

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT				1. CONTRACT ID CODE	PAGE OF PAGES	
				J	1	3
2. AMENDMENT/MODIFICATION NO. 0002		3. EFFECTIVE DATE 28-Apr-2004	4. REQUISITION/PURCHASE REQ. NO.		5. PROJECT NO.(If applicable)	
6. ISSUED BY USA ENGINEER DISTRICT, SEATTLE ATTN: CENWS-CT 4735 EAST MARGINAL WAY SOUTH SEATTLE WA 98134-2329		CODE W912DW	7. ADMINISTERED BY (If other than item 6) <b>See Item 6</b>		CODE	
8. NAME AND ADDRESS OF CONTRACTOR (No., Street, County, State and Zip Code)				X	9A. AMENDMENT OF SOLICITATION NO. W912DW-04-R-0017	
				X	9B. DATED (SEE ITEM 11) 06-Apr-2004	
					10A. MOD. OF CONTRACT/ORDER NO.	
					10B. DATED (SEE ITEM 13)	
CODE		FACILITY CODE				
11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS						
<input checked="" type="checkbox"/> The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offer <input type="checkbox"/> is extended, <input type="checkbox"/> is not extended.						
Offer must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended by one of the following methods: (a) By completing Items 8 and 15, and returning _____ copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.						
12. ACCOUNTING AND APPROPRIATION DATA (If required)						
13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS. IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.						
A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.						
B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(B).						
C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:						
D. OTHER (Specify type of modification and authority)						
E. IMPORTANT: Contractor <input type="checkbox"/> is not, <input type="checkbox"/> is required to sign this document and return _____ copies to the issuing office.						
14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.) Central Heat Plant Low Emissions Tech., Malmstrom AFB, MN -- see continuation.,						
Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.						
15A. NAME AND TITLE OF SIGNER (Type or print)				16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)		
				TEL:	EMAIL:	
15B. CONTRACTOR/OFFEROR		15C. DATE SIGNED	16B. UNITED STATES OF AMERICA		16C. DATE SIGNED	
_____ (Signature of person authorized to sign)			BY _____ (Signature of Contracting Officer)		28-Apr-2004	

## SECTION SF 30 BLOCK 14 CONTINUATION PAGE

**The following items are applicable to this modification:**CONTINUATION

## A. The purposes of this amendment are as follows:

1. To provide a revised Bid Schedule.
2. To provide a revised Section 00800, revising SC-1.
3. To provide a revised Section 01010, adding paragraphs 1.1 References and 1.8.2 Hazardous Materials Contractor Authorization Process.
4. To provide a new Section 01010-A Waste Management Plan.
5. To provide a new Section 01010-B Recovered Materials Written Determination Form.
6. To provide a revised Section 01110, revising paragraph 1.3.
7. To provide a revised Section 15080A, revising paragraph 2.2.
8. To provide a revised Section 15555A, revising paragraph 2.1.1, 2.2.1.1, 2.2.2, 2.3.2, 3.3.4, and 3.5.
9. To provide a revised drawing G1.1 Flow Diagram.
10. To provide a Meeting Attendance Roster from the Site Visit.
11. To provide the slide presentation used at the Site Visit.

B. The attached revised pages supersede and replace the corresponding pages. The attached revised specification sections supersede and replace the corresponding specification sections. Specification changes are generally identified, for convenience, by strikeout for deletions, and underlining of text for additions. All portions of the revised or new pages shall apply whether or not changes have been indicated.

C. NOTICE TO OFFERORS: Offerors must acknowledge receipt of this amendment by number and date on Standard Form 1442, BACK, Block 19, or by telegram.

D. All amendments are available for download this date on the Army Corps of Engineers website at <http://www.nws.usace.army.mil/ct/>.

## Enclosure:

Revised Bid Schedule  
Revised Section 00800  
Revised Section 01010  
New Section 01010-A  
New Section 01010-B  
Revised Section 01110

Revised Section 15080A  
Revised Section 15555A  
Meeting Attendance Roster  
Slide Presentation  
Revised Drawing (R2\_plans.zip) G1.1 Flow Diagram

DOCUMENT 00010

## BID SCHEDULE

## PART 1 GENERAL

## 1.1 BID SCHEDULE

Bid Schedule  
Low Emission Central Heat Plant

Item No.	<u>Description of Item</u> <u>Base Items</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Price</u>	<u>Amount</u>
0001	All work for the Application of Low Emissions Technology to Coal-Fired CHP in accordance with the drawings & specifications but not including the work indicated under items 0002 through <del>0009</del> <u>0010</u> .	1	JOB	LS	\$_____
0002	All work for As-Built Drawings as Specified in Section 01702 from Preparation to Approval.	1	JOB	LS	\$25,000
0003	All Work for O&M Manuals as Specified in Section 01701 from Preparation to Final Approval.	1	JOB	LS	\$20,000
0004	All Work for Form 1354 Checklist and Equipment in Place List as Specified in Section 01704 & 01705 from Preparation to Final Approval.	1	JOB	LS	\$12,000
0005	All work for the installation of Induced Draft Fan Variable Frequency Drives and Motor Replacement. (HTHW Generators No. 1&3)	1	JOB	LS	\$_____
0006	All work for the Plant Air System Modifications.	1	JOB	LS	\$_____
0007	All work for the Instrument Air System Modification.	1	JOB	LS	\$_____

