Insulation shall be finished with aluminum jacketing.

Insulation used for covering valves, flanges, water columns, cross tees and watergauge valves shall be a removable jacket made of fiberglass blankets, suitable for the operating temperature.

2.9.2 Setting

Furnace waterwalls shall be covered with minimum 87% gunnited silicon carbide refractory to a thickness of 7/8 inch from the tangent of the tubes, up to a height of 30 feet above the Martin grate at the center of the furnace. The waterwall surface that

forms the rear sidewalls and stoker roof from 3 feet below the lower panel bend that houses the overfire air nozzles to the chill tube and bridgewall headers, shall be bare.

Thermocouples shall be buried in the silicon carbide lining, as required by the refractory supplier, to monitor the curing process. The Contractor shall furnish and install these thermocouples.

The suppliers of this system shall be Dyko, Didier Taylor, Norton or Purchaser approved equal. All SiC refractory shall be applied over SiC sleeves, which shall have a minimum density of 150 lb/cu. ft. and be installed on 3/8" dia. x 3/4" lg. stainless steel studs welded at 660 per sq. meter.

Shop installed refractory around the overfire air nozzles shall have provisions for anchoring field-installed refractory.

For the other refractory in the stoker area, the following shall be furnished and installed:

- The feed table side walls up to the end of the feed table, shall have minimum 85% SiC bricks. Brickwork in the entire feed table area shall be of the interlocking type. Adequate expansion joints and dense anchoring must be provided to withstand the extreme service expected in this area.

- The ignition roof shall be provided with 3 inch of 70% castable alumina (Al_2O_3) up to the overfire air nozzles and SiC (1 inch thick) at the nozzles and from the nozzles to the corner and up the front wall. The nozzle row shall have sufficient anchoring between the nozzles to install the refractory across the whole row in the form of a single wave.

- The area immediately below the feed table at the front of the grate shall have 85% high alumina special shaped firebricks with adequate expansion joints, e.g., every third joint to be filled with compressible material instead of mortar.

- The area immediately below the chill tubes shall be provided with special shaped firebricks. The fire bricks in the area of the first three stoker sections shall be minimum 85% SiC. The remainder shall be 85% high alumina. Adequate insulation between these bricks and the support frame is essential. Expansion joints must be provided as required.

- The areas from the lower sidewall chill headers to the rear wall and down to the ash chute, and the rear wall itself, shall be provided with castable refractory or low duty firebrick.

- The areas behind the chill tubes and special sidewall shapes shall have high duty firebrick, insulating firebrick, and high temperature block insulation.

All firebricks and refractory shall be properly designed and installed. Special attention shall be given to anchorage and expansion. Attention must be given specifically to the fact that the flow of refuse along the refractory will exert additional forces that require to be compensated by adequate anchoring of the refractory. All design drawings shall be submitted for information and review.

Low duty firebrick is defined as a fireclay brick having a PC value not lower than 15 nor higher than 28. High duty firebrick is defined as a fired clay brick having a PC value not lower than 29 nor higher than 31-1/2.

Hoppers for the convection passes shall be lined internally with refractory suitable for the maximum temperatures expected and for the mechanical strength required to withstand impact from falling slag. The refractory lining for the hopper for the second furnace pass shall be suitable for water washing without deterioration. The surface of the lining of the hoppers must be very smoothly trowelled to allow fly ash to glide through the hopper easily. As an alternate, hoppers may be fabricated from material suitable for the maximum expected gas temperatures, without refractory lining, but adequately insulated.

2.10 Sootblowing System

The Contractor shall provide a completely automated, sequential sootblowing system for each boiler, including sootblowers, wall boxes, motor starters and pushbuttons with local disconnect switches, solid state control system and panel, all necessary steam supply and condensate piping, valves, fittings, hangers, thermal drain valves, etc.

The sootblower system shall be designed to operate with superheated steam, taken from the superheater outlet piping down-stream of the Purchaser's flow element.

The sootblowing system shall be supplied by Diamond Power, or Copes Vulcan.

2.10.1 Sootblowers and Piping

Retractable blowers shall be provided for the convection evaporative surface (third pass) and superheater sections which are exposed to flue gas temperatures in excess of 1000-1200°F. The remaining superheater banks and the economizer may have rotary blowers, typically two blowers per section, including two blowers

at the superheater outlet. Sootblower materials shall be suitable for the temperatures and gas compositions normally encountered when bulk firing municipal solid waste.

Retractable sootblowers shall have steel box beam construction with an open bottom to enclose the drive mechanism, motor, lance and other moving parts for complete protection.

Rotary, lane sootblowers shall not be mounted further than 6 inches from the tube bank that they have to clean. Sootblower mounts and guides shall not be attached to the tube shields.

All sootblowers in the superheater and boiler convection passes shall be provided with a positive pressure, cooling/sealing air system. This air shall be obtained from the seal air fan system.

The piping system which is provided for the steam supply and drainage, shall be designed to allow for the thermal expansion of the piping system and the boiler. It shall be routed in a serpentine, downward arrangement, with shortest possible flanged connections to the individual sootblowers. Sootblower drains shall terminate at the stoker level with an isolation valve. A provision shall be made for removal of the condensate during the blowing cycle without interruption of the blowing.

Piping materials shall conform to the pressure and temperature limitations of ANSI B31.1 and ASME.

2.10.2 Sootblower Control System

Sootblowers shall have sootblower manufacturer's standard 460 volt electric motor drives. A NEMA 4 motor starter shall be furnished and installed local to each sootblower. Individual, blower mounted manual pushbuttons shall be provided. Sootblower pushbuttons, limit switches, etc. and motor shall be completely factory wired to the motor starter. Motor starter shall be furnished and wired complete with all necessary relays and auxiliary contacts required for interlocks and control. Terminal blocks shall be provided and wired to accept all remote power and control cables. Local disconnect switches with an external handle to disconnect power and control voltages shall be furnished, installed and wired to starters.

The Contractor shall furnish complete factory-fabricated sootblower sequencing control insert panels, suitable for mounting in a panel board. Insert panel color shall be as determined by the Purchaser. Factory to install in the subpanel enclosure all timing devices, relays and other devices as required for system control and operation with all wiring connected to terminals for field wiring

connections. Control system shall be the manufacturer's microprocessor or programmable controller system as approved by the Purchaser.

Three-way switches (Auto/Bypass/Manual) or electronic equivalent shall be provided for each sootblower.

The sootblower system and control panels shall be furnished with the following capabilities:

1. Reprogramability of blowing sequence to allow Operator to vary selected sootblower sequence from the panel.

2. Manual initiation of the automatic cycle.

3. Manual blow of any selected sootblower.

4. Deletion of any sootblower or combination of sootblowers from the cycle.

5. Manual stop of the automatic cycle at any point with provision for the completion of any sootblowers in operation.

6. Blowing failure alarm.

7. Forward and reverse travel indication for long retractable sootblowers.

8. Automatic retract of long retractable sootblowers upon motor overload.

9. Provision of separate SPDT "Sootblowing in Progress" dry contact for interface with flue gas cleaning control equipment.

10. Automatic warmup and condensate draining system based on thermal drain valve temperature indication. Use of warmup timing device may be incorporated, but shall not replace or override temperature sensing for control of warmup.

11. Blower operation elapsed time function, to alarm and stop blower sequence if a sootblower takes excessive time to complete its blowing cycle.

12. Variable space timer (0-60 minutes), to permit varying the time between sootblower operation in the sequence.

13. Reverse of all long retractable sootblowers and sequence stop, upon boiler trip.

2.11 Auxiliary Fuel System

The Contractor shall provide auxiliary burner(s) for each of the steam generators. The burner(s) shall be utilized for warmup, shutdown and temperature maintenance dictated by environmental permit conditions, and will be located in the side walls of the furnace within the SiC refractory area and rated for a continuous heat input as defined in the Design Conditions. The burner(s) shall be located 26.5 feet above the grate. The Contractor shall verify that the burner(s) is capable of raising combustion gases temperature to 1800°F for a combustion gas residence time of at least two seconds at all loads as well as during startup and shutdown. If this is not possible with the burner elevation stated above, the Contractor shall propose an alternate location to Ogden Martin Systems, Inc.

2.11.1 Auxiliary Fuel Burner(s)

The burner(s) and burner equipment shall be of a rugged and heavy duty design, entirely suitable for continuous power plant service. They shall also be suitable for service in place but not in operation. The design and all materials shall be chosen to minimize maintenance. Parts subject to severe wear or deterioration shall be replaceable with a minimum of dismantling. All valves or controls shall be mounted outside the burner front and air housing.

The Contractor shall provide a completely prewired burner front package with the necessary combustion control drive unit(s), safety controls and alarm systems, fuel shut-off safety valves, windbox and burner throat, combustion air fan with motor drive and control louvers, etc. The Contractor shall provide a pressure regulator upstream of the fuel control valve train for each gas fired burner. Fuel piping and electrical connection external to the burner front will be provided by the Purchaser. A minimum of two viewports for flame viewing shall be furnished.

The auxiliary burner system shall be provided with a low capacity continuous burner purge/cooling air system utilizing air from the burner purge air fan or from the seal air fan.

The burner design shall provide positive and uniform mixing of the air and fuel at all loads, and shall produce sufficient turbulence to preclude stratification. Burner(s) shall be designed to burn fuel(s) as specified in the Design Conditions.

If fuel atomization is required, an air atomizing design shall be provided utilizing compressed air at 80 psig.

The burner lighting equipment shall be suitable for an entirely automatic purging and light-off procedure, after a manual initiation. For natural gas fired burners, spark ignited gas

pilots shall be used for burner lightoff. For oil fired burners, the ignitors shall be high-energy spark ignitors capable of lighting off the atomized oil without the use of a pilot.

The ignition transformers shall be of the air-cooled type. The high tension wiring from the transformers to the electrodes at the burners shall be furnished and shall have special insulation suitable for the temperatures encountered in this application. The entire ignition system shall be impervious to radio interference. Filters or other equipment required to prevent such interference shall be included.

The ignitor system shall be furnished complete, including all transformers and high tension wiring.

2.11.2 Auxiliary Fuel Burner Control System

The auxiliary burner system, including the control system shall be designed and installed in accordance with the National Fire Protection Association standards, as follows:

-	NFPA 85-A	For single burner boilers
-	NFPA 85-B	For multiple burners boilers (gas fired)
-	NFPA 85-D	For multiple burners boiers (oil fired)
-	NFPA 70	For electrical equipment and wiring

The Contractor shall provide a complete Burner Management System (BMS) as part of the burner front package. The Burner Management System shall be a PLC or microprocessor based system that can be reprogrammed at the site if need be and shall be housed in a NEMA 4 locally installed enclosure. The local enclosure shall have mounted on it the required hardware (switches, lights, alarms, etc.) for locally operating the burner(s).

The BMS shall include the following:

a) Safety control and alarm systems (SCA), designed to act automatically and independently of any other control systems or human operator action. The SCA system shall execute the automatic burner purge, all required function in preparation to light-off, light-off procedure, and safety fuel shut-off.

   The SCA system includes flame scanners and all required monitoring instrumentation.

b) Combustion Control System (CCS), designed to modulate fuel and air at the optimal ratio between 10% and 100% of full burner load, to maintain a set temperature in the furnace. Separate actuators shall be provided for the combustion air damper and fuel control valve.

The furnace temperature controller will be furnished by the Purchaser, will have its own process variable input (furnace temperature) and setpoint, and will send out two 4-20 mA signals to the CCS. These signals shall be passed on to the air and fuel actuators without any alteration.

However, Contractor shall override the Purchaser's signal during purge and light-off procedure in order to develop the correct fuel and air quantities.

The BMS shall accept a remote on/off signal from the control room and a remote permissive signal "boiler purge completed"; the permissive signal shall be used to allow the burner light-off sequence to be initiated only after the boiler purge is completed.

The BMS shall provide the following information to the control room, by means of dry contacts:

- burner starting sequence in progress
- burner on/off
- burner tripped
- burner fail to light
- one common trouble alarm from the local panel.

The Contractor shall identify the hazardous area classification for the electrical equipment and wiring in accordance with Article 500 of NFPA 70 (National Electrical Code). In addition, the hazardous area boundary shall be provided so that interface connections by Purchasers can meet the hazardous area requirements. If the Contractor's design is such that the burner enclosure(s) and/or immediate areas are not considered hazardous, Contractor shall provide a statement to this effect.

A complete description of the features of the burner management system shall be provided, including wiring diagrams, control loops, debugging procedures, check-out procedures, interlocks, etc. Contractor shall also provide a description of operation during the period of transition of firing one fuel to another fuel, (i.e., fuel gas to refuse) or cofiring of different fuels.

2.12 Structural Steel

The structural steel shall be designed in accordance the code prevailing in the jurisdiction of the project and with the following parameters:

Structural Design Parameters	Applicable requirements of the local, state and national building code shall apply

For enclosed boilers:

Roof	Decking, insulation, etc.	10 psf
	Piping support	20 psf
Siding	Panels, insulation, etc.	6 psf
Other loads for:	Boiler and appurtences, piping and trim, ductwork, electrical raceways, cable tray, lighting fixtures and electrical enclosures and boxes, deaerator, elevators, ash diverter gates, roof fans, ash screw conveyor, lime feed system, etc., as specified.	
Wind loads:	Applicable state and local codes with all amendments	
Seismic	Applicable state and local codes with all amendments	

2.12.1 Support Steel

The Contractor shall furnish and erect boiler and boilerhouse support steel (including girts, purlins, parapet and roof trusses for enclosed boilers) as an integrated design, based on the tentative boiler layout per the attached Martin Boiler Design Drawings and Preliminary Boilerhouse Sketch. Girts shall be furnished from grade elevation to the parapet or roof line for the three outside boiler enclosure walls. Girts shall also be furnished to support the wall separating the boiler enclosure, beginning at the charging hopper floor elevation up to the roof line. A 3 foot wide by 7 foot high clear walkway shall be provided behind the Martin feed hoppers at the charging floor elevation. (Refer to Attachment 12). If space restrictions exist above the unit roof, then the building roof steel shall be arranged such that beams frame into (in-lieu of bearing upon) girders to afford the maximums headroom for maintenance operations. The boilerhouse building may or may not be structurally independent from adjacent buildings. The refuse bulding structural frame will be designed to stand and act as an independently supported structure for both vertical and horizontal forces attributed to dead, live, erection, operating, wind and seismic loading conditions. To facilitate this concept, a double column row shall be employed at the refuse/boiler building interface without a load transfer interconnection. The APC and turbine buildings may however, at OMS's option, frame into the boiler building if considered possible. When this option is exercised, the Contractor will be given load points in the Project Specific Requirements for the design of his structure. The

Contractor shall acknowledge that the interconnection points are included in his bid.

If the Contractor requires a larger building envelope due to his own design requirements for the boilers, then the building steel should be correspondingly increased and OMS advised. The support steel shall be sized to take into account steam, feedwater and condensate piping loads; duct loads for ductwork from the economizer outlet to the air pollution control equipment inlet; screw converyors, smoke hatches, vent silencers, roof appurtenances and load for the Purchaser furnished equipment listed in the Design Conditions. The Contractor shall provide all primary steel for support of such Purchaser furnished equipment. The bracing system shall also be arranged to allow access at grade for at least a 5 cubic yard front end loader in each column bay (12' x 12' opening). Further, the Contractor will coordinate and arrange his steelwork to account for water storage tanks, ash handling equipment and other equipment that may be located with the Boiler Enclosure.

All structural steel design drawings shall be sealed by a professional engineer currently registered in the state where the work will be constructed. Shop detail drawings shall also be prepared under the direct supervision of a currently registered professional engineer. A final set of shop drawings shall be submitted to OMS for record purposes.

The boiler building support steel shall include framing for openings for roof access hatch(es), relief valve vent stacks and silencers, screw conveyors, vibrating conveyor(s), piping and electrical trays, economizer outlet ducts and doors; including those for access to APC scrubber penthouse (one) and scrubber inlet duct test platforms (one per boiler). Spacing of roof purlins for Purchaser's roof decking shall not be more than 5'-0".

The Contractor shall provide framing and support for the elevator shaft, machine room, doors, blockwalls around the elevator, when the elevator is located in the boiler building. In addition, the lobby floor at elevation 30 feet and 62.5 feet shall be concrete on metal deck or floor plate.

The Contractor shall furnish adequate support steel to ensure that vibration due to overfire air fan operation is eliminated. If additional materials such as concrete platforms and mass concrete vibration dampers are required, the Contractor shall furnish and install all such materials.

2.12.2 Platforms and Walkways

The Contractor shall provide a complete set of platforms with galvanized grating, stairs and walkways to enable access to the boiler, stoker, sootblowers, ash dump valves at all hoppers,

elevator landings, and other appurtenances. Platforms shall be designed based on a minimum width of 2'-6" for walkways and on each side of sootblowers and around other pieces of equipment. In addition, all platforms shall meet or exceed all OSHA requirements. Wherever possible, platform elevations shall be established such that it shall not be necessary to walk over or duck under the sootblowers.

Stairs and platforms shall be provided, as required, to allow easy access to fans, auxiliary burners, airheaters, sootblowers, all boiler hopper access doors, poke holes, dampers and impact plates, all boiler access doors, all Purchaser and Contractor supplied observation and inspection ports, all temperature and draft connections, drum instrumentation, relief valves, boilerhouse roof, spray attemperation station(s), oxygen analyzers, deaerator flash and storage tank(s) and other locations which have to be reached either regularly or occasionally. In addition, the Contractor shall provide all platforming required for access to Martin supplied equipment including the feed chute access platform. The feedchute access platform shall be located adjacent to the feedchute between the boiler and the feedchute and shall run the entire length of the feedchute at an approximate elevation of 45'. Platforms at the boiler hoppers shall be located not less than four (4) feet and not more than five (5) feet below the hopper outlet flange for installation and maintenance of the flap gate valve. Hopper doors shall be accessible with small step-up platforms at each hopper.

Boiler platforms on both sides of each steam generator shall be extended to meet adjacent building floor elevations at the charging and operating floors. Contractor shall also provide structural support at the rear of the boiler for connection of a 30 foot long walkway to access the flue gas cleaning system. In addition, Contractor shall supply support steel, access to and platform for each scrubbers' inlet duct test ports. This platform will be approximately 10 feet by 10 feet and cantilevered off boiler steel. Stairs shall be provided as required to match building elevations and to avoid obstacles, if present. Platforms shall be extended to the rear of the boiler to match-up with flue gas cleaning system scrubber penthouse and duct access platform.

Each boiler shall be provided with full stair tower access from grade to roof on at least one side. Crossover platforms shall be provided on the rear of the boiler at a minimum of three elevations including the stoker viewing level (approximate elevation 20'-0"), the steam outlet level (for access to Purchaser furnished steam flow element), and at one intermediate level as defined by the Purchaser during the design development.

Handrails and posts shall be angle 2-1/2 x 2-1/2 x 1/4 inch (OSHA approved) or square or round rails and posts. Posts shall be spaced no greater than 8 feet-0 inches on centers. Top rail and intermediate rails shall be spaced in accordance with local codes. All grating shall be banded at edges of openings. Banding strips shall be at least the same thickness and depth as the bearing bars to which they are welded. When openings between grating and protruding elements exceed 1", the a 1/4" minimum toe plate thickness shall be provided and have a vertical height of 4" from its top edge to the level of the floor.

2.13 Welding

All boiler pressure parts welding shall be performed in accordance with ASME, Boiler and Pressure Vessel Code, Section I and/or ANSI B31.1. All structural steel welding shall conform with AWS D1.1.

Welding procedures, welders and welding operators shall be qualified in accordance with ASME, Section IX and/or ANSI B31.1, as applicable. All welding procedures shall be written in accordance with the codes specified and shall include materials used, wall thicknesses, joint design details, welding voltage and current to be used, etc.

The shop welding procedures shall be available for Purchaser's review at the manufacturing location. The field welding procedures will be submitted to the Purchaser.

2.14 Access Doors and Other Wall Openings

Access doors

A sufficient number of access doors shall be provided to facilitate inspection and maintenance work. These shall be provided as a minimum at the following locations:

a) Stoker discharge rearwall (large door, 3 x 4 feet, supplied by Martin).
b) To each section of convection evaporator, superheater and economizer and all sootblower locations.
c) To the sides and top of the penthouse.
d) To the sides of all ash hoppers.
e) Furnace pass at screen tube inlet.

The standard design 18 x 18 inch or 18 inch I.D. round doors (or nearest larger size) shall be ASTM A-48 C1 30 cast iron. All ash hopper doors shall be 24 x 24 inch, fabricated from A-36 plate. All the doors shall be hinged, quick opening type and with grooved faces to accommodate suitable fire box quality door gasket to ensure gas-tight sealing. The door frames shall be fabricated of

suitably reinforced steel plate. All doors in high temperature zones shall be refractory lined. Separate plugs or refractory bricks are not acceptable.

Access doors shall be located and oriented to allow unobstructed access and supply of necessary inspection and maintenance materials, including sky climbers, scaffolds, tubing, etc. For boiler width greater than 25 feet, access doors shall be provided on both sides. Hand holds shall be provided outside and inside and footholds shall be provided as required to ensure safe entrance and exit.