<u>Item No.</u>	<u>Description of Item</u> <u>Optional Items</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Price</u>	<u>Amount</u>
<del>0008</del>	<del>All work to comply with Hazardous Material Contractor Authorization Procedures as required by Section 01010-1.8.</del>	<del>1</del>	<del>JOB</del>	<del>LS</del>	<del>\$_____</del>
Total Base Items					\$_____
<del>0008</del>					
<del>0009</del>	Provide Load Simulator System	1	Job	LS	\$_____
<del>0009</del>					
<del>0010</del>	All Work for Dustless Unloader (Pug Mill) Replacement	1	Job	LS	\$_____
Total Optional Items					\$_____
Total Base & Optional Items					\$_____

The dollar amounts established in Items No. 0002, 0003 and 0004 shall not be revised by bidders.

-- End of Document --

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## SPECIAL CLAUSES

## SC-1 COMMENCEMENT, PROSECUTION AND COMPLETION OF WORK

The Contractor shall be required to

- (a) commence work under this contract within five [5] calendar days after the date the Contractor receives the notice to proceed,
- (b) prosecute the work diligently, and
- (c) complete the entire work ready for use not later than dates specified on the Heat Plant Schedule below (see Table 1). The time stated for completion shall include final cleanup of the premises.

Table 1: HEAT PLANT SCHEDULE

	ITEM	REMARK	DATE
1	1 <sup>st</sup> coal generator available for work (Generator #3)	Gas operation on remaining 2 generators and Bailey System operational	04/15/04
2	2 <sup>nd</sup> coal generator available for work (Generator #1)	1 generator, operation on gas only Bailey System operational	05/01/04
3	Ash system available		04/15/04
4	Plant summer shutdown	All systems available for work	Actual system operation verification during the heat plant season (1 Nov to 30 Dec)
5	Plant restart gas generator (Generator #2)	1 gas generator Bailey System operational	09/15/04 (Note 1 <u>&amp; 2</u> )
6	1 <sup>st</sup> coal/gas generator available for heating	Gas and/or coal operation All systems operational	11/01/04 (Note 1 <u>&amp; 2</u> )
7	2 <sup>nd</sup> coal/gas generator available for heating	All systems operational	11/01/04 (Note 1 <u>&amp; 2</u> )
8	Load Simulator		Start anytime except for water tie-ins

Notes: (1) All work shall be completed within two construction seasons prior to 11/15/05. The contractor shall ensure the heat plant is operational by 11/01/04. Contractor shall resume construction impacting heat plant operations on 05/31/05. Continued construction during winter heating season is authorized provided plant heating is not impacted. If note (1) is not complied with, note (2) applies.

(+2) See Section 01110 – 1.3.

The completion date is based on the assumption that the successful offeror will receive the notice to proceed no later than 31 May 2004.

## SC-1.1 OPTION FOR INCREASED QUANTITY

a. The Government may increase the quantity of work awarded by exercising one or more of the Optional Bid Items 0008 and 0009 at any time, or not at all, but no later than sixty [60] calendar days after receipt by Contractor of notice to proceed. Notice to proceed on work Item(s) added by exercise of the option(s) will be given upon execution of consent of surety.

b. The parties hereto further agree that any option herein shall be considered to have been exercised at the time the Government deposits written notification to the Contractor in the mails.

c. The time allowed for completion of any optional items awarded under this contract will be the same as that for the base item(s), and will be measured from the date of receipt of the notice to proceed for the base item(s).

#### SC-1.2 EXCEPTION TO COMPLETION PERIOD

In case the Contracting Officer determines that completion of the project is not feasible within the completion period(s) stated above, the Contractor shall be responsible for providing means to temporarily heat all the buildings served by the Central Heat Plant CHP (see Section 01110 – 1.3 Table 1) and accomplish such work in the first plant shut down period following the contract completion period and shall complete such work as specified, unless other plant shut down periods are directed or approved by the Contracting Officer.

#### SC-2. LIQUIDATED DAMAGES - CONSTRUCTION (SEP 2000) (FAR 52.211-12)

(a) If the Contractor fails to complete the work within the time specified in SC – 1.c, or any extension, the Contractor shall pay to the Government as liquidated damages, the sum of \$983 for each day of delay until the work is completed or accepted.

(b) If the Government terminates the Contractor's right to proceed, the resulting damages will continue to accrue until the work is completed. These liquidated damages are in addition to excess cost of repurchase under the Termination clause of the CONTRACT CLAUSES.

SC-3. TIME EXTENSIONS (Sept 2000) (FAR 52.211-13): Time extensions for contract changes will depend upon the extent, if any, by which the changes cause delay in the completion of the various elements of construction. The change order granting the time extension may provide that the Contract completion date will be extended only for those specific elements related to the changed work and that the remaining contract completion dates for all other portions of the work will not be altered. The change order also may provide an equitable readjustment of liquidated damages under the new completion schedule.