Access doors/openings for on-line water-wash cleaning

To allow access to the convection heating surfaces for water washing of the tubes during boiler operation, doors and openings shall be provided in the sidewalls. These doors shall be the same access doors as provided for access to the tube banks (e.g. 18 x 18 inch square or 18 inch I.D. round) or in those locations where such doors are not required for personnel access they shall be 12 x 4 inch rectangular inspection doors. All doors shall be located immediately adjacent to the sootblowers. Each sootblower shall have a door at its side or below or above it, whichever way is most convenient to access the tube banks with the water lances. These doors shall be adjacent to the bull nose in the second pass, adjacent to each sootblower in the third pass evaporation section, the superheater and economizer tube banks. Final location shall be approved by the Purchaser.

Observation Ports

An adequate number of observation ports shall be provided to ensure unobstructed furnace monitoring. There would be typically about 12 ports in the furnace (first pass) and rear wall, however, the final number will be determined during the Contract finalization (see also Section 2.3.2).

Observation ports with glass and hinged protection shield shall be provided in the first boiler pass to observe the auxiliary burner(s) and the refuse fire. The observation ports and ignition doors supplied by Martin for the furnace and rear wall shall be installed according to Martin's drawings and instructions. The observation ports at the end of refractory level shall be angled for a downward view of the fire while maintaining view of the refractory top line.

The standard design 8 x 6 inches, hinged doors shall be ASTM A-48 C1 30 cast iron. The door frames shall be steel plate type. To ensure tight closure, the faces of the door are grooved to accommodate suitable quality door gasket. All doors shall be refractory lined and provided with suitably protected glass ports.

Cable Connections

To allow installation of suspended scaffolds (sky climbers) in the furnace (first pass) and second pass, a sufficient number of permanent cable openings shall be incorporated to allow inspection of all 4 walls in each pass. Safety rope openings shall be provided in addition. These openings shall consist of minimum 2 inch OD pipes, extended through the penthouse and provided with capped ends.

Wall Openings

All necessary wall openings for sootblowers, access doors and observation ports, auxiliary burner(s), and instrument and test connections shall be provided.

The burner openings shall be provided with a minimum of suitably reinforced 1/4 inch steel plate and with 3/8 inch thick mounting flanges. The tubes in and around the burner opening shall be formed to provide for a cooled burner throat.

2.15 Boiler Fans

If required in the Design Conditions, Contractor shall provide system fans and associated inlet vanes and drives. Design requirements shall be as contained in the enclosed fan specification (Attachment 5) and the Design Conditions. Acceptable suppliers of these fans include Howden, TLT Babcock, American Davidson, Buffalo Forge, Garden City.

2.16 Motors

All motors provided by Contractor shall conform to the requirements of Purchaser's motor specifications (Attachment 6).

2.17 Electrical

The Contractor's physical layouts shall show and dimension the required clear access and working space about all electrical equipment in accordance with Article 110-16 of the NEC. In no case shall the minimum clear distance be less than 3 feet for 0-150 volt enclosed equpment and 3 feet for 151-600 volt enclosed equipment. The minimum width of the working space shall not be less than 30 inches.

All electrical equipment enclosures, juction boxes and wiring devices shall be NEMA 4. All conduit and wiring devices shall be arranged for side or bottom entry. Top entry into electrical enclosures is not acceptable.

2.18 Nameplates and Tags

Boiler nameplates (two) shall be attached to a bracket welded onto the boiler drum and furnace waterwalls. It shall include the Contractor's (manufacturer's) name, place and year of manufacture, boiler serial number, maximum allowable working pressure and heating surface. Minimum acceptable size is 6 x 8 inches.

The Contractor shall furnish identification tags for valves and instruments. The tags shall be 16 gauge yellow brass plate, 3/4 x 2 inches with 1/8 inch hole for attachment. Tags shall be engraved with 3/16 inch numbers. All tags shall be securely attached, using stainless steel wire.

The tag numbers shall be alpha-numeric combination conforming to the project standard symbols and identifications. Tag numbers will be assigned by the Purchaser.

2.19 Painting and Finishing

The types of surface preparation, priming, finish painting and galvanizing required for the Contractor's scope of supply shall be in accordance with the Purchaser's Painting Specification SA-550 (Attachment 10).

2.20 Erection Requirements

2.20.1 General Erection Requirements

All erection of equipment and materials as defined in this specification shall be performed by the Contractor. This shall include uncrating, receiving, unloading, storage, protection, necessary moving from storage, rigging, drilling, doweling, setting, welding, assembly, aligning, cleaning, testing and any other work necessary to prepare the steam generator and all its auxiliary equipment and accessories, hereinafter called equipment, for normal continuous service. Materials, piping and electrical systems and equipment shall be installed in the locations shown on approved drawings.

Installation procedures shall conform with the procedures prescribed by the Contractor and shall be under technical direction of his field erection representatives. For subcontracted or Purchaser furnished equipment, procedures outlined in

manufacturer's instruction manuals for the equipment shall be followed. For equipment not supplied with instruction manuals, Contractor shall follow standard practices acceptable to Purchaser or the manufacturer's representatives.

The Contractor shall be responsible for locating and setting all equipment furnished under this contract, and for verification of all dimensions and measurements. No allowance will be made to the Contractor for any expense caused by his failure to make a thorough field check. Expansion markers shall be permanently installed at the appropriate location and the design cold and hot positions shall be clearly indicated.

Prior to placing equipment, the Contractor shall inspect and clean, or prepare, the surfaces of all foundations, anchor bolts, sole plates, equipment, etc., to assure satisfactory setting of the equipment. Once foundations are turned over to the Contractor, responsibility of the foundation is assumed by the Contractor (i.e., freeze damage, etc.).

All equipment shall be put in a condition suitable for initial operation, as attested to in writing, by signoff of the Contractor's start-up advisor and the Purchaser's start-up engineer.

Concrete foundations shall be cleaned of all laitance and dirt by chipping and saturating with water for four hours prior to grouting (grouting by others).

All construction shall be performed in accordance with the OSHA requirements of 29 CFR 1926.

2.20.2 Storage and Protection During Erection

Immediately upon arrival of equipment at the jobsite, the Contractor shall thoroughly inspect and determine that all equipment or material is free of damage and complete.

The Contractor shall assume all responsibility for the care, inventory control, safeguarding, weather protection, fire protection, and temporary lay up of all equipment and materials at all times until the installation is accepted by the Purchaser for operation. The Contractor shall protect the equipment and material so that there is no deterioration that could adversely affect the useful life or the suitability of the equipment or material for the purpose for which it was furnished.

All equipment stored outdoors shall be kept clean at all times during storage, handling, installation and after installation until initial operation. In the storage area, it shall be stored on sleepers or otherwise so that it does not contact the earth. When handled, it shall not be dragged along the ground. Electrical and electronic equipment shall be specially handled with heated indoor storage. Interim storage on site of Martin-furnished equipment shall be in accordance to Manufacturer's instruction given in Attachment 8.

The Contractor shall unload, store, protect, and turn over to the Purchaser all tools furnished with the equipment. Any tools furnished with the equipment and used for erection purposes shall be either replaced or cleaned and reconditioned to the satisfaction of the Purchaser before being turned over to the Purchaser.

Specifically, the stokers shall be covered with plywood for protection as soon as the stoker grate bars are installed. This cover shall be installed according to Martin's instructions and, as a minimum, consist of layered plywood sheets with rungs nailed on to allow walking. Heavy plastic foil shall be installed between the stoker grate surface and the wood cover.

2.20.3 Structural Erection Requirements

Erection shall be in accordance with the AISC Specification and OMS Specification No. SS-410 (Attachment 9).

The Contractor shall furnish and install all shims which may be required.

Structural steel members shall be cleaned and deburred at punched holes, sheared edges, etc., to provide a smooth level bearing surface. When specified, friction reducing bearing plates shall be provided and installed in accordance with the equipment and plate manufacturer's recommendations.

Shims for concrete supports shall be random size steel plates and bars. Shims shall be located adjacent to all anchor bolts and at sufficient intermediate points to assure complete alignment of equipment.

Shims for structural steel supports shall be steel plates cut to suit the full bearing surface being supported. The composite thickness of shims between equipment and base plates or sole plates shall be not less than 1/8 in. All base plates and sole plates shall be set to accommodate the 1/8 in. of shims.

After final alignment and torquing of anchor bolts, locking jam nuts shall be installed for all bolts and shall be drawn up firmly. The Contractor shall cut off and deburr all anchor bolts which have a projection beyond the locking nut of more than half the bolt diameter.

2.20.4 Alignment of Equipment

The Contractor shall set and align all rotating equipment and drivers in accordance with the manufacturer's instructions or recommendations. The couplings shall be left loose during alignment. If the equipment and the driver were shipped as a complete unit, the coupling shall be loosened before the alignment.

After all piping and ductwork have been connected to the equipment, and initial operation is imminent, the Contractor shall check the alignment, realign if necessary, and make-up the coupling.

After the equipment has run at normal operating temperature, the Contractor shall recheck the alignment. Then, the Contractor shall final torque all equipment and drivers to the base plates.

2.20.5 Piping Erection Requirements

All piping furnished with the boiler shall be erected, pressure tested and cleaned by the Contractor. Non-boiler external pipe shall be hydrostatically tested in accordance to ANSI B31.1. Fuel piping shall be pneumatically air tested prior to operation. The Contractor shall furnish, install and adjust all hangers and pipe supports for this piping.

2.20.6 Electrical Erection Requirements

The receiving inspection of motors shall include checking to assure that oil was drained from the bearings before shipment, and that protective coatings on bare machined metal surfaces such as shafts and couplings remain intact.

While in storage, oil shall be added for bearing lubrication. The rotors of horizontal shaft motors shall be turned at weekly intervals, to prevent bowing of the shaft. The rotors of vertical shaft motors shall be rotated several turns at weekly intervals, to maintain the oil coating on bearing surfaces and to prevent fretting of bearings. In addition, motor winding pigtails and other motor terminals shall be protected against moisture. A log of all rotations shall be maintained by the Contractor with copy provided to the Purchaser. Motor space heaters shall be energized.

3.0 TESTING, GUARANTEE, QUALITY CONTROL

3.1 Examinations and Tests

The Contractor shall perform examination and testing in accordance with written procedures. Procedures shall be available to the Purchaser for review and approval, at the Purchaser's discretion. For work requiring written procedures, no work shall be performed

until the procedures have been approved by the Purchaser, or approval has been waived. Waiver of approval does not relieve the Contractor of any responsibility for full performance of his obligations. Inspections and test required by local building officials or code shall be to Contractor's account.

Examinations and tests shall be performed by the Contractor and his subsuppliers in the shop, to the greatest extent possible. The

Contractor shall furnish advisors for any of the tests listed below even if they are not performed by the Contractor.

The Purchaser or his representatives shall have free access to the Contractor's plant at all times when the work and tests on the contract materials are in progress, and the Contractor shall notify the Purchaser in advance of all such tests to have a representative present at any such tests at his discretion.

The examinations and tests required by this specification are as follows:

3.1.1 Nondestructive Tests

All nondestructive tests (NDT) shall be performed in accordance with written procedures, which shall be available to the Purchaser. All NDT shall be performed by personnel certified to the applicable quality levels as defined in the procedures.

All NDT results shall be appropriately documented.

3.1.2 Hydrostatic Tests

All hydrostatic testing shall be performed by the Contractor in accordance with written procedures incorporating the requirements of ASME I. All shop fabricated pressure part assemblies shall be hydrostatically shop tested to the extent feasible or in accordance with Contractor's shop practice. Such testing shall take place prior to painting. A final hydrostatic test shall be performed in the field, held for at least one hour and witnessed by the Purchaser. No leakage indications are permissible. The Contractor shall furnish his hydrostatic test procedure to the Purchaser for approval. The Contractor shall be responsible for all supplies and procedures necessary to conduct this test, including but not limited to providing and disposing of the appropriate quality water, filling and draining of pressure parts, notifying appropriate parties, interfacing with the general contractor, the Purchaser and any other affected parties on site, etc.

Unless otherwise specified or permitted by the applicable code, tests shall be made after all heat treatment and weld repairs have been completed.

Corrosion-resistant castings and/or welds shall not be painted prior to testing.

3.1.3 Field Tests

The Contractor shall be responsible for furnishing advisors or Manufacturer's service representatives for all required operating tests of his equipment. The Purchaser will furnish personnel for

observing and recording test data, and will operate the boiler in accordance with the Contractor's recommended procedures.

Field tests shall:

1. Demonstrate that the equipment operates in a stable, commercially satisfactory manner and in accordance in all respects with the requirements of this specification.

2. Demonstrate that all equipment meets the applicable guarantees enumerated in the Performance Guarantees Section 3.2 and Attachment 1, Design Conditions, of this specification.

Boiler efficiency will be calculated by the heat loss method based on combustion analysis, using the ASME-PTC4.1 abbreviated test form. Radiation losses will be established based on Contractor's data.

For the tests, the boiler will be commercially clean and properly operated, and the excess air during each test will be as close as reasonably attainable to that used for the guarantee basis. "Commercially Clean" is defined as the condition of the boiler after it has operated continuously in normal service for at least 21 days but not more than 60 days since the last cleaning in accordance with the manufacturer's instructions. At the end of this period, without shutting down, and without special cleaning or conditioning of any kind, the boiler shall be considered as "Commercially Clean".

3.1.4 Inspections

The following are the notification points for which a minimum of five (5) working days prior notification is required:

1. Boiler - Hydrostatic Test
2. Shipping Release for major boiler components and fans
3. Start of refractory placement
4. Rotation and bumping of all fan motors

3.2 Performance Guarantees

The Contractor shall provide performance guarantees as specified in the Design Conditions. Contractor shall also complete the guarantee section of Equipment Data Sheets.

Contractor shall provide and install on-line cleaning devices, including the addition of retractable sootblowers in the open downpass following the furnace pass and/or the addition or modification of other sootblowers, and/or shall supply and install or delete, as appropriate, economizer heat transfer tube surface, at no additional cost to Purchaser, if necessary to meet the performance guarantees.

3.3 Quality Control

Quality Assurance/Quality Control manuals and Quality Control Reports shall be subject to Purchaser's approval.

A QA/QC inspection program shall be established and regular inspections shall be performed and/or reports submitted to the Purchaser, concerning overall system quality matters, including but not limited to such items as centering of boiler and stoker, spacing, arrangement of equipment studding, refractory, conformance of equipment with drawings and specifications, welding procedures and qualifications, structural steel connections testing, safety relief valve testing, etc.

3.4 Material Safety Data Sheets

Contractor, as part of its operating manuals shall provide Material Safety Data Sheets as required by Federal law.

4.0 SUPPLEMENTAL REQUIREMENTS

4.1 Data and Drawings Required

The Contractor shall provide the following information with his proposal:

- Detailed description of his offering
- The Contractor must state that he fully complies with this Specification other than specifically stated in a list of exceptions. Such a list of exceptions shall clearly state each exception, referenced to item and page number, reason for taking exception, cost and/or schedule impact if exception is not granted and any other clarification deemed necessary.
- Foundation loads and footprint*
- Layout drawing**
- Fan Curves (preliminary) for all proposed fans
- Construction Schedule

- Equipment Data Sheets
- Motor Horsepower Consumption
- Sootblower Location Drawing
- Recommended Spare Parts List

* Footprint shall show preliminary foundation loads for all cases including wind, seismic, operating, dead, live and hydrotesting of equipment to within ±10% of the loading and ±12 inches of the ultimate column locations.

** Layout drawings shall include overall building dimensions (for enclosed boilers), column locations, boiler, fan and air heater arrangement, and duct and hopper arrangement. The number and location of hopper connections shall be clearly shown. Adequate space shall be allotted for removal of sootblowers, fan wheels, heater coils, etc.

After award the information and data below, as a minimum, shall be submitted to the Purchaser for "Review" or for "Information" as specified.

Documents for Approval		Submittal Req'd By (Days after Award)
Document Submittal Schedule		15
Delivery, Fabrication, & Construction Schedule		30
Boiler Pressure Parts, Outline and Arrangement Drawings, including all drawings needed for interfacing with stoker equipment	Preliminary	30
	Final	60
General Arrangement of each Platform Level		45
Trim List		45
General Arrangements of Boiler Fans and other Equipment		30
Loading Diagrams		30
Foundation Baseplate and Anchor Bolt Arrangement Drawings		30
Piping Flow Diagrams		60

Nozzle Loading Diagrams	60
Air & Gas Flow Diagrams	60
Water and Steam Flow Diagrams	60
Refractory Installation Drawings	90
Electrical Wiring Interface Diagrams	90
Burner Control Logic Diagrams	90
Hydrostratic Test Procedure	60 days prior to hydrostatic test
Examination and Test Procedures	90
Fan Curves (final)	90
Motor Curves	90
Certificate, signed and stamped by P.E., licensed in State of boiler location stating that the boiler has been constructed in accordance with the drawings and specifications	After hydrostatic test, but prior to boil-out
Test Reports	15 days after test
"As Built" Drawings	Prior to contract close-out, but not later than 30 days after first refuse fire

Documents for Information

Installation Drawings	180
Storage & Handling Procedures	60 days before shipment
Installation, Operations and Maintenance Manuals (10 sets) *	120 days before boil out
Spare Parts List	120 days after award

Test Program Procedure	90 days prior to operation
Quality Control Manual	60
Quality Control Reports	Every 60 days until mechanical completion
Material Safety Data Sheets	With O&M manuals
Area Classification Drawing	60
Bill of Materials	45
Sootblower Control Logic Diagram	90

* Installation, operation and maintenance manuals shall include availability of key system components, particularly of foreign manufacturers.

ATTACHMENT 1

DESIGN CONDITIONS AND PROJECT SPECIFIC REQUIREMENTS

Purchaser OGDEN MARTIN SYSTEMS OF LEE, INC.

Project LEE COUNTY SOLID WASTE RESOURCE RECOVERY FACILITY

Site Location LEE COUNTY, FLORIDA

1.0 DESIGN CONDITIONS

1.1 Scope

Quantity of Steam Generators Required 2

Boiler Support (X) Top ( ) Bottom

Primary Fuel MSW

Wind 100 MPH, EXPOSURE C Code SBCCI, LATEST EDITION

Seismic Zone 0 Code SBCCI, LATEST EDITION

1.2 Design Data and Conditions (Per Unit)

Note: MCR = Maximum Continuous Rating

Fuel Firing Rate at MCR, TPD 600

Fuel Higher Heating Value (HHV)

Design HHV, Btu/lb 5000

Range HHV, Btu/lb 3640 - 6000

MCR Steam Conditions at superheater non-return valve outlet

Minimum Capacity, lb/hr 169,270

Pressure, psig	865
Temperature, °F	830
Feedwater Inlet Temp. to Economizer, °F	300
Overfire Air Temperature, °F	300
Underfire Air Temperature, °F	300
Excess Air at economizer outlet @ MCR, %	100
Site Elevation (above MSL), ft.	2
Steam Generator Location	(X) Indoors, ( ) Outdoors
Drums	(X) Single, ( ) Two
Air Ducts and Dampers	
Refuse Pit Air Intake - Estimated height above grade, ft.	APPROX. 95
Steam Coil Air Heater (SCAH)	
Inlet Steam	
Steam Source	T/G EXTRACTION
Pressure, psig	120
Temperature, °F	APPROX. 460

[redacted] Air	OFA	UFA
MCR Air Flow, lb/hr	102,860	240,010
MCR Air Flow, ACFM @ 80°F	23,480	54,780

Air Flow @ HHV<5250 Btu/lb, lb/hr	N/A
Air Flow @ HHV=5250-5500 Btu/lb, lb/hr	N/A

Air Flow @ HHV>5500 Btu/lb, lb/hr	N/A
Air Inlet Temperature, °F	80
Coil Operating Pressure, psig	120
Coil Design Pressure, psig	200
Coil Operating Temperature, °F	APPROX. 350
Coil Design Temperature, °F	650
Auxiliary Burner(s)	
Rated continuous heat input % of MCR heat input	2 BURNERS @ 20% EACH
NOx Emission Requirement, ppmdv @ 7% O_2	150
Co Emission Requirement, ppmdv @ 7% O_2	50
Fuel Burned	PROPANE
Is the economizer outlet ducted to a fluegas scrubber, (Yes/No)	YES

1.3 Structural Steel and Boilerhouse Enclosure

Elevator-enclosed and supported by boilerhouse steel, (Yes/No)	NO
Capacity, lb.	N/A
Scrubber inlet duct test port platforms required, (yes/No)	YES

Other Purchaser furnished equipment to be supported from boilerhouse steel/platforms approximate dead load, lb.

Lighting Fixtures	Yes	LATER
Electrical Raceway (tray/conduit)	Yes	LATER
Steam and Water Piping	Yes	LATER
Ash Diverter Gate	(Yes	LATER

Fly Ash Screw Conveyors	(Yes[redacted]	300 LB/FT
Deaerator	(Yes[redacted]	APPROX. 400,000 LB
Lime Silo & Blower	[redacted]No)	N/A
Ductwork Load From Economizer to Scrubber	(Yes[redacted]	LATER
Continuous blowdown tank and heat exchanger	(Yes[redacted]	APPROX. 10,000 LBS
Closed cooling water surge tank	(Yes[redacted])	12,500 LBS

2.0 BOILER FANS

[redacted]

Refer to the attached Fan Specification.

2.1 Fans to be furnished by Contractor

FD Fan	(Yes/No)	YES
OFA Fan	(Yes/No)	YES
Seal Air Fan	(Yes/No)	YES

~~2.2~~ Forced Draft Fan

NOT APPLICABLE

MCR Conditions:

Flow: _____ ACFM

Static Pressure: 16" w.g. static plus losses in duct system and air heater (fouled)

Operating Temperature: _____ to 80°F

BHP _____ HP

Test Block Conditions:

Flow: 115% x Design Flow

Static Pressure: 16" w.g. plus 144% x system losses at design flow

Temperature: Operating temperature + 25°F = 105°F

NOT APPLICABLE

BHP _____ HP

Motor Size Selected _____ HP

2.3 Overfire Air Fan

MCR Conditions:

Flow: _____ ACFM

Static Pressure: 18"w.g. static plus losses in duct system

Operating Temperature: _____ to 80°F

BHP _____ HP

Test Block Conditions:

Flow: 115% x Design Flow

Static Pressure: 18"w.g. plus 144% x system losses at design flow

Temperature: Operating Temperature + 25°F = 105°F

BHP _____ HP

Motor Size Selected _____ HP

2.4 Seal Air Fan

NOT APPLICABLE

MCR Conditions:

Flow:	_____ ACFM (350 ACFM per grate run) plus any boiler required seal air for burner purge air, sootblowers, inspection ports, etc.
Static Pressure:	16" w.g. static plus losses in duct system
Operating Temperature:	_____ to 80°F
BHP	_____ HP

Test Block Conditions:

Flow:	115% x Design Flow
Static Pressure:	16" w.g. plus 144% x system losses at design flow
Temperature:	Operating temperature + 25°F = 105°F
BHP	_____ HP
Motor Size Selected	_____ HP

3.0 PROJECT SPECIFIC REQUIREMENTS

The attached Project Specific Requirements, if any, are additions, deletions and/or revisions to the preceding Specification requirements and shall be considered as part of this Specification. In the event of conflict, the Project Specific Requirements shall govern.

3.1 Loads from Adjacent Buildings

a) T-G Enclosure

__X__ Applicable
____ Not Applicable

b) APC Enclosure

__X__ Applicable
____ Not Applicable

The boiler bulding design shall provide for loads from adjoining T-G and APC enclosures interfacing with and attaching to the Boiler enclosure/structure. Loads and locations are given below and shown on [redacted] (Attachment 2):

LOAD TABLE

Load Point	Elevation	Column Lines	Vertical * Loads DL	Vertical * Loads LL	Horizontal * Loads E-W	Horizontal * Loads N-S	Remarks
"A"	110	E.9/13	35	30		1.0/LF	(1)
"B"	110	D.9/13	35	30			
"C"	110	E.1/13	35	30			
"D"	110	D.1/13	35	30		1.0/LF	(2)
"E"	25	C.6/13	40	30	40	0.5/LF	(3)
	55	C.6/13	50	60	7.4		(4)
	60	C.6/13	25	15	23		(5)
	25	C.6/12	100	120			
	55	C.6/12	40	60	7.4	4	(4)
	60	C.6/12	20	30			
	25	C.6/11	100	150			
	55	C.6/11	25	30	7.4	2	(4)
	60	C.6/11	20	30			
	25	C.6/10	40	40			
	60	C.6/10	25	15			

NOTES:

* ALL LOADS IN KIPS

(1) N-S HORIZONTAL LOADING APPLIES FROM EL. 0' TO 110'

(2) N-S HORIZONTAL LOADING APPLIES FROM EL. 25' TO 110'

(3) N-S HORIZONTAL LOADING APPLIES FROM EL. 0' TO 25'

(4) E-W & N-S T/G CRANE LOADS

(5) E-W WIND LOAD AT ROOF HORIZONTAL TRUSS

LOADING FOR CONCRETE SLAB BETWEEN COLUMNS C.6/D.1 AND 11/12 IS 250 LB/FT^2 (TOTAL)

3.2 Page 2, Section 1.2.1:

A selective non-catalytic reduction system (Thermal DeNOx) will be furnished by the Purchaser and will be used to inject a mixture of air and ammonia into the boiler at one of two injection zones. The Vendor shall furnish and install the valving, flexible hoses, piping, supports, nozzles, boiler penetrations, platforming and access to platforming associated with this system. Refer to Attachment 14, which is typical for a boiler of the indicated width. The number of nozzles and width of the system will be modified as required for the width of the Lee boiler.

3.3 Page 6, Section 1.4.D.1:

Contractor shall provide a bolt hole pattern for the economizer outlet flange which is consistent with a pattern provided by the Purchaser.

3.4 Page 12, Section 2.2:

Tube shields shall cover all tube welds which are exposed to direct flue gas impingement. Tube welds shall be positioned to prohibit direct impingement by sootblowing steam.

3.5 Page 12, Section 2.3.1:

Boiler drum manholes shall be 16 inches round.

Spare drum connections shall be double valved and capped.

3.6 Page 14, Section 2.3.2:

The furnace waterwalls shall be sandblasted per SSPC-SP-6 prior to applying refractory.

3.7 Page 17, Section 2.4.1:

Primary superheater tube banks of 5 foot - 5 inches deep will be allowed in lieu of the 5 foot maximum depth specified.

3.8 Page 23, Section 2.6.1, Air Flow Measurement:

A venturi section shall be used to monitor the total air flow for underfire and overfire air flow. An independent flow measurement of overfire air shall also be provided utilizing an annubar type device.

3.9 Page 25, Section 2.6.2:

As opposed to the capacity requirement specified, the electromatic valve on the superheater outlet header shall be capable of passing a minimum of 10 percent of the boiler full load capacity, in complete accordance with ASME Code, Section 1.

3.10 Page 27, Section 2.6.2:

The design, materials of construction and installation of pipe hangers, supports, guides, restraints and anchors shall be in accordance with ANSI B31.1 and MSS Standard SP-58 in effect as of June 27, 1989, whichever is most stringent.

3.11 Page 27, Section 2.7.1:

The penthouse construction shall be all welded steel construction.

3.12 Page 28, Section 2.7.2:

The overall boiler arrangement will incorporate a total of 2 economizer hoppers, 4 superheater hoppers and 2 convection pass hoppers per boiler.

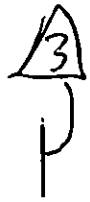
3.13 Page 28, Section 2.7.3:

The allowable velocity through the combustion air intake screen shall be 1000 fpm in lieu of the 800 fpm specified.

3.14 Page 29, Section 2.7.3 (third paragraph):

Air supply to OFA nozzles shall utilize a single header arrangement which is reduced in size to ensure equal flow to all nozzles.

3.15 Page 31, Section 2.8:



The overfire air steam coil air heaters shall be horizontal units, located at an elevation of approximately 20 feet and coordinated with overfire air fan placement. Air side drain connections from the air heaters shall be routed to grade. All air preheaters shall be designed and manufactured per ASME, Section VIII, Division 1.

3.16 Page 31, Section 2.9.2:

The waterwalls shall be covered with tile refractory for a height of 15 feet from the grate as measured from the center of the furnace. The waterwalls shall be covered with gunnited refractory as specified from a height of 15 feet to 30 feet as measured from the center of the furnace.

3.17 Page 32, Section 2.9.2:

The ignition roof shall be provided with 1-inch thick 85% SiC material up to the overfire air nozzles in lieu of 3- inches of 70% Al_2O_3.

3.18 Page 34, Section 2.10.1:

A pressure gauge shall be provided at each sootblower to monitor sootblowing steam pressure. Hardware for each steam pressure measurement shall be as follows:

a) Pressure gauge Grade 1a (+/- 1.0% accuracy), range 0-600 psig, 4 1/2-inch dial size, stainless steel Bourdon tube and socket, 1/2 NPT bottom connection.
b) Stainless steel pigtail siphon.
c) Instrument valve, stainless steel, globe, grafoil packing, 1/2 FNPT connections.

Source shall be Ashcroft or Ametek - US Gauge Division.

3.19 Page 36, Section 2.11:

Propane piping train shall be of all welded construction.

3.20 Page 36, Section 2.11.1:

Burner purge air shall be provided by independent burner purge air fans.

Auxiliary burner forced draft and purge air fans shall be provided with TEFC motors in accordance with Attachment 6.

3.21 Page 37, Section 2.11.2:

The actuator for the burner forced draft fan vortex damper shall be as manufactured by Bailey Controls.

The propane piping systems at each burner front shall be classified as follows:

a) Class 1, Group D, Division 1 - 5 feet in all directions.
b) Class 1, Group D, Division 2 - 5 feet to 15 feet in all directions.

3.22 Page 39, Section 2.12.1:

The top of the boiler enclosure parapet shall not exceed 110'-0". The boiler enclosure roof shall be sloped at least 1/4-inch per foot front to rear. The minimum parapet height shall be 1'-0" above the roof, unless otherwise required by the local building official. The roof, including metal deck, insulation and single membrane roofing is approximately 6-inches thick. Therefore, the top of the boiler vendors lowest purlin must not exceed an elevation of 106'-6".

The primary boiler enclosure siding will be uninsulated vertical ribbed panel equivalent to H.H. Robertson HR5-36. The top 25 feet of the boiler enclosure will be sided with uninsulated flush metal panel equivalent to Steelite concealed fastener panels CFP III. Accordingly, alternate girt spacing will be required at the top 25 feet. In addition, a translucent panel will be provided between the upper 25 feet and the primary siding. The translucent panel will be approximately 3.5 to 7 feet in height and requires a girt at the top and the bottom.

Exterior wall girts will not be required as follows since the air pollution control equipment will be enclosed: (Refer to Attachment 2)

a) At column line 13 between columns D.1 and E.9 from elevation 0 to 102 feet.
b) At column line 13 between columns C.6 and D.1 from elevation 0 to 25 feet.

3.23 Page 40, Section 2.12.1:

Permanent platforming in the area of the ash dischargers shall be supported from above to maximize access capabilities below these platforms.

3.24 Page 42, Section 2.12.2:

In addition to the areas specifically referenced, the Vendor shall provide access to and access platforming for Purchaser supplied boiler blowdown equipment, closed cooling water surge tank, and deaerator equipment. This shall include interconnecting caged ladder between deaerator storage and air removal sections.
Platforming for deaerator is defined as follows: (Refer to Attachment 2)

a) Drawing M201 between columns C.6/D.1 and 11/13 at el. 45 feet.
b) Drawing M202 between columns C.6/D.1 and 11/13 (approx. 16 feet by 32 feet) at el. approx. 58 feet.

Further, clearance shall be provided for demineralized water and neutralization tanks shown on Drawing M200. Approximately 35 feet should be allowed for the demineralized water storage tank and 25 feet for the neutralization tank.

Control valve station platforming will be a concrete slab between columns C.6/D.1 and 11/12 at elevation 25 feet. This floor slab decking and concrete will be by Purchaser. Structural steel framing and supports, including access to this platform shall be by the boiler vendor. Boiler vendor shall provide steel beam framing in this area such that clear span does not exceed 6 feet.

3.25 Page 43, Section 2.14 (Access doors):

Access doors shall be provided in each run of ductwork of 24 inch square or round diameter, or greater.Doors shall be located on both sides of turning vanes and between each piece of equipment. Access doors shall be equipped with quick tightening clamp bolts.

3.26 Page 44, Section 2.15:

The Martin data sheets, Attachment 4, indicate fan sizing criteria which differs from Specification SM-104, Attachment 5. Attachment 5 shall be the governing document with regard to fan sizing criteria.

3.27 Page 44, Section 2.17:

The following electrical requirements shall be complied with:

a) All electrical equipment/devices shall be UL listed.
b) Conduit shall be intermediate metallic type.
c) All 600 volt conductors for 480 volt power shall be copper, with thermosetting ethylene propylene rubber or cross linked polyethylene insulation and a neoprene, hypalon or CPE jacket. PVC or nylon materials shall not be used.
d) Control, metering and alarm circuits shall be multiple conductor color coded in accordance with ICEA Table K-2. Instrumentation wiring shall be shielded, single-pair or multi-pair cable as required by the instrumentation equipment. PVC or nylon materials shall not be used.

3.28 Page 52, Section 4.1:

Drawing submittal for the following information shall be as follows:

a) Boiler column loading - gravity weights (10-15% accuracy): 30 days prior to Notice to Proceed.
b) Separate hydrotest load (flooded): 30 days prior to Notice to Proceed.
c) Live loads on platforms: 30 days prior to Notice to Proceed.
d) Structural steel drawings showing vertical bracing: 30 days prior to Notice to Proceed.
e) Complete loading information including wind, seismic, snow, etc.: At Notice to Proceed.

3.28 Attachment 12:

The feed chute support bracket shall be modified to a cantelevered support integral to the charging floor to increase access space between the feed hopper and the dust wall.

END OF PROJECT SPECIFIC REQUIREMENTS

ATTACHMENT 2

PRELIMINARY BOILERHOUSE SKETCH

The attached sketch represents the preliminary layout of the boilerhouse. Contractor shall adhere to this layout to the greatest extent possible. Any required deviation from the preliminary layout must be clearly defined in the Proposal. Modifications to the layout after contract award will not be accepted.

DRAWINGS ATTACHED INCLUDE:

7102-E-210000 REV. C - PLOT PLAN
7102-E-210101 REV C - 6/A EL. 0'-0" & 14'-3"
7102-E-210201 REV C - 6/A EL. 28'-6 & 45'-0"
7102-E-210301 REV C - 6/A EL. 62'-0"
7102-E-210401 REV C - 6/A EL. 94'-5" & 89'-0"
7102-E-210901 REV C - 6/A SECTION A-A

ATTACHMENT 4

MARTIN DESIGN DATA

The following Martin Design Data Sheets are included as part of this specification:

a) Furnace Design Data Sheets No. 4P 9919/10 (6 sheets)

b) Boiler Design Data Sheets No. 4P 9919/21 (6 sheets)

[redacted]

d) Boiler ~~Sketch No.~~ Layout. 1A000191/a

e) Load Plan No.* 4P 9919/12

* REFER ALSO TO MARTIN DWG. 1A000235

MARTIN GMBH FÜR UMWELT- UND ENERGIETECHNIK			4P 9919 10
Date: February 20, 1990	Name: Ho/Ze		Sheet No. 1
Project: LEE COUNTY, FL (3 x 600 tpd)			Design case, MCR

F U R N A C E D E S I G N D A T A

Number of Units:	in operation	2
	standby	-

	Units of Measurement			
	US-units	Metric units	US-units	Metric units
Refuse throughput per unit	%		100	
Refuse-throughput per unit	tpd	t/day	600	544.32
Calorific value, HHV (LHV)	Btu/lb	kcal/kg	5,000	2,470
Max. gross heat release per unit	10^6 x Btu/h (HHV)	Gcal/h (LHV)	250.0	56.02

GRATE:

Martin Stoker Grate (German and foreign patents, patent pending)

Number of runs			4	
Stoker width	ft, inch	mm	29'-5 9/16"	8,980
Number of steps			13	
Total grate area	sqft	m^2	693.2	64.4

ASH DISCHARGER:

Martin Ash Discharger (German and foreign patents)

Inlet section (inside)	ft, inch	mm	3'- 3 3/8" x 7'-10 1/2"	1,000x2,400
Max. ash ejecting capacity	tons/h	t/h	9.9	9.0
Number per Stoker			2	

MARTIN GMBH FUR UMWELT- UND ENERGIETECHNIK				4P 9919 10
Date: February 20, 1990	Name: Ho/Ze		Sheet No. 2	
FUEL DATA	US-units	Metric units	US-units	Metric units
Refuse throughput per unit	%		100	
Refuse throughput per unit	lb/h	kg/h	50,000	22,680
HHV (LHV)	Btu/lb	kcal/kg	5,000	2,470
Ash	%		20.9	
Water	%		20.7	
Combustibles	%		58.4	
ULTIMATE ANALYSIS:				
Carbon, C	%		28.5	
Hydrogen, H	%		3.8	
Oxygen, O	%		25.1	
Nitrogen, N	%		0.5	
Chlorine, Cl	%		0.4	
Sulfur, S	%		0.1	
Phosphorus, P	%		-	
Fluorine, F	%		-	
Iron, oxidizable, Fe	%		-	
Ash	%		20.9	
Water	%		20.7	
Total	%		100.0	
HEAT INPUT AND GRATE LOADING				
Gross heat input:				
Refuse	$x10^6$ Btu/h	Gcal/h	250.0	56.02
Sewage sludge	"	"	-	-
Waste oil	"	"	-	-
Auxiliary firing	"	"	-	-
Preheated air	"	"	18.4	4.63
Total heat input	"	"	268.4	60.65
Grate heat release, refuse and sludge only	Btu / sqft,h	kcal/m²h	360.646	869.870
Grate load performance	lb / sqft,h	kg/m², h	72.13	352.17

MARTIN GMBH FÜR UMWELT- UND ENERGIETECHNIK				4P 9919 10
Date: February 20, 1990		Name: Ho/Ze		Sheet No. 3
	US-units	Metric units	US-units	Metric units
Refuse throughput per unit	%		100	
Refuse throughput per unit	lb/h	kg/h	50,000	22,680
HHV (LHV)	Btu/lb	kcal/kg	5,000	2,470
HEAT LOSSES AND EFFICIENCIES				
Loss by unburned material in residue	%	%	2.47	2.78
Heat loss by hot clinker	%	%	0.51	0.57
Heat loss due to radiation	%	%	0.48	0.54
Loss by sensible heat in flue gases	%	%	24.86	15.34
Unaccounted for losses	%	%	1.50	1.69
Total efficiency (calc.)	%	%	71.68	80.77
Total efficiency (guar.)	%	%	70.18	79.08
Stoker efficiency (calc.)	%	%	97.02	96.65
Stoker efficiency (guar.)	%	%	96.44	96.00
AIR AND FLUE GAS DATA (US-units referred to 68° F)				
CO_2 (maximum)	% by volume		19.77	
CO_2 in furnace (dry)	% by volume		9.82	
CO_2 in system exit (dry)	% by volume		-	
Excess air rate: Furnace	% by vol.	-	100	2.0
" air rate: System exit	% by vol.	-	-	-
Specific air quantity in furnace, wet	scuft/lb	Nm^3/kg	91.791	5.3400
Specific flue gas quantity				
Furnace, wet	scuft/lb	Nm^3/kg	103.182	6.0027
System exit, wet	scuft/lb	Nm^3/kg	-	-
Specific gravity of flue gases				
Furnace, wet	lb/scuft	kg/Nm^3	0.0742	1.2760
System exit, wet	lb/scuft	kg/Nm^3	-	-
Underfire air (- %)	SCFM	Nm^3/h	See sheet	No. 5
Overfire air (- %)	SCFM	Nm^3/h	See sheet	No. 5
Auxiliary firing	SCFM	Nm^3/h	-	-
Combustion air quantity (total), wet	SCFM	Nm^3/h	76,502	121,110
Flue gas quantity:				
Furnace, wet	SCFM	Nm^3/h	85,996	136,140
System exit, wet	SCFM	Nm^3/h	-	-
Flue gas composition (system exit) see page 6.				