#### SC-5. INSURANCE - WORK ON A GOVERNMENT INSTALLATION (JAN 1997) (FAR 52.228-5)

(a) The Contractor shall, at its own expense, provide and maintain during the entire performance period of this Contract at least the kinds and minimum amounts of insurance required in the Insurance Liability Schedule or elsewhere in the Contract.

(b) Before commencing work under this Contract, the Contractor shall certify to the Contracting Officer in writing that the required insurance has been obtained. The policies evidencing required

insurance shall contain an endorsement to the effect that any cancellation or any material change adversely affecting the Government's interest shall not be effective:

(1) for such period as the laws of the State in which this Contract is to be performed prescribe;  
or

(2) until 30 days after the insurer or the Contractor gives written notice to the Contracting Officer, whichever period is longer.

(c) The Contractor shall insert the substance of this clause, including this paragraph (c), in subcontracts under this Contract that require work on a Government installation and shall require subcontractors to provide and maintain the insurance required in the Schedule or elsewhere in the Contract. The Contractor shall maintain a copy of all subcontractors' proofs of required insurance, and shall make copies available to the Contracting Officer upon request.

#### SC-5.1 REQUIRED INSURANCE IN ACCORDANCE WITH FAR 28.307-2:

(1) Workers' compensation and employer's liability. Contractors are required to comply with applicable Federal and State workers' compensation and occupational disease statutes. If occupational diseases are not compensable under those statutes, they shall be covered under the employer's liability section of the insurance policy, except when Contract operations are so commingled with a Contractor's commercial operation that it would not be practical to require this coverage. Employer's liability coverage of at least \$100,000 shall be required, except in states with exclusive or monopolistic funds that do not permit workers' compensation to be written by private carriers.

(2) General Liability.

(a) The Contracting Officer shall require bodily injury liability insurance coverage written on the comprehensive form of policy of at least \$500,000 per occurrence.

(b) Property damage liability insurance shall be required only in special circumstances as determined by the agency.

(3) Automobile liability. The Contracting Officer shall require automobile liability insurance written on the comprehensive form of policy. The policy shall provide for bodily injury and property damage liability covering the operation of all automobiles used in connection with performing the Contract. Policies covering automobiles operated in the United States shall provide coverage of at least \$200,000 per person and \$500,000 per occurrence for bodily injury and \$20,000 per occurrence for property damage. The amount of liability coverage on other policies shall be commensurate with any legal requirements of the locality and sufficient to meet normal and customary claims.

(4) Aircraft public and passenger liability. When aircraft are used in connection with performing the Contract, the Contracting Officer shall require aircraft public and passenger liability insurance. Coverage shall be at least \$200,000 per person and \$500,000 per occurrence for bodily injury, other than passenger liability, and \$200,000 per occurrence for property damage. Coverage for passenger liability bodily injury shall be at least \$200,000 multiplied by the number of seats or passengers, whichever is greater.

(5) Vessel liability. When Contract performance involves use of vessels, the Contracting Officer shall require, as determined by the agency, vessel collision liability and protection and indemnity liability insurance.

(6) Environmental Liability If this contract includes the transport, treatment, storage, or disposal of hazardous material waste the following coverage is required.

The Contractor shall ensure the transporter and disposal facility have liability insurance in effect for claims arising out of the death or bodily injury and property damage from hazardous material/waste transport, treatment, storage and disposal, including vehicle liability and legal defense costs in the amount of \$1,000,000.00 as evidenced by a certificate of insurance for General, Automobile, and Environmental Liability Coverage. Proof of this insurance shall be provided to the Contracting Officer.

SC-7. PERFORMANCE OF WORK BY THE CONTRACTOR (APR 1984) (FAR 52.236-1): The Contractor shall perform on the site, and with its own organization, work equivalent to at least twenty five percent (25%) of the total amount of work to be performed under the Contract. The percentage may be reduced by a supplemental agreement to this Contract if, during performing the work, the Contractor requests a reduction and the Contracting Officer determines that the reduction would be to the advantage of the Government.

SC-8. PHYSICAL DATA (APR 1984) (FAR 52.236-4): Data and information furnished or referred to below is for the Contractor's information. The Government will not be responsible for any interpretation of or conclusion drawn from the data or information by the Contractor.

(a) Physical Conditions: The indications of physical conditions on the drawings and in the specifications are the result of site investigations by test holes shown on the drawings.

(b) Weather Conditions: Each bidder shall be satisfied before submitting his bid as to the hazards likely to arise from weather conditions. Complete weather records and reports may be obtained from any National Weather Service Office.

(c) Transportation Facilities: Each bidder, before submitting his bid, shall make an investigation of the conditions of existing public and private roads and of clearances, restrictions, bridge load limits, and other limitations affecting transportation and ingress and egress at the jobsite. The unavailability of transportation facilities or limitations thereon shall not become a basis for claims for damages or extension of time for completion of the work.

(d) Right-of-Way: The right-of-way for the work covered by these specifications will be furnished by the Government, except that the Contractor shall provide right-of-way for ingress and egress across private property where necessary to gain access to the jobsite. The Contractor may use such portions of the land within the right-of-way not otherwise occupied as may be designated by the Contracting Officer. The Contractor shall, without expense to the Government, and at any time during the progress of the work when space is needed within the right-of-way for any other purposes, promptly vacate and clean up any part of the grounds that have been allotted to, or have been in use by, him when directed to do so by the Contracting Officer. The Contractor shall keep the buildings and grounds in use by him at the site of the work in an orderly and sanitary condition. Should the Contractor require additional working space or lands for material yards, job offices, or other purposes, he shall obtain such additional lands or easements at his expense.

SC-10. LAYOUT OF WORK (APR 1984) (FAR 52.236-17): The Contractor shall lay out its work from Government-established base lines and bench marks indicated on the drawings, and shall be responsible for all measurements in connection with the layout. The Contractor shall furnish, at its own expense, all stakes, templates, platforms, equipment, tools, materials, and labor required to lay out any

part of the work. The Contractor shall be responsible for executing the work to the lines and grades that may be established or indicated by the Contracting Officer. The Contractor shall also be responsible for maintaining and preserving all stakes and other marks established by the Contracting Officer until authorized to remove them. If such marks are destroyed by the Contractor or through its negligence before their removal is authorized, the Contracting Officer may replace them and deduct the expense of the replacement from any amounts due, or to become due, to the Contractor.

SC-11. RESERVED

SC-12. AIRFIELD SAFETY PRECAUTIONS

(a) Definitions: As used in this clause --

(1) "Landing Areas" means:

(i) the primary surfaces which are comprised of the surface of the runways, the runway shoulders, and the lateral safety zones (the length of each primary surface is the same as the runway length; the width of each primary surface is 610 meters (2,000 feet), 305 meters (1,000 feet) on each side of the runway centerline; (see footnote at end of clause)).

(ii) the "clear zone" beyond the ends of each runway, i.e., the extension of the "primary surface" for a distance of 305 meters (1,000 feet) beyond each end of each runway;

(iii) all taxiways plus the lateral clearance zones along each side for the length of the taxiways (the outer edge of each lateral clearance zone is laterally 76 meters (250 feet) from the far or opposite edge of the taxiway, i.e., a 23 meters (75-foot)-wide taxiway would have a combined width of taxiway and lateral clearance zones of 130 meters (425 feet); and

(iv) all aircraft parking aprons plus the area 38 meters (125 feet) in width extending beyond each edge all around the aprons.

(2) "Safety precaution areas" means those portions of approach-departure clearance zones and transitional zones where placement of objects incident to Contract performance might result in vertical projections at or above the approach-departure clearance surface or the transitional surface.

(i) The "approach-departure clearance surface" is an extension of the primary surface and the clear zone at each end of each runway, for a distance of 15,240 meters (50,000 feet), first along an inclined (glide angle) and then along a horizontal plane, both flaring symmetrically about the runway centerline extended.

(a) The inclined plane (glide angle) begins in the clear zone 61 meters (200 feet) past the end of the runway (and primary surface) at the same elevation as the end of the runway, and continues upward at a slope of 50:1 (.3048 meter (one foot) vertically for each 15.24 meters (50 feet) horizontally) to an elevation of 152 meters (500 feet) above the established airfield elevation; at that point the plane becomes horizontal, continuing at that same uniform elevation to a point 15,240 meters (50,000 feet) longitudinally from the beginning of the inclined plane (glide angle) and ending there.

(b) The width of the surface at the beginning of the inclined plane (glide angle) is the same as the width of the clear zone; thence it flares uniformly, reaching the maximum width of 4,877 meters (16,000 feet) at the end.

(ii) The "approach-departure clearance zone" is the ground area under the approach-departure clearance surface.

(iii) The "transitional surface" is a sideways extension of all primary surfaces, clear zones, and approach-departure clearance surfaces along inclined planes.

(a) The inclined plane in each case begins at the edge of the surface.

(b) The slope of the inclined plane is 7:1 (.3048 meter (one foot) vertically for each 2.13 meters (7 feet) horizontally), and it continues to the point of intersection with

(1) Inner horizontal surface (which is the horizontal plane 46 meters (150 feet) above the established airfield elevation) or

(2) Outer horizontal surface (which is the horizontal plane 152 meters (500 feet) above the established airfield elevation), whichever is applicable.

(iv) The "transitional zone" is the ground area under the transitional surface. (It adjoins the primary surface, clear zone and approach-departure clearance zone.)

(b) General

(1) The Contractor shall comply with the requirements of this clause while

(i) Operating all ground equipment (mobile or station art);

(ii) Placing all materials; and

(iii) Performing all work, upon and around all airfields.

(a) The requirements of this clause are in addition to any other safety requirements of this contract.

(c) The Contractor shall--

(1) Report to the Contracting Officer before initiating any work;

(2) Notify the Contracting Officer of proposed changes to locations and operations;

(3) Not permit either its equipment or personnel to use any runway for purposes other than aircraft operation without permission of the Contracting Officer, unless the runway is--

(i) Closed by order of the Contracting Officer, and

(ii) Marked as provided in paragraph (d)(2) of this clause;

(4) Keep all paved surfaces such as runways, taxiways, and hardstands, clean at all times and, specifically, free from small stones which might damage aircraft propellers or jet aircraft;

(5) Operate mobile equipment according to the safety provisions of this clause, while actually performing work on the airfield. At all other times, the Contractor shall remove all mobile equipment to locations--

(i) Approved by the Contracting Officer,

(ii) At a distance of at least 229 meters (750 feet) from the runway centerline, plus any additional distance; and

(iii) Necessary to ensure compliance with the other provisions of this clause; and

(6) Not open a trench unless material is on hand and ready for placing in the trench. As soon as practicable after material has been placed and work approved, the Contractor shall backfill and compact trenches as required by the contract. Meanwhile, all hazardous conditions shall be marked and lighted in accordance with the other provisions of this clause.