MARTIN GMBH FÜR UMWELT- UND ENERGIETECHNIK				4P 9919 10
Date: February 20, 1990	Name: Ho/Ze		Sheet No. 4	
	US-units	Metric units	US-units	Metric units
Refuse throughput per unit	%		100	
Refuse throughput per unit	lb/h	kg/h	50,000	22,680
HHV (LHV)	Btu/lb	kcal/kg	5,000	2,470
AIR AND FLUE GAS TEMPERATURES				
Ambient air	°F	°C	80	26.67
Underfire air	°F	°C	300	148.89
Overfire air	°F	°C	300	148.89
Air for auxiliary firing	°F	°C	-	-
Air for waste oil burning	°F	°C	-	-
Combustion temperature in furnace area (flame end)	°F	°C	-	-
Flue gas temperature:				
Boiler exit	°F	°C	425	218.33
Dust arrestor exit	°F	°C	-	-
AIR AND FLUE GAS PRESSURES				
Neg. pressure in furnace	in WG	mm WG	-	-
Draught loss across boiler	in WG	mm WG	-	-
Underfire air pressure at grate inlet	in WG	mm WG	~ 16	~ 400
Overfire air pressure at nozzle inlet	in WG	mm WG	~ 18	~ 460
FLY ASH DATA				
Dust burden of flue gases in furnace, as found by calculation (68 °F)	gr/scuft	g/Nm³	-	-
Ditto (design figure)	gr/scuft	g/Nm³	-	-
Dust burden of flue gases entering dust arrestor as found by calculation (68 °F)	gr/scuft	g/Nm³	1.7143	4.21
Dust burden of flue gases entering dust arrestor as found by calculation (design figure) (68 °F)	gr/scuft	g/Nm³	2.0360	5.00
Dust burden of flue gases leaving dust arrestor (design figure) (68 °F)	gr/scuft	mg/Nm³	-	-

MARTIN GMBH FÜR UMWELT- UND ENERGIETECHNIK				4P 9919 10
Date: February 20, 1990	Name: Ho/Ze		Sheet No. 5	
	US-units	Metric units	US-units	Metric units
Refuse throughput per unit	%		100	
Refuse throughput per unit	lb/h	kg/h	50,000	22,680
HHV (LHV)	Btu/lb	kcal/kg	5,000	2,470
F A N D E S I G N				
F.D. FAN (80 % of combustion air)				
Calculated air quantity	SCFM	Nm³/h	61,201	96,888
Margin for fluctuations in c.v.	%		15	
Margin required by DIN	%		-	
Total margin	%		15	
Design air quantity	SCFM	Nm³/h	70,381	111,421
Design air temperature	°F	°C	~ 104	~ 40
Air pressure under grate	in WG	mm WG	~ 16	~ 400
Design capacity	CFM	m³/h	75,186	127,737
Design stat. pressure	in WG	mm WG	-	-
I.D. FAN				
Flue gas quantity at fan inlet	SCFM	Nm³/h	85,996	136,140
Margin for fluctuations in c.v.	%		15	
Margin required by DIN	%		-	
Total margin	%		15	
Design flue gas quantity	SCFM	Nm³/h	98,895	156,561
Design temperature	°F	°C	572	300
Design capacity	CFM	m³/h	193,362	328,512
Design static pressure	in WG	mm WG	-	-
OVERFIRE AIR FAN (35 % of combustion air)				
Calculated overfire air quantity	SCFM	Nm³/h	26,776	42,389
Margin for fluctuations in c.v.	%		15	
Margin required by DIN	%		-	
Total margin	%		15	
Design overfire air quantity	SCFM	Nm³/h	30,792	48,747
Design temperature	°F	°C	~ 104	~ 40
Overfire air pressure at nozzle inlet	in WG	mm WG	~ 18	~ .460
Design capacity	CFM	m³/h	32,894	55,885
Design static pressure	in WG	mm WG	-	-

MARTIN GMBH FÜR UMWELT- UND ENERGIETECHNIK				4P 9919 10
Date: February 20, 1990		Name: Ho/Ze		Sheet No. 6
	US-units	Metric units	US-units	Metric units
Refuse throughput per unit	%		100	
Refuse throughput per unit	lb/h	kg/h	50,000	22,680
HHV (LHV)	Btu/lb	kcal/kg	5,000	2,470
WATER CONSUMPTION EXCLUDING FLUE GAS COOLING				
Ash discharger quenching bath	lb/tons	kg/t	-	-
Ash discharger quenching bath	lb/h	kg/h	~ 3,110	~ 1,410
Feed chute water jacket	lb/h	kg/h	-	-
Hydraulic fluid cooling	lb/h	kg/h	~ 4,410	~ 2,000
Total	lb/h	kg/h	-	-

FLUE GAS COMPOSITION (System exit):		
wet:		
CO_2	% by volume	8.537
O_2	% by volume	9.189
N_2 + Ar	% by volume	69.242
H_2O	% by volume	12.979
SO_2	% by volume	0.011
HCl	% by volume	0.042
HF	% by volume	-
dry:		
CO_2	% by volume	9.817
O_2	% by volume	10.566
N_2 + Ar	% by volume	79.617
Max. content of noxious gases in wet flue gases (theoretical):		
SO_2	ppm	117
HCl	ppm	421
HF	ppm	-

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BOILER DESIGN DATA	Date: 02-05-1992	Name: Flr	Sheet: No: 1	4P 9919 21

Project: LEE COUNTY Fl. M.C.R. 600 tpd - 5000 Btu/lb
Our No.: 9919 (DISTRAL Doc. January 15/92)

	Units of Measurement			
	US-units	Metric units	US-units	Metric units
Refuse throughput per unit	%	%	100.00	100.00
Refuse quantity per unit	sht/h	t/h	25.00	22.68
	lb/h	kg/h	50,000	22,680
Calorific value of refuse	Btu/lb	kcal/kg	5,000	2,470
Ash	%	%	20.90	20.90
Moisture	%	%	20.70	20.70
Combustible matter	%	%	58.40	58.40
Design pressure (approx.)	psig	atue	1,095	77.0
Drum pressure (approx.)	psig	atue	996	70.0
Live steam pressure	psig	atue	865	60.8
Live steam temperature	F	C	830	443
Saturated steam temperature	F	C	546	285
Feedwater temperature	F	C	300	149
Flue gas temperature at boiler outlet	F	C	425	218
Preheated air temperature	F	C	300	149
Ambient temperature	F	C	80	27
Boiler efficiency ,calcul .	%	%	73.61	82.24
,guarant.	%	%	72.11	80.56
Steam output,calcul.	lb/h	kg/h	172,554	78,270
guarant.	lb/h	kg/h	169,049	76,680
(2 % blow-down considered)				
Quantity of injected water (calculated)				
First stage: SH1-SH2 :	lb/h	kg/h	3,880	1,760
Second stage: SH2-SH3 :	lb/h	kg/h	4,365	1,980
Total (steam temp. control)	lb/h	kg/h	8,245	3,740
Part load	%	%	80	80
Gross heat release	10^6x Btu/h	Gcal/h	250.00	56.02
Heat input from preh. air			18.36	4.63
Total heat input			268.36	60.65
Combustion air quantity	SCFM	Nm3/h	76,502	121,110
Flue gas quantity,Furnace	SCFM	Nm3/h	85,997	136,140
Flue gas quantity system exit	SCFM	Nm3/h	85,997	136,140

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Project: LEE COUNTY Fl.	Date: 02-05-1992	Name: Flr	Sheet: No: 2	4P 9919 21

	US-units	Metric units	US-units	Metric units
Refuse throughput per unit	%	%	100.00	100.00
Refuse quantity per unit	lb/h	kg/h	50,000	22,680
Calorific value of refuse	Btu/lb	kcal/kg	5,000	2,470
FURNACE (1st pass)				
Tube diameter	inch	mm	3	76.20
Tube pitch (monowall)	inch	mm	4	101.60
Height of silicon carbide coat on monowall (approx.)	ft-inch	m	30- 0	9.14
Flue gas temp. at refuse feed table edge (approx.)	F	C	2,012	1,100
Flue gas velocity at refuse feed table edge (approx.)	fps	m/s	13.68	4.17
Flue gas temperature at flame end	F	C	1,899	1,037
Flue gas veloci. at flame end	fps	m/s	13.06	3.98
Furnace wall temperature (approx.)	F	C	1,742	950
Fouling factor	-	-	1.00	1.00
RADIANT FURNACE CHAMBER (1st pass)				
Flue gas temperature at inlet	F	C	1,899	1,037
Flue gas velocity at outlet	fps	m/s	12.11	3.69
Flue gas temp. at outlet	F	C	1,724	940
Fouling factor	-	-	0.50	0.50
PASSAGE THROUGH SCREEN TUBES (between 1st and 2nd pass)				
Tube diameter	inch	mm	-	-
Tube pitch , transverse	ft-inch	mm	-	-
longitudinal	ft-inch	mm	-	-
Flue gas temperature at inlet	F	C	-	-
Flue gas temp. at outlet	F	C	-	-
Average flue gas velocity	fps	m/s	-	-
Fouling factor	-	-	-	-

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Project: LEE COUNTY Fl.	Date: 02-05-1992	Name: Flr	Sheet: No: 3	4P 9919 21

	US-units	Metric units	US-units	Metric units
Refuse throughput per unit	%	%	100.00	100.00
Refuse quantity per unit	lb/h	kg/h	50,000	22,680
Calorific value of refuse	Btu/lb	kcal/kg	5,000	2,470
RADIANT FURNACE CHAMBER (2nd pass) 1 curtain wall /boiler center				
Tube diameter	inch	mm	3	76.20
Tube pitch	inch	mm	4	101.60
Flue gas temperature at inlet	F	C	1,724	940
Flue gas temp. at outlet	F	C	1,515	824
Average flue gas velocity	fps	m/s	16.73	5.10
Fouling factor	-	-	0.60	0.60
EVAPORATION SURFACE in the 3-rd pass				
Tube diameter	inch	mm	2 3/ 4	69.85
Tube pitch, transverse	ft-inch	mm	1- 0	304.80
longitudinal	inch	mm	4	101.60
Flue gas temperature at inlet	F	C	1,515	824
Flue gas temp. at outlet	F	C	1,245	674
Average flue gas velocity	fps	m/s	21.13	6.44
Fouling factor	-	-	0.65	0.65
RADIANT FURNACE CHAMBER (3rd pass)				
Tube diameter	inch	mm	3	76.20
Tube pitch	inch	mm	4	101.60
Flue gas temperature at inlet	F	C	1,245	674
Flue gas temp. at outlet	F	C	1,218	659
Average flue gas velocity	fps	m/s	14.96	4.56
Fouling factor	-	-	0.70	0.70

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Project: LEE COUNTY Fl.	Date: 02-05-1992	Name: Flr	Sheet: No: 4	4P 9919 21

	US-units	Metric units	US-units	Metric units
Refuse throughput per unit	%	%	100.00	100.00
Refuse quantity per unit	lb/h	kg/h	50,000	22,680
Calorific value of refuse	Btu/lb	kcal/kg	5,000	2,470
PASSAGE THROUGH SCREEN TUBES (3rd pass / superheater)				
Tube diameter	inch	mm	-	-
Tube pitch, transverse	inch	mm	-	-
longitudinal	inch	mm	-	-
Flue gas temperature at inlet	F	C	-	-
Flue gas temp. at outlet	F	C	-	-
Average flue gas velocity	fps	m/s	-	-
Fouling factor	-	-	-	-
SUPERHEATER 3				
Tube diameter	inch	mm	1 1/ 2	38.10
Tube pitch, transverse	inch	mm	5	127.00
longitudinal	inch	mm	5	127.00
Flue gas temperature at inlet	F	C	1,218	659
Flue gas temp. at outlet	F	C	1,083	584
Steam temperature at inlet	F	C	703	373
Steam temperature at outlet	F	C	830	443
Average steam velocity	fps	m/s	70.28	21.42
Average flue gas velocity	fps	m/s	13.22	4.03
Fouling factor	-	-	0.74	0.74
SUPERHEATER 2				
Tube diameter	inch	mm	1 1/ 2	38.10
Tube pitch, transverse	inch	mm	5	127.00
longitudinal	inch	mm	5	127.00
Flue gas temperature at inlet	F	C	1,083	584
Flue gas temp. at outlet	F	C	964	518
Steam temperature at inlet	F	C	644	340
Steam temperature at outlet	F	C	748	398
Average steam velocity	fps	m/s	61.12	18.63
Average flue gas velocity	fps	m/s	11.88	3.62
Fouling factor	-	-	0.75	0.75

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Project: LEE COUNTY Fl.	Date: 02-05-1992	Name: Flr	Sheet: No: 5	4P 9919 21

	US-units	Metric units	US-units	Metric units
Refuse throughput per unit	%	%	100.00	100.00
Refuse quantity per unit	lb/h	kg/h	50,000	22,680
Calorific value of refuse	Btu/lb	kcal/kg	5,000	2,470
SUPERHEATER 1				
Tube diameter	inch	mm	1 1/ 2	38.10
Tube pitch, transverse	inch	mm	5	127.00
longitudinal	inch	mm	5	127.00
Flue gas temperature at inlet	F	C	964	518
Flue gas temp. at outlet	F	C	757	403
Steam temperature at inlet	F	C	546	285
Steam temperature at outlet	F	C	680	360
Average steam velocity	fps	m/s	50.23	15.31
Average flue gas velocity	fps	m/s	10.40	3.17
Fouling factor	-	-	0.76	0.76
ECONOMIZER				
Tube diameter	inch	mm	2	50.80
Tube pitch, transverse	inch	mm	4	101.60
longitudinal	inch	mm	4	101.60
Flue gas temperature at inlet	F	C	757	403
Flue gas temp. at outlet	F	C	425	218
Feedwater temp. at inlet	F	C	300	149
Feedwater temp. at outlet	F	C	495	257
Average flue gas velocity	fps	m/s	18.31	5.58
Average feedwater velocity	fps	m/s	2.33	0.71
Fouling factor	-	-	0.77	0.77
VOLUMES AND HEAT RELEASES				
Volume of 1st boiler pass	cuft	m^3	27,794	787
Heat release of 1st boiler pass	Btu / cuftxh	kcal / m^3xh	8,995	71,181
Volume of all radiant furnace chambers	cuft	m^3	41,073	1,163
Heat release of all radiant furnace chambers	Btu / cuftxh	kcal / m^3xh	6,087	48,168

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Project: LEE COUNTY Fl.	Date: 02-05-1992	Name: Flr	Sheet: No: 6	4P 9919 21

	US-units	Metric units	US-units	Metric units
Refuse throughput per unit	%	%	100.00	100.00
Refuse quantity per unit	lb/h	kg/h	50,000	22,680
Calorific value of refuse	Btu/lb	kcal/kg	5,000	2,470
HEATING SURFACES (approx.) (as used for calculation)				
Furnace (1st pass), proj.	sqft	m^2	2,680	249
Radiant furnace chamber (1st pass), proj.	sqft	m^2	2,734	254
Screen between 1st and 2nd pass	sqft	m^2	0	0
Radiant furnace chamber (2nd pass), proj.	sqft	m^2	3,940	366
Evaporation surface in the 3rd pass	sqft	m^2	5,640	524
Radiant furnace chamber (3rd pass), proj.	sqft	m^2	1,033	96
Screen between 3rd pass and superheater	sqft	m^2	0	0
Monowalls in superheater area, proj.	sqft	m^2	2,056	191
Superheater 3	sqft	m^2	5,070	471
Superheater 2	sqft	m^2	5,156	479
Superheater 1	sqft	m^2	12,325	1,145
Economizer	sqft	m^2	33,724	3,133
Total, approx.	sqft	m^2	74,358	6,908

Comments:

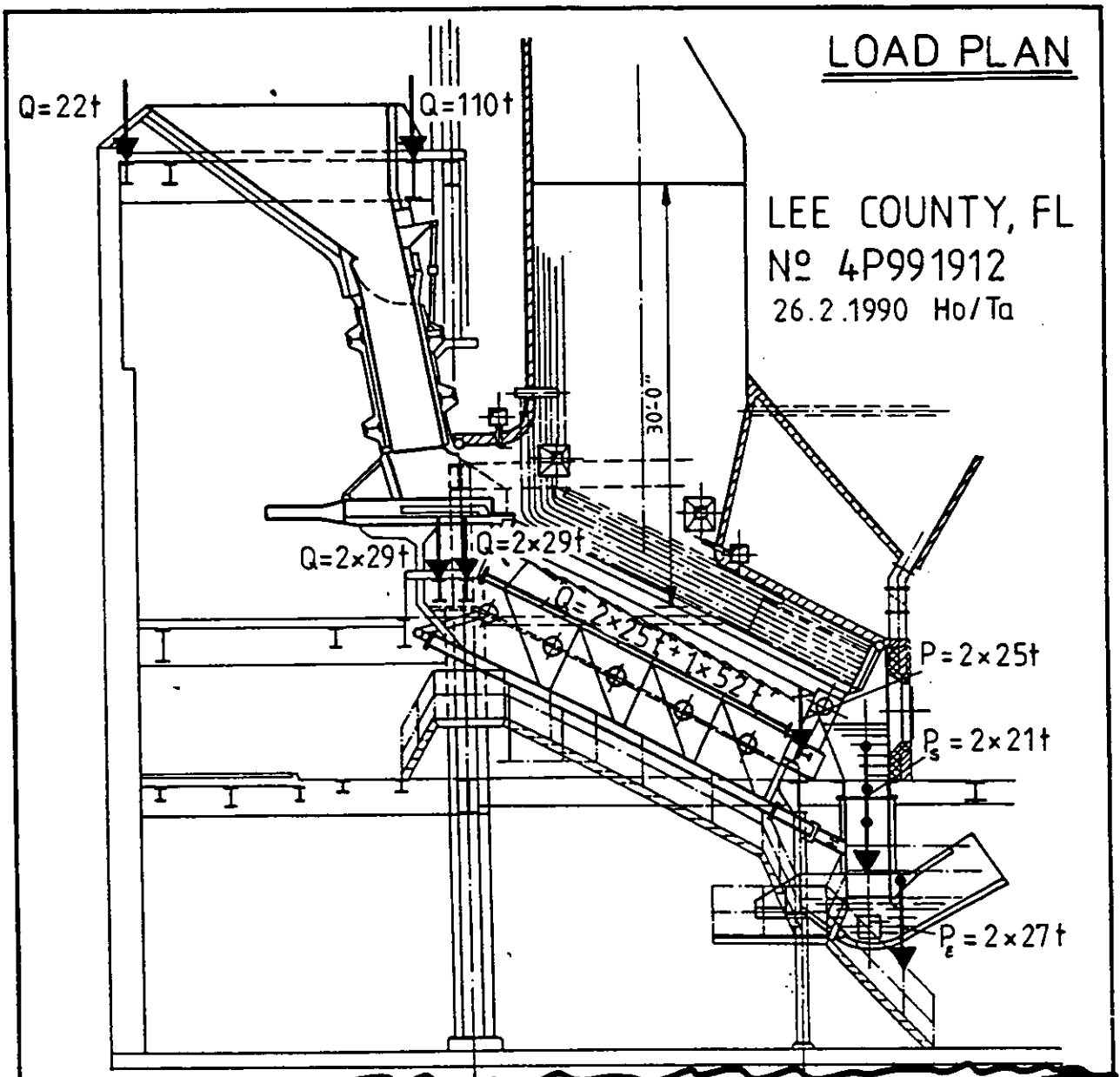
Boiler losses (US - units) :

Heat loss due to radiation : 0.45 %
Loss by sensible heat in flue gases : 23.16 %
Unaccounted for losses : 1.50 %

Corresponding drawings No. DEC 90004-0108-0001/Rev.P and 90004-0109-0002 from 01/15/92

MARTIN GMBH für Umwelt- und Energietechnik

LOAD PLAN



LEE COUNTY, FL
№ 4P991912
26.2.1990 Ho/Ta

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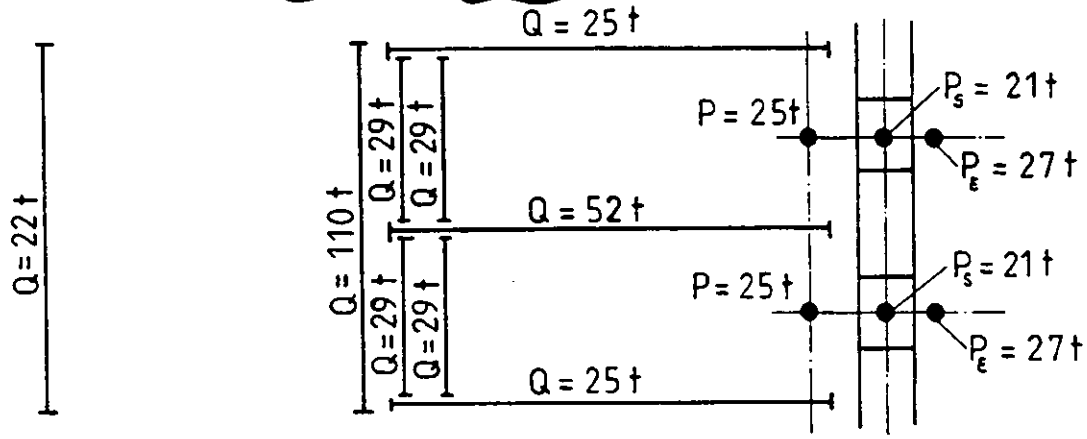
REFER ALSO TO MARTIN DWG.
1A000235



D-8000 München 40, Leopoldstraße 248, Telefon 089/35031-0, Telex 5215717

ATTACHMENT 5

FAN SPECIFICATION

The following fan specification(s) are included as part of this boiler specification. Contractor shall complete all Fan Data Sheets included in these specification(s), and furnish them with his proposal.

Fan specification(s) included are:

SM-104 - Forced Draft, Induced Draft, Overfire, Seal and Reverse Air Fans

ATTACHMENT 6

MOTOR SPECIFICATION(S)

The following motor specification(s) are included as part of this boiler specification. Contractor shall complete all Motor Data Sheets included in these specification(s), and furnish them with his proposal.