(e) Landing Areas

The Contractor shall--

(1) Place nothing upon the landing areas without the authorization of the Contracting Officer.

(2) Outline those landing areas hazardous to aircraft, using (unless otherwise authorized by the Contracting Officer) red flags by day, and electric, battery-operated low-intensity red flasher lights by night;

(3) Obtain, at an airfield where flying is controlled, additional permission from the control tower operator every time before entering any landing area, unless the landing area is marked as hazardous in accordance with paragraph (d)(2) of this clause;

(4) Identify all vehicles it operates in landing areas by means of a flag on a staff attached to, and flying above, the vehicle. The flag shall be .9144 meters (3 feet) square, and consist of a checkered pattern of international orange and white squares of .3048 meter (1 foot) on each side (except that the flag may vary up to 10 percent from each of these dimensions);

(5) Mark all other equipment and materials in the landing areas, using the same marking devices as in paragraph (d)(2) of this clause; and

(6) Perform work so as to leave that portion of the landing area which is available to aircraft free from hazards, holes, piles of material, and projecting shoulders that might damage an airplane tire.

(e) Safety Precaution Areas

The Contractor shall--

(1) Place nothing upon the safety precaution areas without authorization of the Contracting Officer;

(2) Mark all equipment and materials in safety precaution areas, using (unless otherwise authorized by the Contracting Officer) red flags by day, and electric, battery-operated, low-intensity red flasher lights by night; and

(3) Provide all objects placed in safety precaution areas with a red light or red lantern at night, if the objects project above the approach-departure clearance surface or above the transitional surface.

SC-13. IDENTIFICATION OF GOVERNMENT-FURNISHED PROPERTY (APR 1984) (FAR 52.245-3): The Government will furnish to the Contractor the property identified in the schedule to be incorporated or installed into the work or used in performing the contract. The listed property will be furnished to the Contractor at the place designated by the Contracting Officer. The Contractor is required to accept delivery, pay any demurrage or detention charges, and unload and transport the property to the jobsite at its own expense. When the property is delivered, the Contractor shall verify its quantity and condition and acknowledge receipt in writing to the Contracting Officer. The Contractor shall also report in writing to the Contracting Officer within 24 hours of delivery any damage to or shortage of the property as received. All such property shall be installed or incorporated into the work at the expense of the Contractor, unless otherwise indicated in this contract. Delivery site location for Government Furnished Property is

SC-14. EQUIPMENT OWNERSHIP AND OPERATING EXPENSE SCHEDULE (MAR 1995)-(EFARS 52.231-5000)

(a) This clause does not apply to terminations. See 52.249-5000, Basis for Settlement of Proposals and FAR Part 49.

(b) Allowable cost for construction and marine plant and equipment in sound workable condition owned or controlled and furnished by a contractor or subcontractor at any tier shall be based on actual cost data for each piece of equipment or groups of similar serial and series for which the Government can determine both ownership and operating costs from the contractor's accounting records. When both ownership and operating costs cannot be determined for any piece of equipment or groups of similar serial or series equipment from the contractor's accounting records, costs for that equipment shall be based upon the applicable provisions of EP 1110-1-8, Construction Equipment Ownership and Operating Expense Schedule, Region IV. Working conditions shall be considered to be average for determining equipment rates using the schedule unless specified otherwise by the contracting officer. For equipment not included in the schedule, rates for comparable pieces of equipment may be used or a rate may be developed using the formula provided in the schedule. For forward pricing, the schedule in effect at the time of negotiations shall apply. For retroactive pricing, the schedule in effect at the time the work was performed shall apply.

(c) Equipment rental costs are allowable, subject to the provisions of FAR 31.105(d)(ii) and FAR 31.205-36. Rates for equipment rented from an organization under common control, lease-purchase arrangements, and sale-leaseback arrangements, will be determined using the schedule, except that actual rates will be used for equipment leased from an organization under common control that has an established practice of leasing the same or similar equipment to unaffiliated lessees.

(d) When actual equipment costs are proposed and the total amount of the pricing action exceeds the small purchase threshold, the contracting officer shall request the contractor to submit either certified cost or pricing data, or partial/limited data, as appropriate. The data shall be submitted on Standard Form 1411, Contract Pricing Proposal Cover Sheet.

(e) Copies of EP1110-1-8 "Construction Equipment Ownership and Operating Expense Schedule" Volumes 1 through 12 are available in Portable Document Format (PDF) and can be viewed or downloaded at <http://www.usace.army.mil/inet/usace-docs/eng-pamphlets/cecw.htm>. A CD-ROM containing (Volumes 1-12) is available through either the Superintendent of Documents or Government bookstores. For additional information telephone 202-512-2250, or access on the Internet at [http://www.access.gpo.gov/su\\_docs](http://www.access.gpo.gov/su_docs).

SC-15. PAYMENT FOR MATERIALS DELIVERED OFF-SITE (MAR 1995)-(EFARS 52.232-5000)

(a) Pursuant to FAR clause 52.232-5, Payments Under Fixed Priced Construction Contracts, materials delivered to the contractor at locations other than the site of the work may be taken into consideration in making payments if included in payment estimates and if all the conditions of the General Provisions are fulfilled. Payment for items delivered to locations other than the work site will be limited to:

(1) materials required by the technical provisions; or (2) materials that have been fabricated to the point where they are identifiable to an item of work required under this contract.

(b) Such payment will be made only after receipt of paid or receipted invoices or invoices with canceled check showing title to the items in the prime contractor and including the value of material and labor incorporated into the item. In addition to petroleum products, payment for materials delivered off-site is limited to the following items: Any other construction material stored offsite may be considered in determining the amount of a progress payment.

SC-18. CONTRACT DRAWINGS AND SPECIFICATIONS (AUG 2000)(DOD FAR SUPP 252.236-7001)

(a) The Government will provide to the Contractor, without charge, one set of contract drawings and specifications, except publications incorporated into the technical provisions by reference, in electronic media.

(b) The Contractor shall--

- (1) Check all drawings furnished immediately upon receipt;
- (2) Compare all drawings and verify the figures before laying out the work;
- (3) Promptly notify the Contracting Officer of any discrepancies;
- (4) Be responsible for any errors which might have been avoided by complying with this paragraph (b); and
- (5) Reproduce and print contract drawings and specifications as needed.

(c) In general—

- (1) Large scale drawings shall govern small scale drawings; and
- (2) The Contractor shall follow figures marked on drawings in preference to scale measurements.

(d) Omissions from the drawings or specifications or the misdescription of details of work which are manifestly necessary to carry out the intent of the drawings and specifications, or that are customarily performed, shall not relieve the Contractor from performing such omitted or misdescribed details of the work. The Contractor shall perform such details as if fully and correctly set forth and described in the drawings and specifications.

(e) The work shall conform to the specifications and the contract drawings identified in the index of drawings attached at the end of the Special Clauses.

SC-22. EPA ENERGY STAR: The Government requires that certain equipment be Energy Star compliant. Initially, the sole Energy Star requirement shall be the self certification by the bidder that the specified equipment is Energy Star compliant. Within 3 months of the availability of an EPA sanctioned test for Energy Star compliance, the Contractor shall submit all equipment upgrades and additions for testing and provide proof of compliance to the Government upon completion of testing. Testing shall be at the Contractor's expense.

SC-23. RECOVERED MATERIALS: The Corps of Engineers encourages all bidders to utilize recovered materials to the maximum extent practicable. The attached APPENDIX R contains procurement guidelines for products containing recovered materials.

## APPENDIX R

## PART 247 - COMPREHENSIVE PROCUREMENT GUIDELINE FOR PRODUCTS CONTAINING RECOVERED MATERIALS

40 CFR Ch. 1 (9-1-99 Edition)

Subpart B-Item Designations

§ 247.10 Paper and paper products.

Paper and paper products, excluding building and construction paper grades.

§ 247.11 Vehicular products.

(a) Lubricating oils containing re-refined oil, including engine lubricating oils, hydraulic fluids, and gear oils, excluding marine and aviation oils.

(b) Tires, excluding airplane tire

(e) Reclaimed engine coolants, excluding coolants used in non-vehicular applications.

247.12 Construction products.

(a) Building insulation product including the following items:

(1) Loose-fill insulation, including but not limited to cellulose fiber, mineral fibers (fiberglass and rock vermiculite, and perlite);

(2) Blanket and batt insulation, including but not limited to mineral fibers (fiberglass and rock wool).

(3) Board (sheathing, roof decking wall panel) insulation, including but not limited to structural fiberboard and laminated paperboard products perlite composite board, polyurethane, polyisocyanurate, polystyrene, phenolics, and composites; and

(4) Spray-in-place insulation, including but not limited to foam-in-place polyurethane and polyisocyanurate and spray-on cellulose.

(b) Structural fiberboard and laminated paperboard products for applications other than building insulation, including building board, sheathing shingle backer, sound deadening board, roof insulating board, insulating wallboard, acoustical and non-acoustical ceiling tile, acoustical and non-acoustical lay-in panels, floor underlayments, and roof overlay (cover board).

(c) Cement and concrete, including concrete products such as pipe and block, containing coal fly as ground granulated blast furnace (GGBF) slag.

(d) Carpet made of polyester fiber use in low- and medium-wear applications.

(e) Floor tiles and patio block containing recovered rubber or plastic.

(f) Shower and restroom dividers/partitions containing recovered plastic or steel.

(g) (1) Consolidated latex paint used for covering graffiti; and

(2) Reprocessed latex paint used for interior and exterior architectural applications such as wallboard, ceilings, and trim; gutter boards; and concrete, stucco, masonry, wood and metal surfaces.

§247.13 Transportation products.

(a) Traffic barricades and traffic cones used in controlling or restricting vehicular traffic.

(b) Parking stops made from concrete or containing recovered plastic or rubber.