Motor specification(s) included are:

SE-211 - Squirrel Cage Induction Motors Below 600 Volts

SE-212 - Squirrel Cage Induction Motors Above 2000 Volts

ATTACHMENT 7

TECHNICAL DATA SUPPLIED BY CONTRACTOR

PERFORMANCE GUARANTEES

1. Steam output, based on firing the specified refuse fuel, 300 °F feedwater, 300 °F underfire and [redacted] °F overfire air, 100 % excess air — 169,270 lb/hr
   Steam output, based on firing the specified auxiliary fuel with the burner at 100% burner load, 300 °F feedwater — 80,000 lb/hr

2. Superheated steam pressure at the steam non-return valve outlet — 865 psig

3. Maximum steam impurity leaving the superheater, based on appropriate ABMA boiler water concentrations for the normal operating pressure — 0.5 ppm

4. Total boiler steam/water side pressure drop at MCR, from feedwater terminal point to main steam terminal point — 220 psi

5. Maximum flue gas exit temperature rise from 425 °F to no more than 500 °F after 4000 hours accumulated operation and no manual cleaning of fireside surfaces — YES [redacted]

6. Control range of 80% of steam flow as guaranteed in item 1 above, while maintaining the outlet steam temperature of 830 °F plus or minus 10°F (FOR MSW) — YES [redacted]

7. Maximum total fan motor power consumption (kW) when operating at 100%, as per item 1 above — 270 kW

8. Economizer water flow mass rate (minimum water mass flow rate 400,000 lb/sq. ft-hr) — 400,000 lb/sq. ft-hr

COMBUSTION/STEAM GENERATION UNITS

1. Number of Units	Two (2)	
2. Type	Single Drum, Natural Circulation	
3. Manufacturer	Distral S.A.	
4. Maximum Continuous Rating (MCR) Solid Waste Capacity	600	TPD

Note: All data in Items 4 through 24 shall be per Steam Generation Unit

5. Design Data (MCR)		
a) Continuous steam output	169,270	lb/hr
b) Blowdown	3,450	lb/hr
c) Steam pressure (at superheater non-return valve outlet)	865	psig
d) Steam temperature (at superheater non-return valve outlet)	830	°F
e) Feedwater temperature	300	°F
6. Boiler Design Pressure/Economizer	1095/1250	psig

7. Heat Loss Calculation Summary

Item	Btu/hr	%
a. Heat Input	268,463,445	100.00
b. Heat Output	193,888,390	72.22
c. Losses:		
i Dry Gas		
ii Moisture:	61,612,360	22.95
iii Residue:	7,973,364	2.97
iv Convection & Radiation:	966,468	0.36
v Manufacturer's Margin:	4,026,952	1.50
Total Losses	74,579,144	27.78
d. Boiler Efficiency		72.22

8. Boiler Drum(s) Description

	Dia. (in ID)	Minimum Thickness (in)	Max. Metal Temp.	Material
Top Drum	60	3.125	600	SA516Gr70
Bottom Drum, if applicable	N/A	N/A	N/A	N/A

9. Tube Description

Furnace waterwalls (1st pass)	3	0.180	650	SA178A
Furnace arch (above refractory)	3	0.220	650	SA178A
Furnace exit screen	6.625	0.432	650	SA106B
Radiant Furnace Chamber (2nd pass)	3	0.180	650	SA178A
Convection Evaporator	2.75	0.180	650	SA178A
Primary Superheater I	1.5	0.180	680	SA210A1
Primary Superheater II	1.5	0.180	720	SA210A1
Secondary Superheater I	1.5	0.180	800	SA213T11
Secondary Superheater II	1.5	0.180	900	SA213T11
Superheater Enclosure	3	0.180	650	SA178A
Economizer	2	0.150	500	SA178A

10. Waterwall Tube Pitch

	(in)
Furnace Waterwalls (1st pass)	4
Radiant Furnace Chamber (2nd pass)	4
Superheater Enclosure	5

11. Header Description

	Dia. (in OD)	Minimum Thickness (in-min)	Material
Sidewall	10.75/8.625(*)/6.625(**)	0.9844/ 0.793"-0.756	SA106B
Front and Rear Waterwall	10.75	0.984"	SA106B

(*) Upper Sidewall
(**) Chill Tubes Wall

	Dia. (in OD)	Minimum Thickness (in)	Material
Furnace Exit Screen	8.625	0.793	SA106B
Convection Evaporator	Outlet 8.625 Inlet 10.75	0.710 0.875	SA106B
Primary Superheater I	10.75	0.629	SA106B
Primary Superheater II	10.75	0.629	SA106B
Secondary SuperheaterI	10.75	0.629	SA106B/335P11
Secondary Superheater II	10.75	0.629	SA335P11
Superheater Enclosure	Upper 6.625 Lower 8.625	0.756 0.793	SA106B
Economiser Inlet	6.625	0.492	SA-106B
Economiser Outlet	6.625	0.492	SA-106B

12. Tube Shield Description

Evaporative Section
Superheater Inlet Screen
Superheater
Economiser

Installed at first two rows of evaporator and screen tubes at first two rows of superheater, at first row of economizer; at first row of either side of soot blower cavities.

13. Volumes

Volume of 1st furnace pass	26,417	ft^3
Volume of all radiant passes	47,435	ft^3

14. Heating Surfaces Summary (projected)

Furance (1st pass)	2,517	ft^2
Radiant Furance Chamber (1st pass)	2,512	ft^2
Radiant Furnace Chamber (2nd pass, 3rd pass)	5,233	ft^2
Superheater Enclosure	2,040	ft^2
Total Projected Heating Surface	12,443	ft^2

15. Heating Surfaces Summary (Circumferential)

Screen between 1st and 2nd pass	146	ft^2
Screen between 2nd and 3rd pass	N/A	ft^2
Convection Evaporator	5637	ft^2
Screen between Evaporator and Superheater	177	ft^2
Primary Superheater I	6219	ft^2
Primary Superheater II	6108	ft^2
Secondary Superheater I	5150	ft^2
Secondary Superheater II	5069	ft^2
Economizer	33720	ft^2
Total Circumferential Heating Surface	62226	ft^2

16. Weight of the Steam Generator (each)

Boiler drum(s)	97.5	kips
Waterwalls, downcomers, risers, etc.	469.0	kips
Convection evaporator	50.7	kips
Superheaters	203.7	kips
Economizer	216.8	kips
Structural steel (buckstays, etc.)	125.0	kips
Casings, hoppers, ducts	198.8	kips
Lagging, insulation, and setting	314.6	kips
Valves, trim, piping, instruments, sootblowers, oil burners, miscellaneous	80.8	kips
Subtotal	1756.9	kips
Water content (full)	322.6	kips
Estimated ash deposits (load)	1718.0	kips
Total for each steam generator	3797.5	kips

Boilerhouse Support Steel (total for all units)	1418	kips
Platforms and walkways (total for all units)	1098	kips
Estimated square footage of all platforms required (information only)	15620	ft^2

17. Performance Data

MCR = Maximum Continous Rating
C.P.= Control Point (80% of MCR)

	MCR	C.P.
Air pressure drop after 4000 hours of continuous operation without shutdown for cleaning, in. wg.	4	2.56
Flusgas pressure drop after 4000 hours of continuous operation without shutdown for cleaning, in. wg.	1.66	1.06
Pressure drop from economizer inlet to drum (friction + static), psi	38	30
Pressure drop from drum to S.H. outlet header, psi	134	85.8
F.W. piping and valve pressure drop from terminal point to boiler, psi	8	6.4
M.S. piping and valve pressure drop from boiler to terminal point, psi	7	4.5
Highest safety valve setting, psig	1103	

CONVECTION EVAPORATOR		MCR	C.P.
Tube diameter	in.	2.75	
Tranverse pitch	in.	12.0	
Longitudinal pitch	in.	4"	
No. of tubes wide	—	29	
No. of tubes deep	—	21	
Average effective tube length	ft,	10	
Total heating surface	ft^2	5637	
Flusgas inlet temperature	°F	1506	

		MCR	C.P.
Fluegas outlet temperature	°F	1251	
Boiler water temperature	°F	550	
Free gas area	ft^2	237.7	
Average fluegas velocity	fps	21.09	
Fluegas draft loss	in.wg.	0.00	
Water mass flow rate	lb/sqft-hr	----	
Average (cold) water velocity	fps	----	
Fouling factor	—	0.65	

PRIMARY SUPERHEATER I

Tube diameter	in.	1.5	
Transverse pitch	in.	5	
Longitudinal pitch	in.	5	
No. of tubes wide	—	72	
No. of tubes deep	—	14	
Average effective tube length	ft.	15.09	
Total heating surface	ft^2	6,219	
Fluegas inlet temperature	°F	858	
Fluegas outlet temperature	°F	770	
Steam inlet temperature	°F	550	
Steam outlet temperature	°F	596	
Free gas area	ft^2	370.8	
Average fluegas velocity	fps	9.42	
Fluegas draft loss	in.wg.	0.03	
Steam mass flow rate	lb/sqft-hr	315,475	
Average steam velocity	fps	40.79	
Fouling factor	—	0.76	

PRIMARY SUPERHEATER II

Tube diameter	in.	1.5	
Transverse pitch	in.	5	

		MCR	C.P.
Longitudinal pitch	in.	5	
No. of tubes wide	—	72	
No. of tubes deepo	—	14	
Average effective tube length	ft.	15.09	
Total (projected) heating surface	ft^2	6107.8	
Fluegas inlet temperature	°F	963	
Fluegas outlet temperature	°F	858	
Steam inlet temperature	°F	596	
Steam outlet temperature	°F	674	
Free gas area	ft^2	365	
Average fluegas velocity	fps	10.30	
Fluegas draft loss	in.wg.	0.03	
Steam mass flow rate	lb/sqft-hr	315,475	
Average steam velocity	fps	48.65	
Fouling factor	—	0.76	

SECONDARY SUPERHEATER I

Tube diameter	in.	1.5	
Transverse pitch	in.	5	
Longitudinal pitch	in.	5	
No. of tubes wide	—	72	
No. of tubes deep	—	12	
Average effective tube length	ft.	14.75	
Total heating surface	ft^2	5150.4	
Fluegas inlet temperature	°F	1079	
Fluegas outlet temperature	°F	963	
Steam inlet temperature	°F	642	
Steam outlet temperature	°F	743	
Average fluegas velocity	fps	11.30	
Fluegas draft loss	in.wg.	0.03	
Steam mass flow rate	lb/sqft-hr	322577	
Average steam velocity	fps	57.06	
Fouling factor	—	0.75	

SECONDARY SUPERHEATER II

Tube diameter	in.	1.5		
Transverse pitch	in.	5		
Longitudinal pitch	in.	5		
No. of tubes wide	—	72		
No. of tubes deep	—	12		
Average effective tube length	ft.	14.7		
Total heating Surface	ft^2	5069		
Fluegas inlet temperature	°F	1217		
Fluegas outlet temperature	°F	1079		
Steam inlet temperature	°F	698		
Steam outlet temperature	°F	830		
Average fluegas velocity	fps	12.46		
Fluegas draft loss	in.wg.	0.03		
Steam mass flow rate	lb/sqft-hr	331,240		
Average steam velocity	fps	67.78		
Fouling factor	—	0.74		

ECONOMIZER

Tube diameter	in.	2		
Transverse pitch	in.	4		
Longitudinal pitch	in.	4		
No. of tubes wide	—	92		
No. of tubes deep	—	70		
Average effective tube length	ft.	9.67		
Total heating Surface	ft^2	33,720		
No. of tube sections (bans)	—	5		
Fluegas inlet temperature	°F	770		
Fluegas outlet temperature	°F	425		
Water inlet temperature	°F	300		
Water outlet temperature	°F	501		
Free gas area	ft^2	154.9		
Average fluegas velocity	fps	18.57		

		MCR	C.P.
Fluegas draft loss	in.wg.	0.59	
Water mass flow rate	lb/sqft-hr	476,428	
Average water velocity	fps	2.45	
Fouling factor	---	0.77	

18. Preliminary Trim List

Items	Qty	Size	Mfgr/Model	Set Point
Safety Valves			Consolidated	
Drum safety valves	2	2.5/2.5	1717A/1737A	1071/1103
Superheater safety valves	1	1.5	1717C	920
Superheater power-activated relief valve	1	2	25121VX	900
Major boiler valves				
Feed valve	1	4"	(*) 4016Y	
Feed check valve	1	4"	4094Y	
Main steam stop/check valve	1	10"	4006Y	
Main steam valve	1	10"	4016Y	
Sootblower steam valve	1	2"	1048Y	

Miscellaneous valves

Items	Qty	Size	Mfgr/Model
Drum vent	2	1-1/2	1048Y
Chemical feed	2	1/2	1048Y/36174
Pressure gauge/transmitter	1	1/2	1048Y
Test gauge-3 way			
Steam and water sampling	4/2	1/2/1	1048Y
Water level transmitter	4	1"	1048Y
Water column	2	1-1/2	VOGT
Water column drain	2	3/4	1048Y
Gauge glass	2	1-1/2	Reliance

(*) All Valves by Edward Unless Otherwise Stated.

Gauge glass drain	2	3/8	1048Y
Probe water column	2	1	VOGT
Probe water column drain	2	1	1048Y
Main steam line drain	2	1	1048Y
Superheater drain	8	1	1048Y
Waterwalls drain	36	1-1/2	36124
Economizer drain	2	1	1048Y
Attemperator vent	4	1	1048Y
Main steam line vent			1048Y
Sootblower drain (with thermostat control	4	1	Copes V600

18.1 Preliminary Valve and Additional Trim List

Items	Qty	Size	Mfgr/Model

19. Steam Coil Air Heater

	LINCHBURG [redacted] -RLT	LINCHBURG [redacted] -RLT	
Manufacturer			
Effective Heating Surface	10582	4630	sq.ft.
Operating Steam Pressure	120	120	psig
Operating Steam Temperature	350	350	°F
Inlet Air Flow	54770	23470	ACFM
Inlet Air Temperature	80	80	°F
Outlet Air Temperature	300	300	°F
Air Pressure - loss	1.5	1.5	in wg
Steam Flow	13,782	6,038	lb/hr

Design Pressure	200	200 psig
Design Temperature	650	650 °F
Material and ASTM Designation	C.S.	C.S.
Bare or Finned, and Fins per inch	Finned - 4	Finned - 4
Fin Type: Parallel, Spiralwound	Helical	Helical
Fin material	C.S.	C.S.
Number of heating sections	6	5
Coils: self-draining, removable	Yes	Yes
Coil Arrangement: vertical or horiz	Horizontal	Horizontal
Air Side Fouling Factor	0.01	0.01 hr-ft^2-°F/Btu
Steam Side Fouling Factor	0.001	0.001 hr-ft^2-°F/Btu
Maximum Face Velocity	690	690 fpm
Casing and Access Section Thickness		gauge
Access Door Size	18" x 48"	18" x 48" in.

20. Sootblowers

Location	Qty	Make	Model	Type	Material	HP Each
Evaporator	8	(*)	T20E	Retract	Alloy S.	0.6
Convection Section						
Superheater	8		T20E	Retract	Alloy S.	0.6
	12		D5E	Rotary	Hyvuloy	1/8
Economizer	20		D5E	Rotary	Steel	1/8

(*) All by Copes Vulcan

Blowing steam flow, lbs/hr	T120, 6480, D5E, 15700
Blowing steam-total quantity, lbs per cycle	T20, 8288, D5E, 5573
Sootblowing duration, min.	T120, 4.8, D5E, 0.70
Steam pressure to sootblowers	Psig 450 at S.B Head, 150 Blowing Press
Are the following furnished:	
Supports	Yes
All necessary valves	Yes
All necessary piping	Yes
Provisions for future sootblowers in second furnace pass	Yes
Are the locations of base and future sootblowers clearly shown on outline and section arrangement drawings	Yes
Sootblower Control Panel	
Manufacturer	Copes Vulcan
Model	Msc.
Additional Features	

Contractor shall attach additional descriptions as required to clearly describe offeing.

21. Attemperation

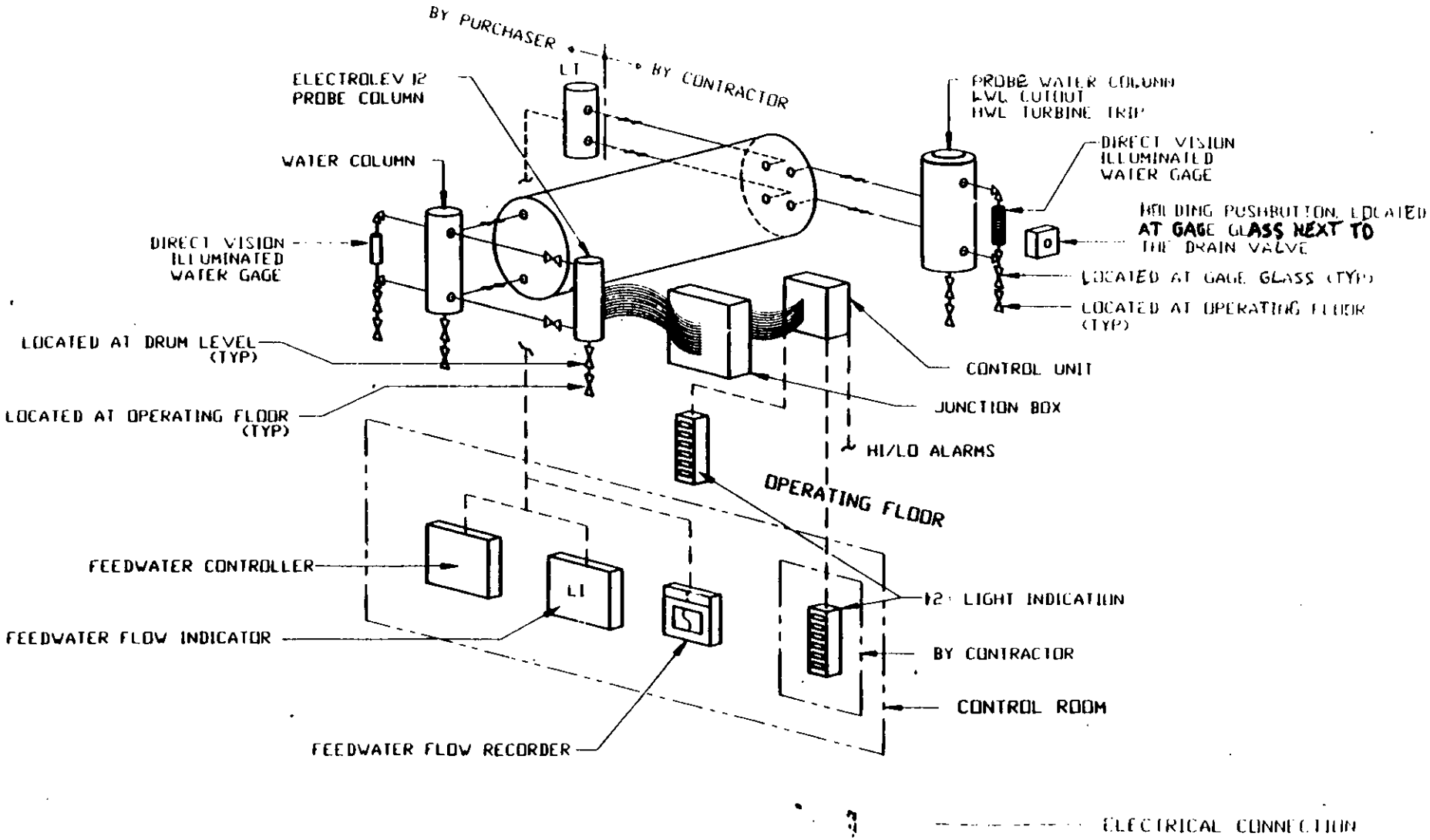
No. of stages	2
Superheat load control point	80 %
Superheater outlet temperature	830 °F
Control description:	Spray

Contractor shall include additional descriptions as requred to clearly describe offering.

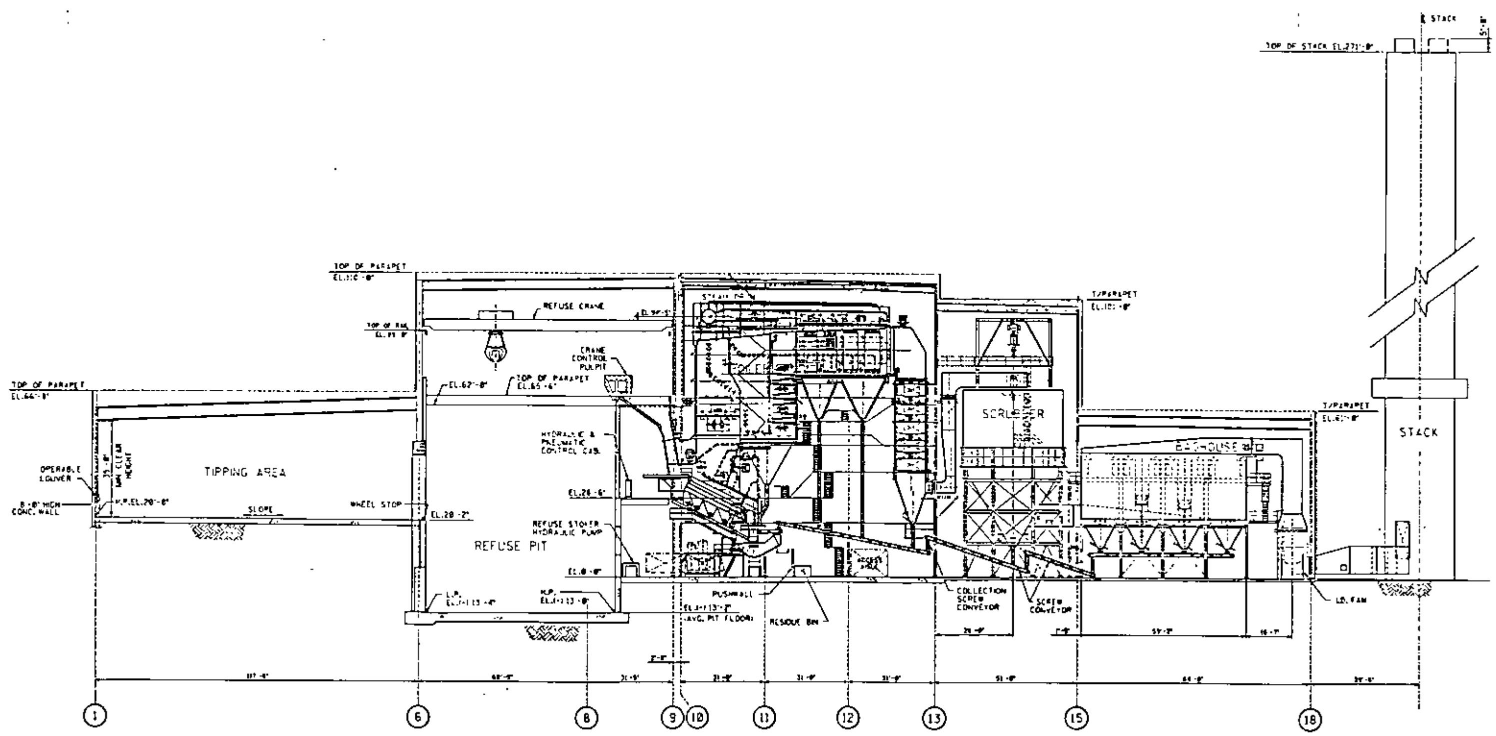
22. Auxiliary Burner(s)

No. of burners per steam generator	Two	
Design heat input per burner	50	MBTU/hr
Fuel oil Type/No.	N/A	
Fuel consumption at design heat input	N/A	
Fuel pressure required at Purchaser's supply point	N/A	
Atomizing medium	N/A	
Atomizing medium consumption at design heat input	N/A	SCFM(air)
lb/hr(steam)	N/A	
Atomizing medium pressure required at Purchaser's supply point		psig
Propane		
Fuel consumption at design heat input	39683	SCFH
Fuel pressure required at Purchaser's supply point	15	psig

Burner Description:



	ATTACHMENT 3 DRUM LEVEL TRIM AND ACCESSORIES	OGDEN PROJECTS, INC 4/91 1 OF 1 0



SECTION A-A

GENERAL ARRANGEMENT
SECTION A-A
LEE COUNTY SOLID WASTE RESOURCE RECOVERY FACILITY

OGDEN MARTIN SYSTEMS OF LEE, INC.

United Engineers & Constructors

C-1033

7102-E-210901

C

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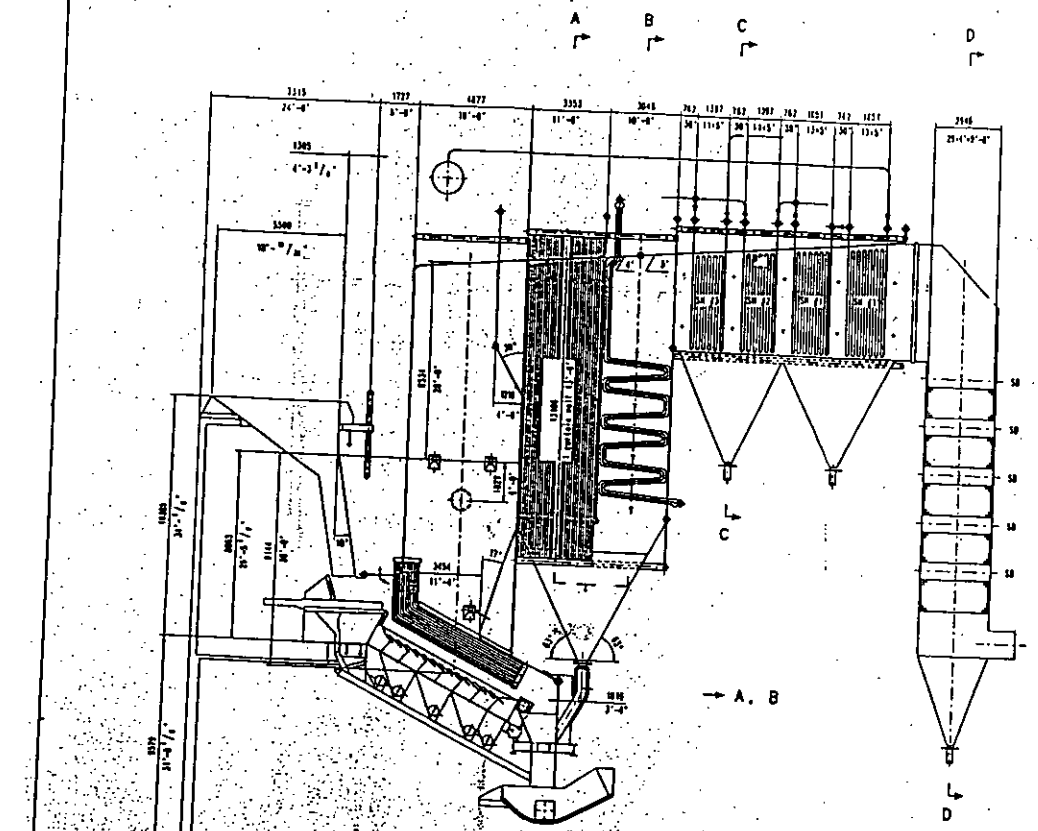
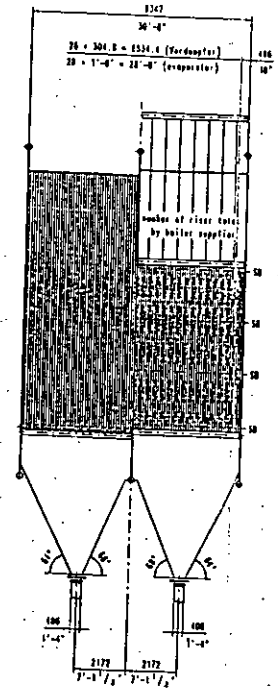
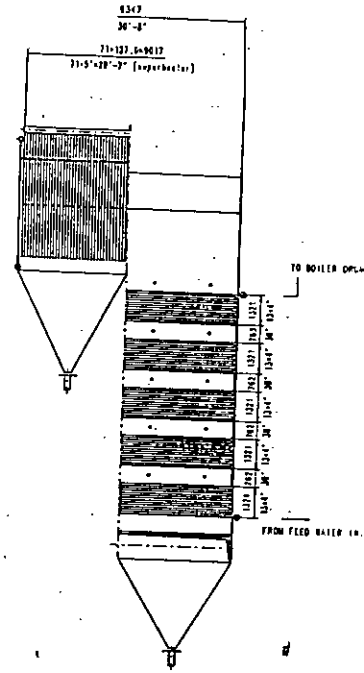


HALF SECTIONS

A-A B-B C-C D-D





MARTIN stoker:	13 steps
stoker width:	8,980 mm = 29'-5 1/2"
steam rate:	172,554 lb/h
steam temperature:	830 °F
steam pressure:	665 psig
boiler width:	30'-8" = 92 + 4"
evaporator:	28 sections
superheater:	72 flows
economizer:	30 flows

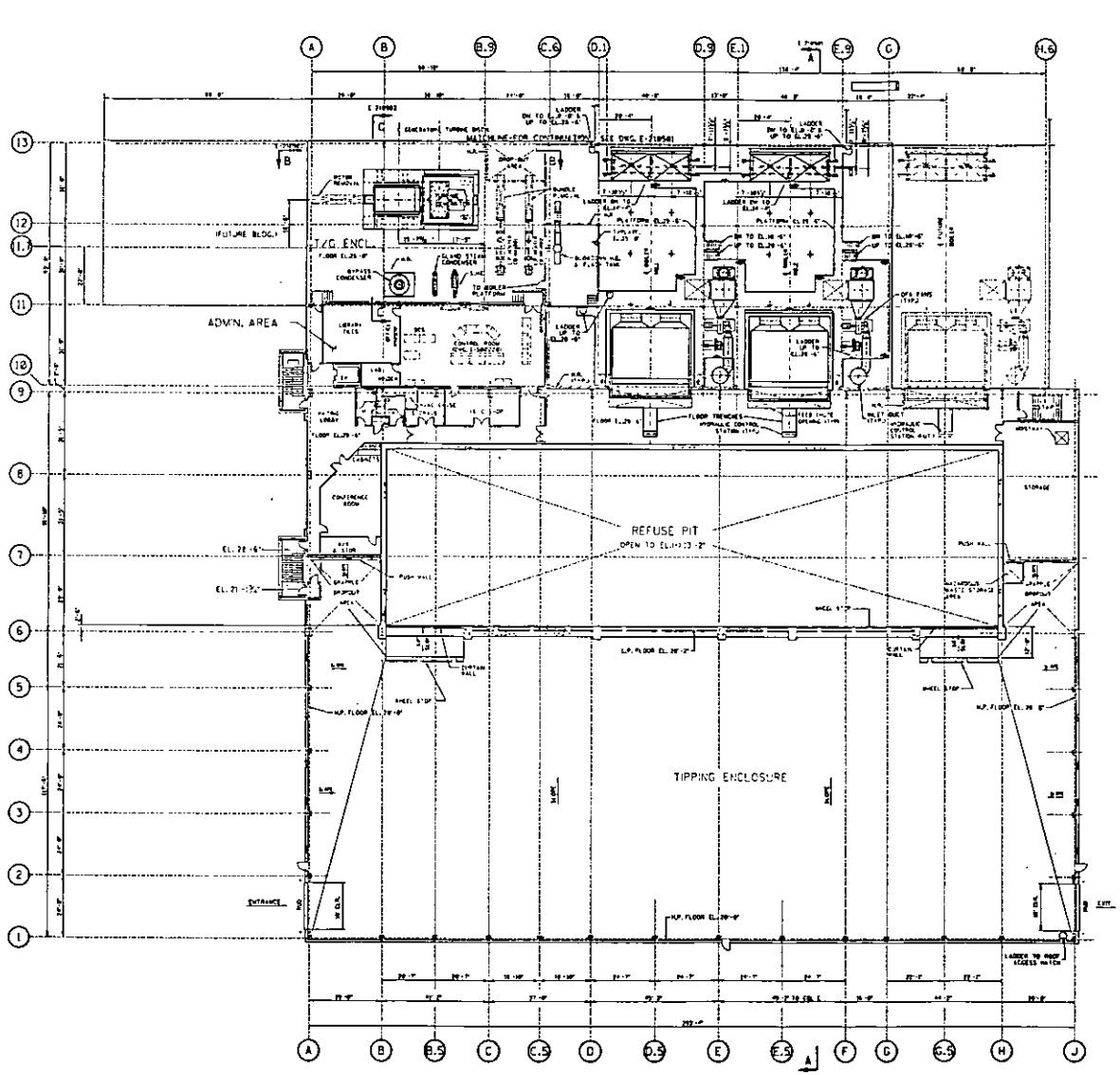
MARTIN GMBH für Umwelt- und Energietechnik

BOILER LAYOUT DRAWING

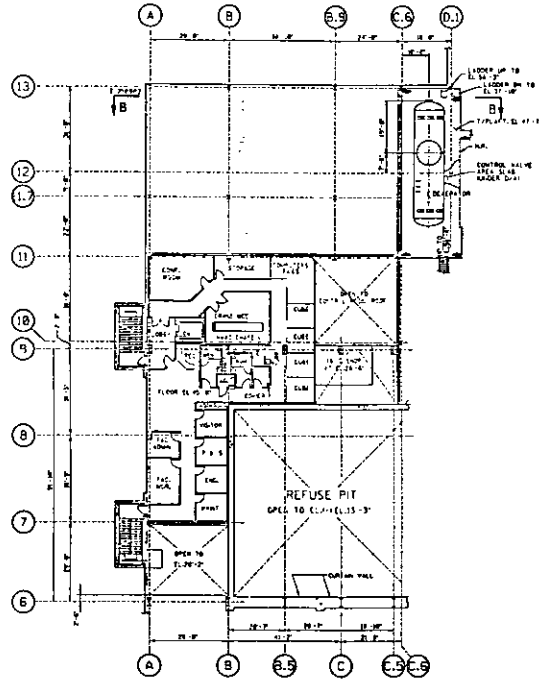
600 TPD + 3 UNITS = 5,000 BTU/h

RESOURCE RECOVERY FACILITY
LEE COUNTY

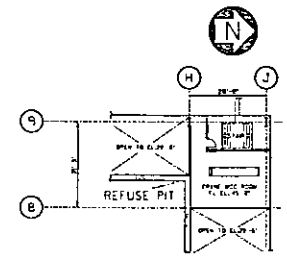
1A000191



PLAN EL.28'-6"



PARTIAL PLAN EL.45'-8"



Ebasco Engineers & Constructors

GENERAL ARRANGEMENT PLAN
FLOOR EL. 28'-6" & EL. 45'-8"
LEE COUNTY SOLID WASTE RESOURCE RECOVERY FACILITY

OGDEN MARTIN SYSTEMS OF LEE, INC.

C-1033

7182-E-210201

C

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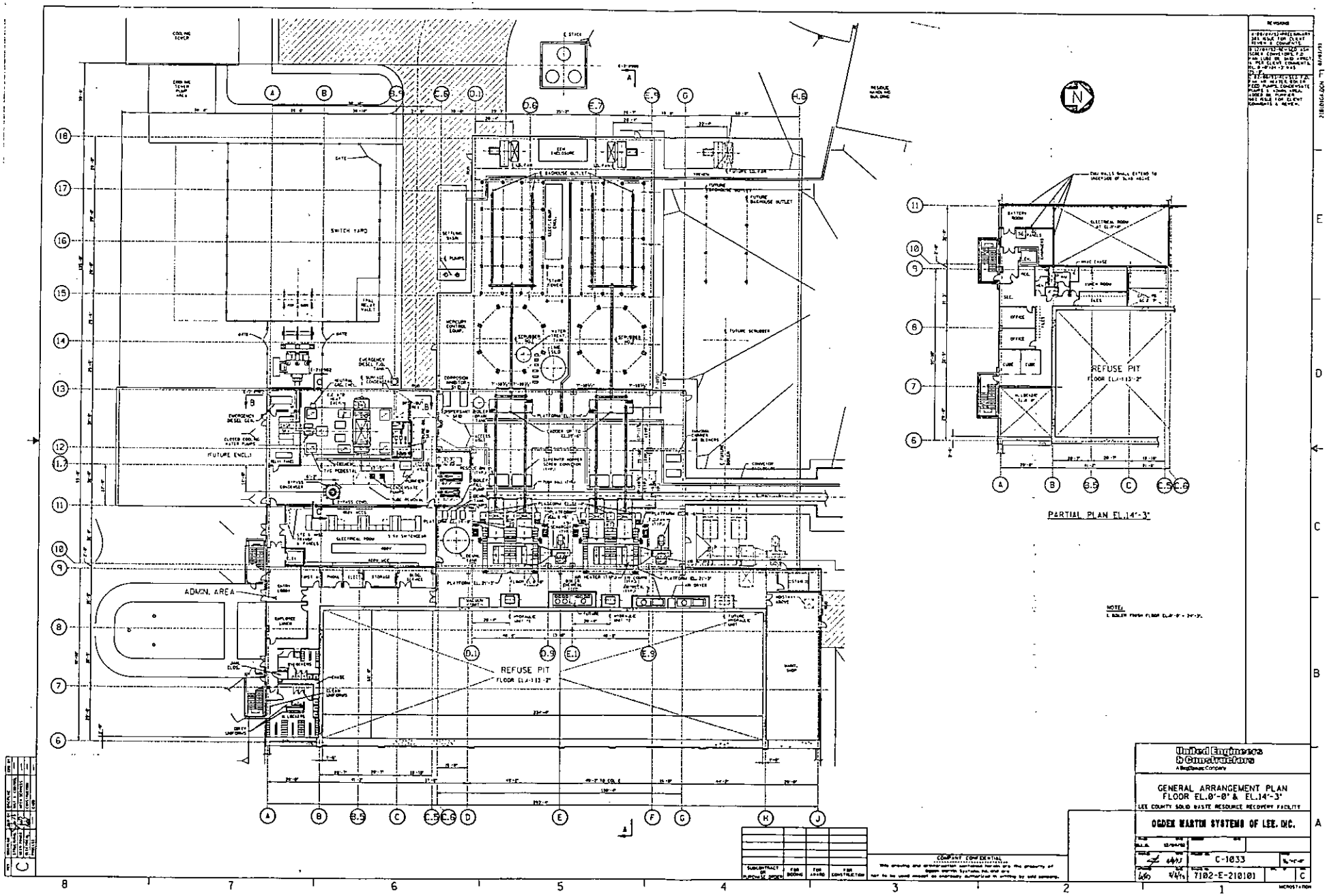

NOTES:

United Engineers & Constructors
A Raytheon Company

GENERAL ARRANGEMENT PLAN
FLOOR EL.0'-0" & EL.14'-3"
LEE COUNTY SOLID WASTE RESOURCE RECOVERY FACILITY

OGDEN MARTIN SYSTEMS OF LEE, INC.

C-1033

7102-E-210101

C

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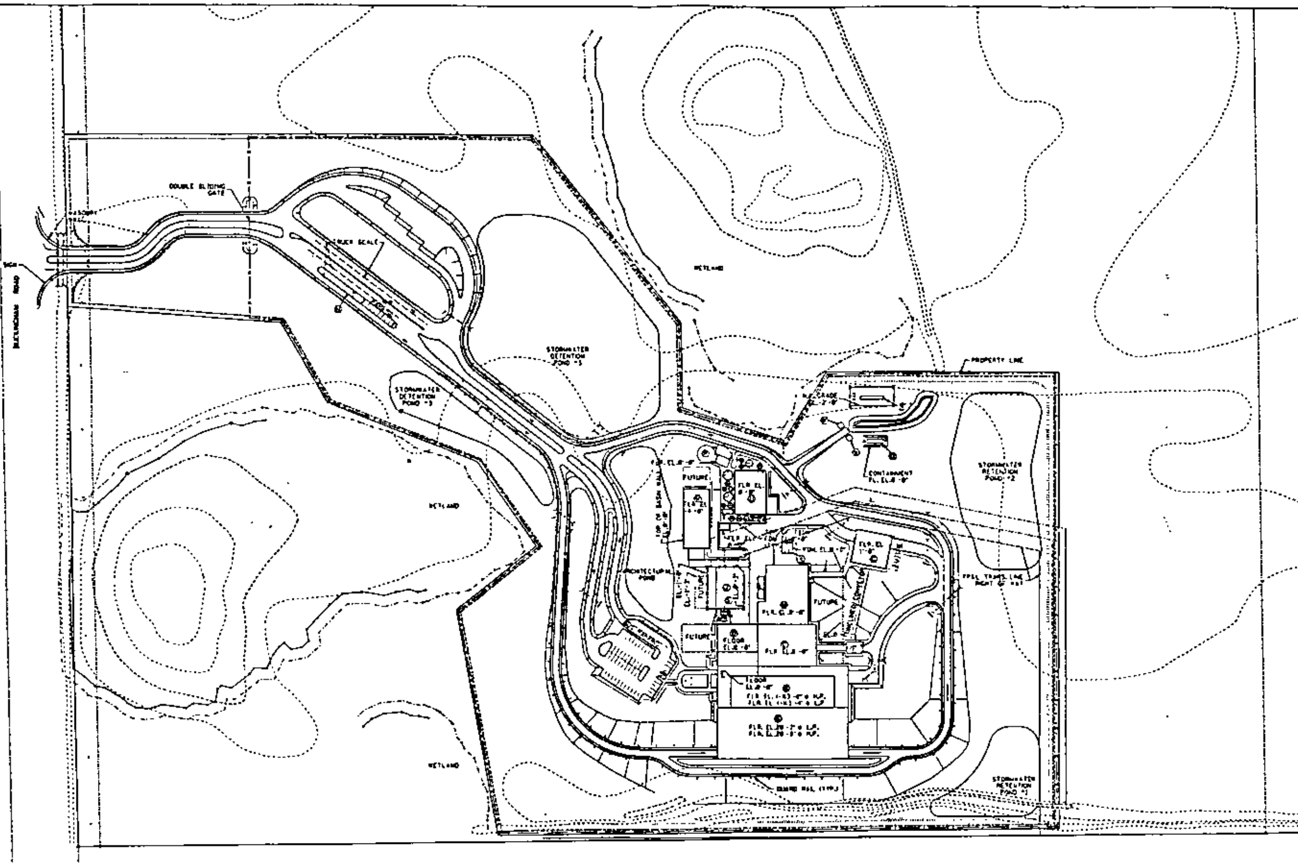