(c) Channelizers containing recovered plastic or rubber.

(d) Delineators containing recovered plastic, rubber, or steel.

- (e) Flexible delineators containing recovered plastic.

§ 247.14 Park and recreation products

- (a) Playground surfaces and running tracks containing recovered rubber or plastic.
- (b) Plastic fencing containing recovered plastic for use in controlling snow or sand drifting and as a warning/safety barrier in construction or other applications.

247.15 Landscaping products.

- (a) Hydraulic mulch products containing recovered paper or recovered wood used for hydroseeding and as an over-spray for straw mulch in landscaping, erosion control, and soil reclamation.
- (b) Compost made from yard trimmings, leaves, and/or grass clippings for use in landscaping, seeding of grass or other plants on roadsides and embankments, as a nutritious mulch under trees and shrubs, and in erosion control and soil reclamation.
- (c) Garden and soaker hoses containing recovered plastic or rubber.
- (d) Lawn and garden edging containing recovered plastic or rubber.

§ 247.16 Non-paper office product.

- (a) Office recycling containers and office waste receptacles.
- (b) Plastic desktop accessories.
- (c) Toner cartridges.
- (d) Binders.
- (e) Plastic trash bags.
- (f) Printer ribbons.
- (g) Plastic envelopes.

§ 247.17 Miscellaneous products.

Pallets containing recovered wood, plastic, or paperboard.

## INDEX OF DRAWINGS

Central Heating Plant Application of Low Emissions Tech., Malmstrom AFB

Drawing file number: N/A

<b>SHEET NUMBER</b>	<b>PLATE NUMBER</b>	<b>TITLE</b>	<b>REVISION NUMBER</b>	<b>DATE</b>
1	T1.1	Cover Sheet/Vicinity Map		05 Mar 2004
2	G1.1	Flow Diagram (1 of 2)		05 Mar 2004
3	G1.2	Flow Diagram (2 of 2)		05 Mar 2004
4	M1.1	Plan @ El. 3410'-6"+/- (Operating Floor)		05 Mar 2004
5	M1.2	Plan @ El. 3438'-6 +/- (Coal Scale Floor)		05 Mar 2004
6	M1.3	Partial Plans @ El. 3461'-0"+/- & 3503'-0" +/- (Roof & Stack Platform)		05 Mar 2004
7	M1.4	Partial Plans @ El. 3392'-6"+/-, El. 3410'- 6"+/-, & El. 3432'-6"+/-		05 Mar 2004
8	M2.1	Sections (1 of 3)		05 Mar 2004
9	M2.2	Sections (2 of 3)		05 Mar 2004
10	M2.3	Sections (3 of 3)		05 Mar 2004
11	M3.1	Details (1 of 2)		05 Mar 2004
12	M3.2	Details (2 of 2)		05 Mar 2004
13	S1.1	Platform Framing Plans		05 Mar 2004
14	S1.2	Platform Framing Plans		05 Mar 2004
15	S1.3	Load Simulator Foundation Plan & Misc. Plans		05 Mar 2004
16	S2.1	Framing Elevations		05 Mar 2004
17	S3.1	Sections & Details		05 Mar 2004
18	S3.2	Sections & Details		05 Mar 2004
19	E1.1	Electrical Single Line Diagram		05 Mar 2004

<b>SHEET NUMBER</b>	<b>PLATE NUMBER</b>	<b>TITLE</b>	<b>REVISION NUMBER</b>	<b>DATE</b>
<b>20</b>	<b>E2.1</b>	<b>Electrical Plan Operating Level</b>		<b>05 Mar 2004</b>
<b>21</b>	<b>E2.2</b>	<b>Electrical Plan Mezzanine Level</b>		<b>05 Mar 2004</b>
<b>22</b>	<b>E2.3</b>	<b>Electrical Plan Coal Scale Level</b>		<b>05 Mar 2004</b>
<b>23</b>	<b>E2.4</b>	<b>Electrical Plan Roof Level</b>		<b>05 Mar 2004</b>
<b>24</b>	<b>E3.1</b>	<b>Motor Control Center Elevations</b>		<b>05 Mar 2004</b>
<b>25</b>	<b>E3.2</b>	<b>Control Architecture Diagrams</b>		<b>05 Mar 2004</b>
<b>26</b>	<b>E3.3</b>	<b>Electrical Schedules</b>		<b>05 Mar 2004</b>

STANDARD DETAILS BOUND IN THE SPECIFICATIONS

<b>DRAWING NUMBER</b>	<b>SHEET NUMBER</b>	<b>TITLE</b>	<b>DATE</b>
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SECTION 01501 - CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

1 & 2	U.S. Air Force Project Construction Sign	84JUN20
1	Hard Hat Sign	10SEP90

END OF SECTION

## SECTION 01010

## ENVIRONMENTAL PROTECTION

## PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. All references listed in these specifications are intended to be the current version or edition, unless specifically identified otherwise. The Contractor shall conform to the Occupational Safety & Health Act, Environmental Protection Agency, Montana Dept. of Environmental Quality, U.S. Air Force and all other Federal, State and Local environmental regulatory requirements.