REFERENCE DRAWINGS:

E-230001 G.A. RESIDUE HANDLING BUILDING
E-240002 G.A. GRIZZLY BUILDING
E-210004 G.A. WASTE WATER TREATMENT BUILDING

- (A) TIPPING AREA
- (B) REFUSE PIT AREA
- (C) BOILER AREA
- (D) TURBINE GENERATOR AREA
- (E) FACILITY ADMINISTRATION AREA
- (F) GRIZZLY BUILDING
- (G) RESIDUE HANDLING BUILDING
- (H) COOLING TOWER
- (J) FPSL SWITCHYARD
- (K) STACK
- (L) SETTLING BASIN
- (M) APC AREA
- (N) SCALE HOUSE
- (P) FIRE WATER TANK & PUMP HOUSE
- (Q) AMMONIA STORAGE
- (R) PROPANE STORAGE
- (S) SWITCHYARD
- (T) CHLORINATION BUILDING
- (U) WATER TREATMENT BUILDING
- (V) AMMONIA UNLOADING STATION
- (W) PROPANE UNLOADING STATION
- (X) DIESEL OIL TANK & FUELING STATION

NOTES:

1. BOILER TRASH FLOOR EL. [illegible]

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SUBCONTRACT OR PURCHASE ORDER	FOR BIDDING	FOR AWARD	FOR CONSTRUCTION

United Engineers & Constructors
A Raytheon Company

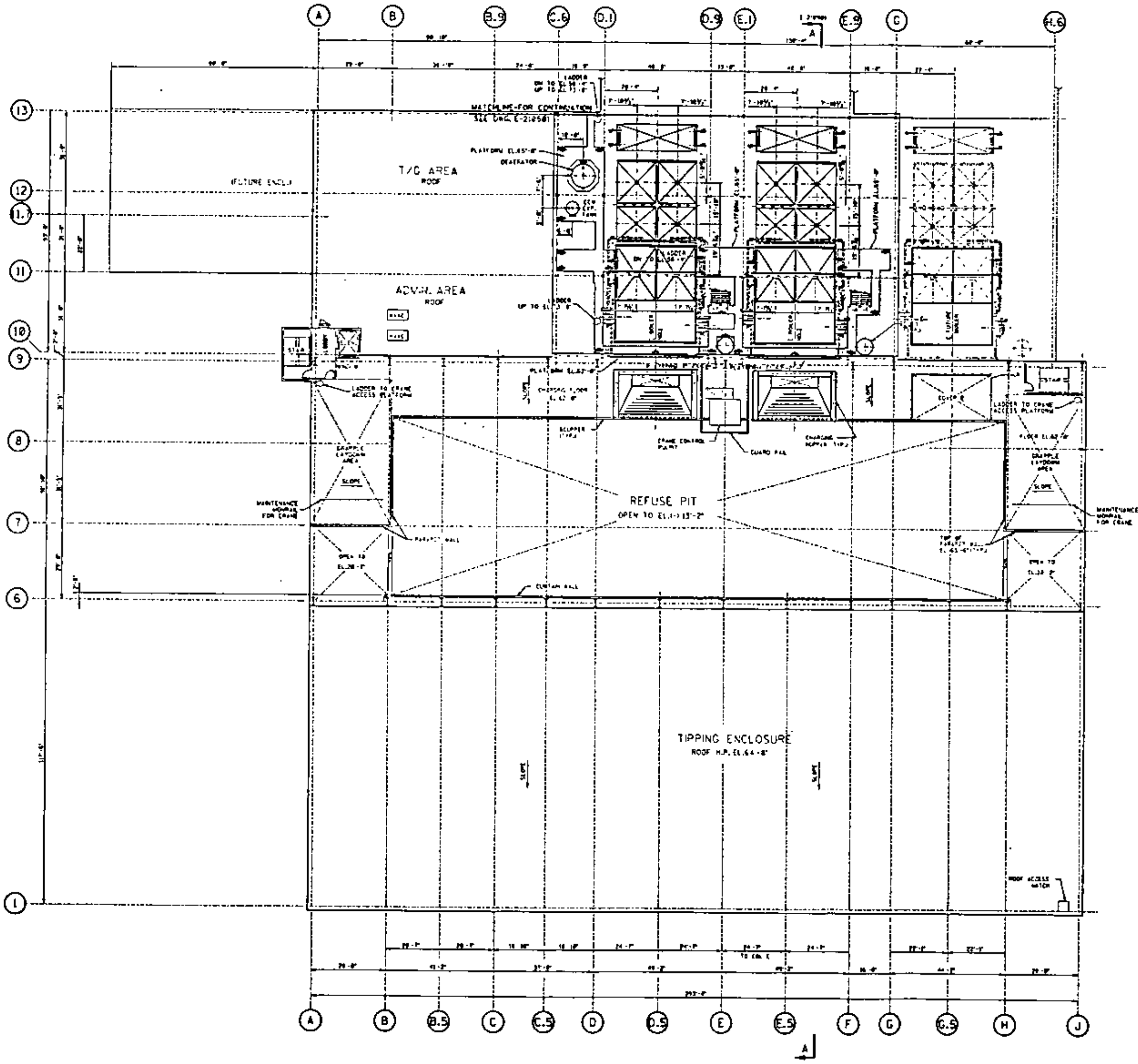
GENERAL ARRANGEMENT PLOT PLAN

LEE COUNTY SOLID WASTE RESOURCE RECOVERY FACILITY

OGDEN MARTIN SYSTEMS OF LEE, INC.

D.L.A. 12/04/92	C-1033
	7102-E-210000
REV.	C

MICROSTATION



NOTE:

1. PROVIDE ACCESS TO ALL ROOF AREAS, EITHER BY MANDOOR FROM ADJACENT STRUCTURE OR WHEN NO ADJACENT STRUCTURE, LADDER AND ROOF HATCH. EXTERIOR LADDERS TO ACCESS ROOF AREAS ARE NOT ACCEPTABLE.

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United Engineers & Constructors

GENERAL ARRANGEMENT PLAN
CHARGE FLOOR EL. 62'-0"

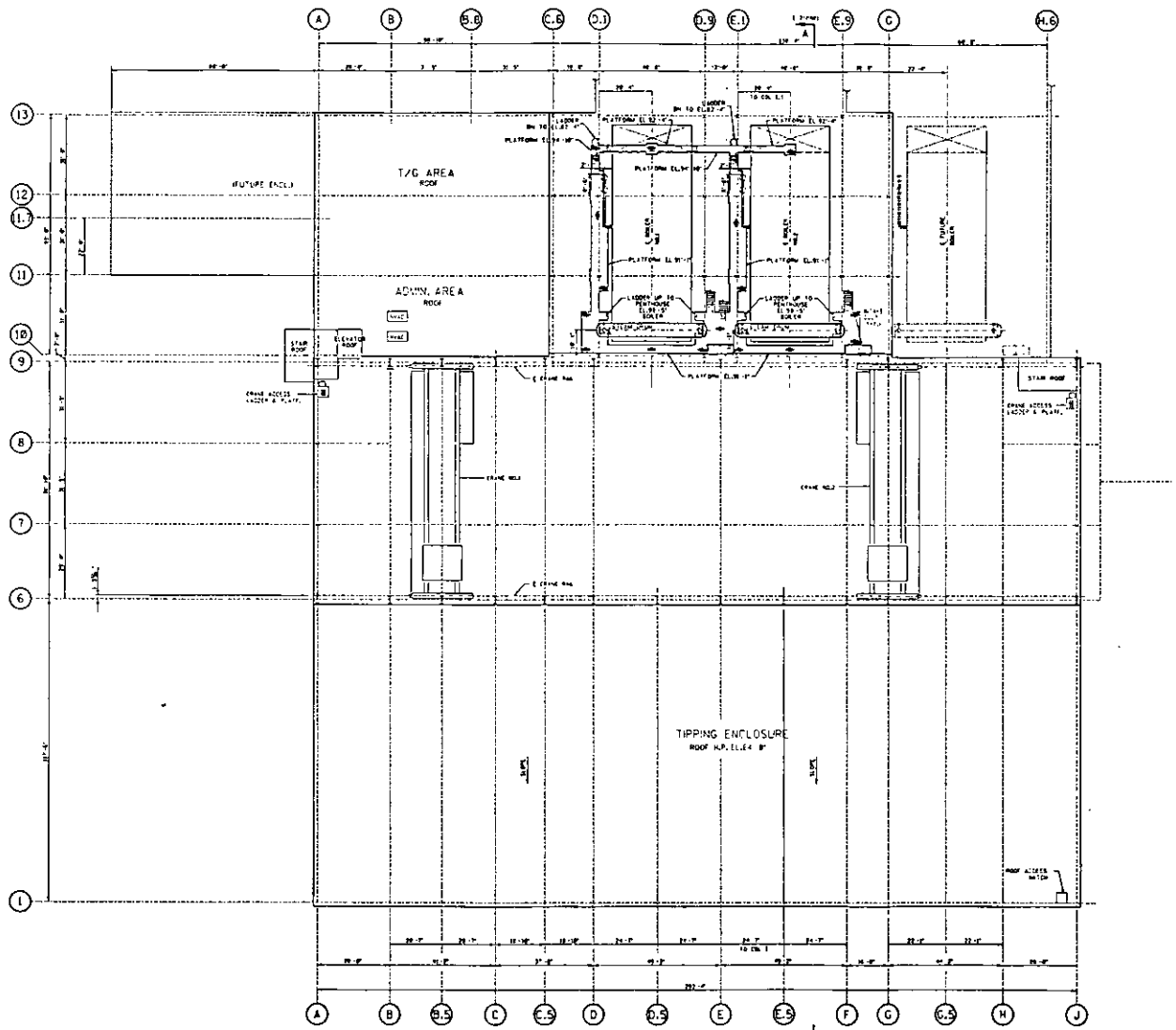
LEE COUNTY SOLID WASTE RESOURCE RECOVERY FACILITY

OGDEN MARTIN SYSTEMS OF LEE, INC.

C-1033

7102-E-210301

C



United Engineers & Constructors
A Raytheon Company

GENERAL ARRANGEMENT PLAN
STEAM DRUM EL. 94'-5" &
REFUSE CRANE EL. 89'-0"
LEE COUNTY SOLID WASTE RESOURCE RECOVERY FACILITY

OGDEN MARTIN SYSTEMS OF LEE, INC.

C-1033

7102-E-210401

C

SUBCONTRACT OR PURCHASE ORDER | FOR BIDDING | FOR AWARD | FOR CONSTRUCTION

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0124E
DISTRAL S.A.
DEC-91-002

AUXILIARY BURNERS

DISTRAL S. A. shall furnish for each boiler two (2) flexi-pak lox NOx auxiliary burner package assemblies, one for each furnace side wall, by Peabody or Purchaser approved equal. The supply per burner is as follows:

1 - Windbox fabricated of 1/4" steel plate with open back for welding to the boiler front plate. The following forced draft fan will be fitted for mounting on top of the windbox.

1 - Northern centrifugal forced draft fan, direct connected to a 15 HP, 1800 RPM, TEFC electric motor. The fan will be complete with inlet screen and air control vortex. The capacity will be 10,688 SCFM at 8.79" W.C. at sea level.

1 - Bailey Model UP10 rotary actuator for forced draft fan vortex.
1 - Burher purge/cooling blower direct connected to a 1750 RPM, T.E.F.C. motor. *

The following equipment will be mounted, piped and wired on the windbox, as far as practicable, except where noted:

1 - Peabody type ISC, forced draft burner suitably arranged for balanced furnace firing.
1 - Gas care type gas burner.
1 - FPM gas-electric ignitor with transformer, electrode and flexible gas hose.
1 - Throat sweep

Ignitor Gas Train

1 - Ignitor shut-off valve
2 - Maxon solenoid shut-off valves
1 - Maxon vent solenoid shut-off valve
1 - Fisher Y-600 pressure regulating valve
1 - "Y" type strainer
1 - Leak test cock.
1 - 1-1/2" pressure gauge

* INCLUDING INLET ISOLATION VORTEX WITH BAILEY ROTARY ACTUATOR.

12

Gas Train Steel/Welded Train

1 - Low pressure switch.
2 - Maxon automatic safety shut-off valves with end switches.
1 - Maxon vent solenoid shut-off valve.
1 - Leak test cock.
1 - Fisher 1098 EGR-GIL Series pressure regulating valve.
1 - Burner shut-off cock.
1 - High pressure switch.
2 - 3-1/2" pressure gauges.

Flame Safeguard Equipment

1 - NEMA-4 electrical control cabinet with the following mounted and wired to terminal strip:

- 1 - Flame proving relay, Peabody micro-computer controller.
- 1 - Allen-Bradley programmer controller including:
  - 1 - Microprocessor CPU
  - 1 - Set, inputs
  - 1 - Set, outputs
- 1 - Cable I/O expander chasis.
- 1 - Set, output modules, isolated.
- 1 - Set, output modules, relay.
- 1 - Set, status light, ready, purging, ignitor on, module failure, flame proven, flame failure.
- 1 - Flame strength indicator.
- 1 - Alarm Horn.
- 1 - Combustion air flow switch.
- 1 - High steam pressure operating limit switch.
- 1 - Flame scanner, Peabody FV-03.
- 1 - Purge air flow switch.
- 1 - Excess high steam pressure operating limit switch.

Electric Positioning Combustion Controls

(4-20 MA Signals By Others)

1 - Maxon gas control valve with low fire interlock and actuator.
1 - Bailey Model UP10 rotary actuator.
[redacted].
1 - "Manual-Automatic" selector switch.

24. Access Doors and Observation Ports

Item	Location	No.	Dimensions
Access Doors*	Stoker Enclosure	2	36" x 48"
	Furnace-1st pass	2	18" DIA.
	Evaporator-2nd pass	-	N/A
	Evaporator-3rd pass	6	18" DIA
	2nd/3rd pass hopper	2	24" x 24"
	Superheater	6	18" DIA.
	Superheater hoppers	4	24" x 24"
	Economizer	10	24" x 24"
	Economizer hopper	2	24" x 24"
	Air Ducts	2	24" x 24"
	FG Ducts	2	24" x 24"
Observation Ports	Stoker Enclosure	6	8" x 6"
	Furnace-1st pass	6	8" x 6"

25. Economizer Outlet Connection

Flange connection dimension (L X W) 3'-10" x 30'-8" ft.

Centerline elevation 32'-5 1/8" ~~ft.~~

Distance from outlet flange to rear wall center line 1 ft.

26. Specification Compliance:

Other than those exceptions/clarifications listed here, the Contractor confirms full compliance with the specifications, including all attachments. All exceptions/clarifications listed below must include the applicable Specification Section, reference and explanation. If an exception represents a more cost effective design, the Contractor must bid to the Specification and provide a cost option.

* Exclusive of water wash connections and air heater access doors. - RLT

ATTACHMENT 8

STORAGE OF MARTIN STOKER EQUIPMENT

The following requirements are part of SM-101, Technical Specification for MSW Steam Generators, and shall be complied with by the Boiler Supplier.

1. Large Components:
Large components (such a longitudinal frames, intermediate longitudinal frames, transverse frames, compartment walls, driving beams, transition pieces, grate siftings hoppers, siftings discharge ducts, ash dischargers and feed chutes) shall be covered with well-fastened tarpaulins to protect them against rain water. Tarpaulins shall be brought to grade and tucked neatly under equipment. The storage ground must be dry. Components shall be laid out on top of beams to avoid contact with soil.

   Prior to storage, surface coating and paint shall be checked for good condition. Any damage occurred during transport shall be repaired so that rust formation is avoided.

   The components shall not be stored on top of each other. Should stock piling be required, beams shall be inserted between components to avoid deformation and to ensure good ventilation.

   All roller bearings and spherical bearings which remain fitted during storage are to be checked for sufficient filling with grease. "Exposed" bearing points shall be wrapped in oil paper.

   The protective film on machined, uncoated surfaces shall be checked for good condition, and repaired if necessary.

2. Hydraulic cylinders:
Cylinders which remain fitted shall be checked to ensure that the piston rod has entered the cylinder completely and cannot be moved out.

   An anti-corrosive film is applied to the piston rod protruding from the cylinder and its machined surfaces in the workshop. Nevertheless, all these points shall be treated with anti-corrosive agent. The spherical bearings must be filled with a sufficient amount of the appropriate type of grease.

   Cylinders filled with oil and sealed are not to be exposed to direct sunlight or temperatures exceeding 120°F.

Hydraulic cylinders shipped in cases must remain in their original packing. They must, however, be checked for damage or exposure to moisture during shipping. If cases are wet, they shall be dried and repacked.

Cases shall be stored in a dry and ventilated room.

3. Pneumatic cylinders:
Pneumatic cylinders are shipped loosely packed in cases. Cylinder insides are slightly oiled and sealed. Cylinders shall remain in their original packing if it is still in good condition and shall be stored in a dry and ventilated room.

4. Driving beam support rollers:
Support rollers are either shipped loose, packed in cases, or must be disassembled and packed on site.

Support rollers shipped loose or in cases, shall remain in their original packing, and shall be stored in a dry room. If the original packing is not in good condition, or if rollers must be packed at site, storage crates must be weather tight.

5. Feed ram support rollers:
These rollers shall be removed,placed in weather tight storage crates and stored in a dry room.

6. Driving beam guide rollers:
These rollers shall remain in place.

7. Undergrate air damper control gear and other components shipped as loose items:
The bearing points shall be greased and the components stored in a dry and ventilated room.

8. Grate and feeder surface elements:
These items are delivered on pallets provided with a protective foil. Each panel contains a bag of drying medium. If this has become ineffective due to sea transport, the foil must be removed. The pallets shall be loaded with the castings and stored in a dry and ventilated room.

9. Seal air and pneumatic piping:
These are to be stored in a dry and ventilated room.

10. Hydraulic Pumping Station:
The hydraulic pumping station will be delivered seaworthy-packed and the tank will be filled with sloshing oil up to its head. If the packing is undamaged, the hydraulic pumping station shall be stored in a dry and ventilated room for no more than 6 months.

11. Hydraulic Pneumatic Cabinets:
Hydraulic-pneumatic cabinets are shipped seaworthy- and vacuum-packed. Units shall be stored in a dry and ventilated room for no more than 6 months.

12. Hydraulic Piping:
Piping up to nominal 1/2-inch is galvanized, with ends sealed with plastic plugs. Larger pipe sizes are protected with anti-corrosive coating and sealed ends. Fittings and mounting brackets are galvanized. Devices such as pressure counterbalance valves are wrapped in oil paper and shipped separately. All pipe shall be inspected for plugs and proper coating and repaired as necessary.

13. Electronic Cabinets:
Electronic cabinets are shipped seaworthy and vacuum-packed. Packing shall be inspected for damage and repaired if necessary. Units shall be stored in a dry and ventilated room.

ATTACHMENT 9

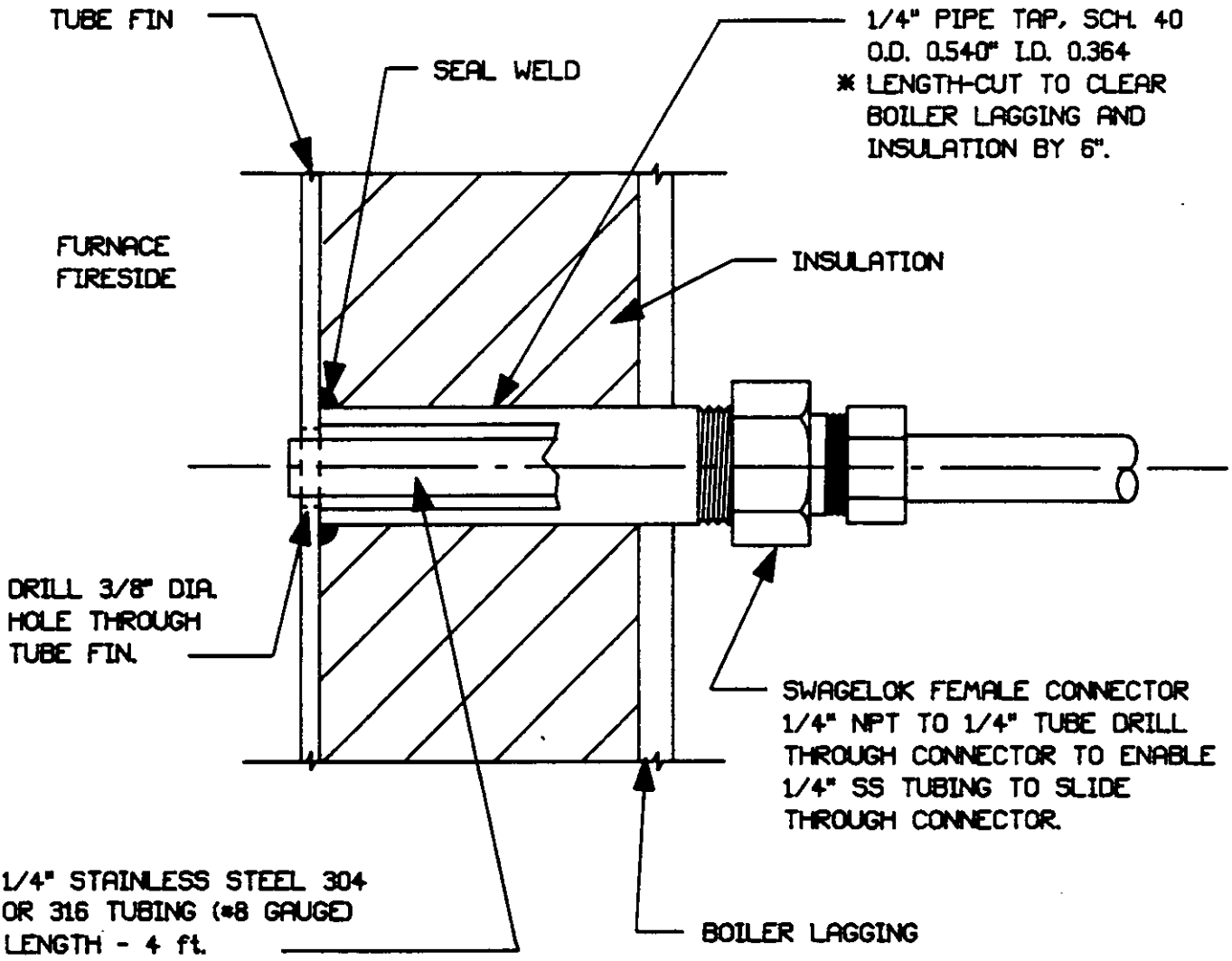
STRUCTURAL STEEL SPECIFICATION

The following structural steel specification, SS-410 Structural Steel, is included as part of this boiler specification. Contractor shall comply with all requirements of this specification.

ATTACHMENT 10

PAINTING SPECIFICATION

The following painting specification, SA-550 Painting Ferrous metals included in Subcontractor's Work, is included as part of this boiler specification. Contractor shall comply with all requirements of this specification.



NOTE: CONTRACTOR SHALL INSTALL PIPE, TAP AND CAP.
PURCHASER WILL PROVIDE PROBE AND FITTINGS.

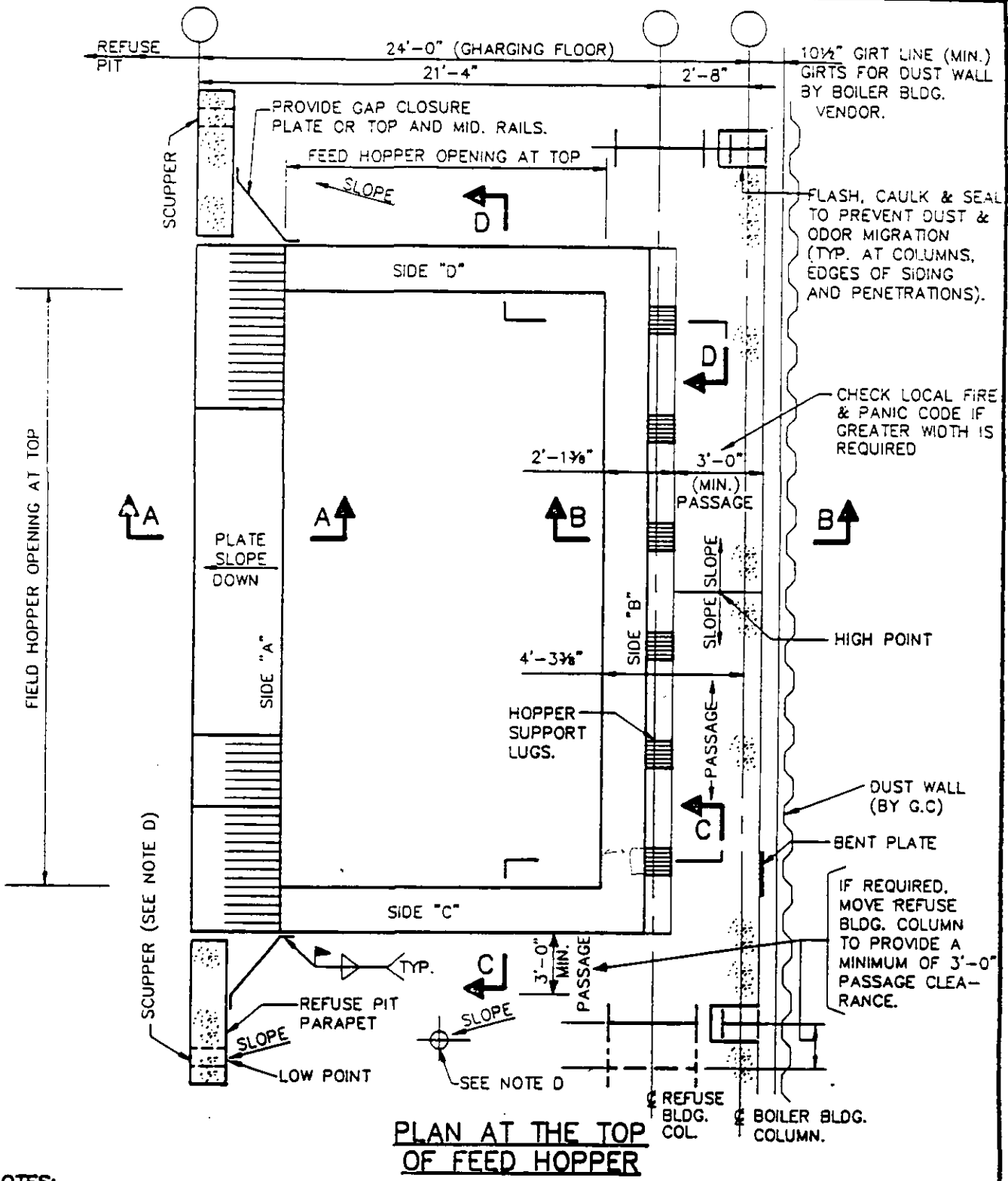
AN OGDEN COMPANY	ATTACHMENT 11 FURNACE SIDEWALL TEST TAP PENETRATION	OGDEN PROJECTS, INC. APPROVED: [signature] DATE: 10-9-90 DWG. No. REV. 1

ATTACHMENT 12

REFUSE FEED HOPPER SUPPORT AND PASSAGEWAY

The following sketches are included as part of this boiler specification. Contractor shall comply with all requirements of these sketches.

Sketches included are: RS-412A, RS-412B and RS-412C - Martin Feed Hopper Support and Passageway at Charging Floor.



PLAN AT THE TOP OF FEED HOPPER

NOTES:

A) FEED HOPPER SUPPORTED ON SIDES A & B ONLY.

B) THERE ARE NO ANCHOR BOLTS CONNECTING FEED HOPPER & SUPPORT BEAM/CONCRETE.

C) SIDE "B" CARRIES MAXIMUM HOPPER LOAD

D) WHEN SCUPPERS ARE NOT PERMITTED BY RFP & SERVICE AGREEMENT, USE FLOOR DRAINS.

(ALL ELEVATIONS REFERENCED TO DATUM 0'-0" BOILER FLOOR.)

1	DATUM 0'-0" SUBSTITUTED FOR 100'-0".

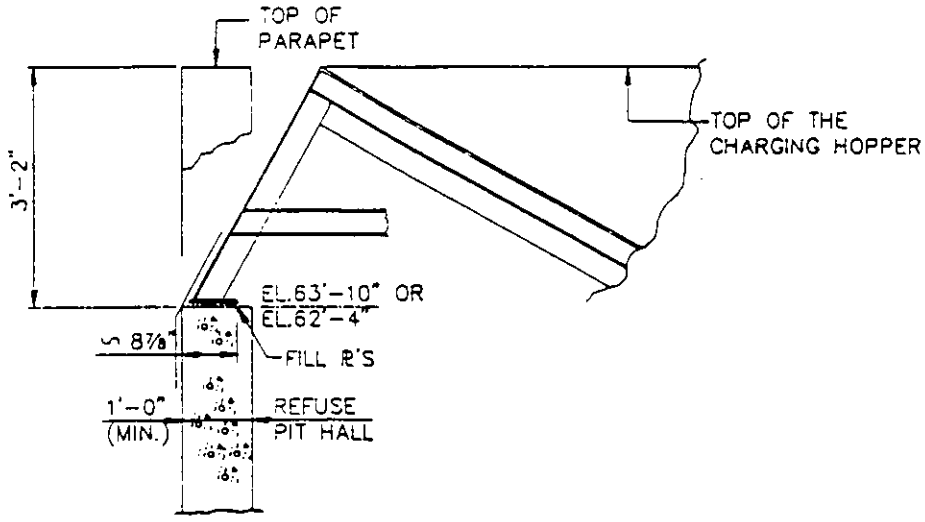
REVISION

AN OGDEN COMPANY

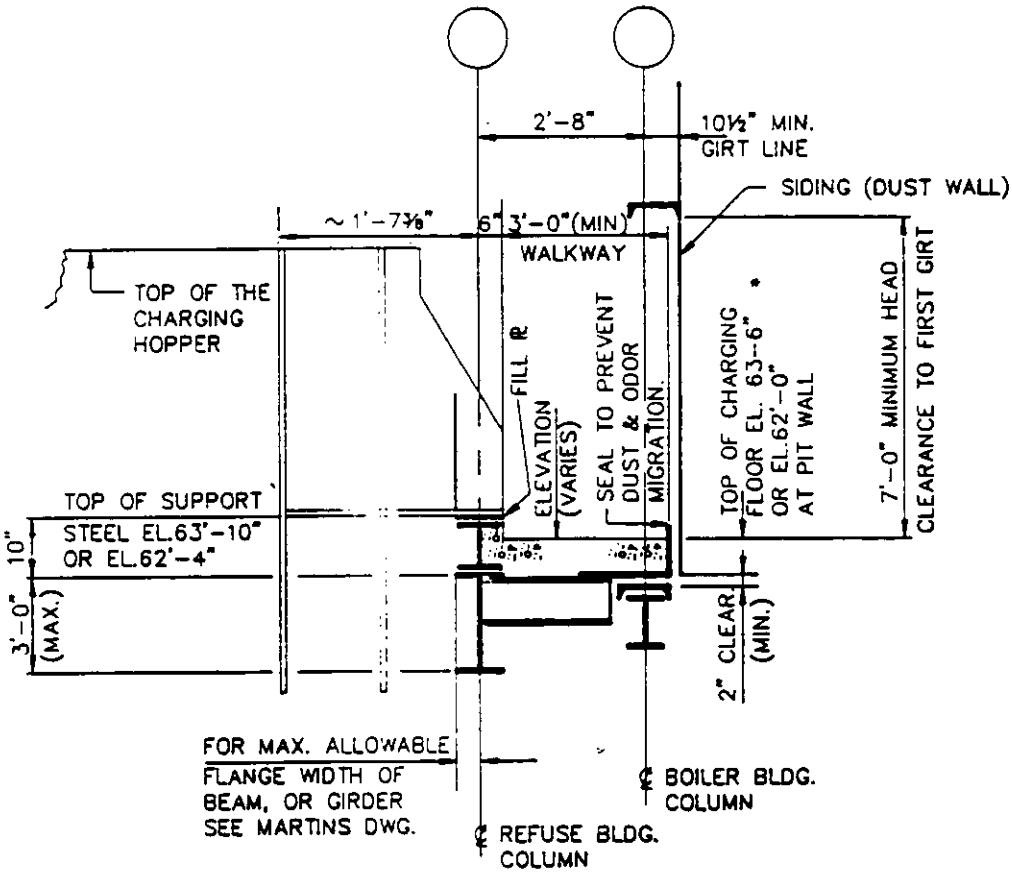
MARTIN REFUSE FEED HOPPER SUPPORT AND PASSAGE WAY AT CHARGING FLOOR

OGDEN PROJECTS, INC.

APPROVED: PJM	DATE: 8/20/81
DWG. NO. RS-412A	REV. 1



SECTION A-A



SECTION B-B

NOTES:

* ELEVATION VARIES WITH NUMBER STOKER STEPS
  15 STEPS ELEV.=63'-6"
  18 STEPS ELEV.=62'-0"

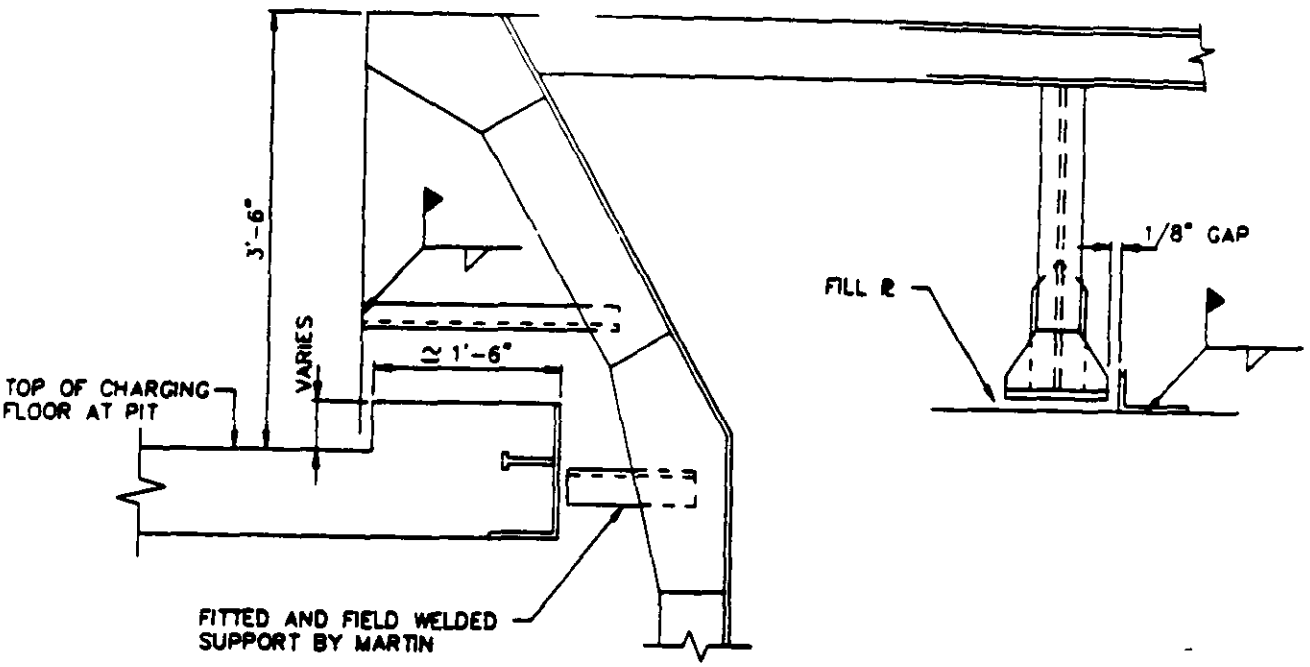
WORK THIS STANDARD WITH RS-412A & C

1	DATUM 0'-0" SUBSTITUTED FOR 100'-0".
REVISION	

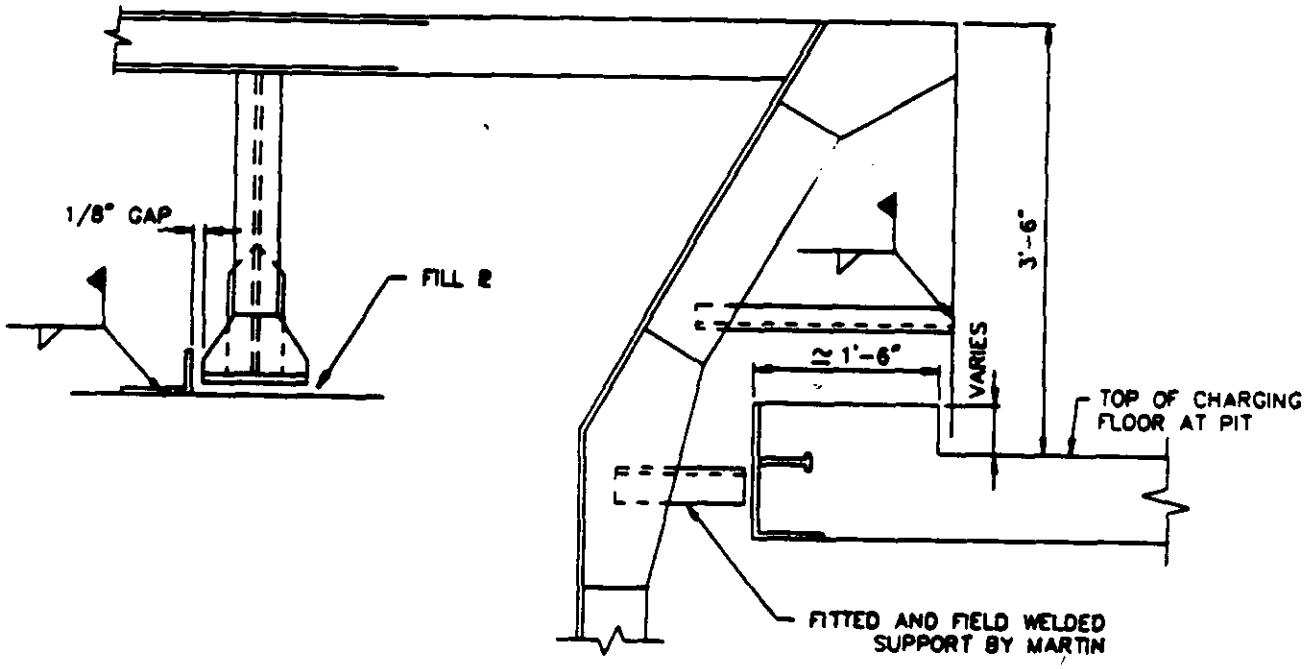
AN OGDEN COMPANY

MARTIN REFUSE FEED HOPPER SUPPORT AND PASSAGE WAY

OGDEN PROJECTS, INC.	
APPROVED PJM	DATE 8/30/91
DWG. NO. RS-412B	REV. 1



SECTION C–C



SECTION D–D

AN OGDEN COMPANY

MARTIN REFUSE FEED HOPPER SUPPORT AND PASSAGE WAY

OGDEN PROJECTS, INC.

APPROVED	DATE
PJM	3/19/90
DWG. NO. RS-412C	REV. 0

ATTACHMENT 13

INSTRUCTIONS REGARDING ERECTION OF THE MARTIN STOKER

The following guidelines are part of SM-101, Technical Specification for MSW Steam Generators, and shall be complied with by the Boiler Supplier:

1. Measure and check the grate supporting structure. Fix grate datum point.

2. Hang the undergrate hopper below grate.

3. Fit and bolt the grate front together.

4. Install shop-assembled grate runs. Fit in clinker dam supports and clinker rollers of the field assembled grate runs (for grate with 3 or more runs).

5. Put into place undergrate hoppers and underfire air plenum bottom plates (for grates with 3 or more runs).

6. Fit and bolt bulkheads, grate driving beams, and carrier beams (partly shop-assembled) of the field assembled grate runs.

7. Level out grate front and grate.

8. Weld grate front, grate, and undergrate hopper.

9. Assemble and bolt division plate supports, feed rams, and transition piece.

10. Erect chute as follows:

    a) Rear wall upper part.
    b) Side wall upper and center parts. Upper part and center part bolted and welded on the ground.
    c) Bracing beam.
    d) Rear wall center parts with chute gates (for grates with 4 or more runs).
    e) Front wall. Right-hand side front wall upper part, intermediate piece, and center part assembled and welded on the ground. Proceed the same way for left-hand side.
    f) Hang up buckstays for water jacket front wall on bracing beam or platform (for wide grates).
    g) Mount segments of water jacket front wall.
    h) Mount segments of water jacket rear wall.
    i) Mount water jacket side walls.

k) Buckstays for water jackets rear and front walls (for wide grates). Chute bolted and welded together.

11. Fit in grate structure and adjust as required.

12. Mount division plates and compensation blocks between grate runs, side plates and compression plates, top guide assembly for grate driving beams in the field-assembled grate runs, heat shields, seal air lines to driving beam support rollers.

13. Put into place ash discharger connecting piece, ash discharger, and ash pit. Complete sifting discharge ducts.

14. Assemble and adjust grate surface.

15. Fit underfire air control system.

16. Run piping systems as follows:

    a) Chute water jacket supply and drain lines.
    b) Hydraulic pump, cabinets, and piping.
    c) Compressed-air piping and cylinders.
    d) Pressure indicating lines and gauges.
    e) Grease pump and lines.
    f) Cooling air lines in grate front.

17. Electric systems:

    a) Limit switch and magnets.
    b) Local pushbutton stations.
    c) Measuring transducers for angle of rotation.
    d) Transmitters.
    e) Control cabinets.

18. Touch-up painting.

19. Measures to protect ready-mounted grate:

    a) Cover grate surface with wood.
    b) Secure all hydraulic cylinders with piston rods in entered position.
    c) Secure chute damper in closed position (from top).