AIR FORCE INSTRUCTION

AFI 32-7080 Air Force Instruction (Ozone Depleting Chemicals)

341st Space Wing

OPLAN 32-4 341st Space Wing Integrated Hazardous Material Emergency Response Plan

OPLAN 32-7042 341st Space Wing Hazardous Material Management Plan

CODE OF FEDERAL REGULATIONS (CFR)

40 CFR 260 Hazardous Waste Management System: General

40 CFR 279 Standards for the Management of Used Oil

1.2 SUBMITTALS

Submit the following in accordance with Section 01330, "Submittal Procedures:"

SD-11 Closeout Submittals

HAZMART account close out report; G

1.21.3 PERMITS AND FEES1.2.11.3.1 Payment

No separate payment will be made for work covered under this section. The Contractor shall be responsible for payment of fees associated with environmental permits, application, and/or notices obtained by the Contractor. All costs associated with this section shall be included in the contract price. The Contractor shall be responsible for payment of all

finest/fees for violation or non-compliance with Federal, State, Regional and local laws and regulations.

1.2.21.3.2 Obtaining Environmental Permits

The Government has obtained the following permits/licenses related to the construction of this project.

- 1) State Preconstruction Air Quality Permit.
- 2) Operating Air Quality Permit.

The Contractor shall be responsible for obtaining and complying with all other environmental permits and commitments required by Federal, State, regional, and local environmental laws and regulations.

1.2.31.3.3 Demolition Work

Contractors shall notify the Montana Dept. of Environmental Quality, Permitting & Compliance Division, Air & Waste Management Bureau, P.O. Box 200901, Helena, MT. 59620-0901 for all demolition work where load bearing members are removed.

1.31.4 AIR QUALITY

1.3.11.4.1 Use of Equipment

Equipment operation, activities, or processes performed by the Contractor shall be in accordance with all Federal and State air emission and performance laws and standards.

1.3.21.4.2 Burning

Burning of material is not allowed on base by the Contractor.

1.3.31.4.3 Particulates

The contractor shall not operate a construction site or demolition project unless reasonable precautions are taken to control emissions of particulate matter. Such emissions of airborne particulate matter shall not exceed 20% opacity as defined in 40 CFR 60 Appendix A.

1.3.41.4.4 Sound Intrusions

The Contractor shall keep construction activities under surveillance and control to minimize environment damage by noise. The Contractor shall comply with the provisions of the State of Montana rules.

1.3.51.4.5 Ozone Depleting Chemicals (ODCs)

1.3.5.11.4.5.1 Air Force Policy on ODCs

The contractor shall ensure activities performed under this contract are in compliance with the Air Force Policy on ODCs. The contractor shall not purchase, use, nor specify the use of any Class I ODC in the production, design, or maintenance of the end item. Class II ODCs may be used or specified only with the written approval of the Contracting Officer. ODCs are identified and classified in Air Force Instruction (AFI 32-7080).

1.3.5.21.4.5.2 Air Conditioning & Refrigeration Equipment

Any maintenance, repair and demolition work to air conditioning and refrigeration equipment shall require that all CFC (Chlorofluorocarbons) handling standards be met. The contractor shall not furnish any equipment that requires the use of ozone depleting chemicals nor shall he vent or cause to be vented CFC or HCFC (Hydrochlorofluorocarbons) refrigerants or other mixtures containing CFCs to the atmosphere during repair, maintenance or demolition work on the equipment covered by this contract. The contractor shall have available refrigerant recovery or reclaim equipment to perform the work. Personnel who operate refrigerant reclaim or recycling equipment shall possess the necessary state and local certifications for operating the equipment. The contractor shall be responsible for meeting all requirements, permitting, licensing and certification required by state or local ordinance to work on refrigeration systems. Replacement compressors and other replacement equipment used in repairing CFC-containing systems shall be compatible with CFC replacement refrigerants.

1.41.5 WATER RESOURCES AND STORM WATER DISCHARGE

The Contractor shall monitor construction activities to prevent pollution of surface and ground waters. Toxic or hazardous chemicals shall not be applied to soil or vegetation unless otherwise indicated. The Contractor shall monitor all water areas affected by construction activities. For construction activities immediately adjacent to impaired surface waters, the Contractor shall be capable of quantifying sediment or pollutant loading to that surface water when required by State or Federally issued Clean Water Act permits.

1.4.11.5.1 Discharge of Contaminates

The contractor shall not discharge any contaminated materials into the storm drain system on Base. EPA authorizes the following non-storm water discharges: fire fighting activities; fire hydrant flushing; potable water sources; irrigation drainage; lawn watering; routine building wash-down without detergents; pavement wash-waters where spills/leaks of toxic or hazardous materials have not occurred and where detergents are not used; air conditioning condensate; springs; uncontaminated groundwater; and foundation/footing drains where flows are not contaminated with process materials such as hydrocarbons/solvents.

1.4.21.5.2 Sanitary Sewer

The Contractor shall not dump any restricted materials down the sanitary sewer or wastewater disposal system without approval of the Air Force. All discharges to the sewer shall meet Federal, State, and Local regulatory requirements and shall meet the permit requirements limiting MAFB discharges. The base sewer discharge is tested weekly by the City of Great Falls for conformance requirements.

Restricted waste water materials include those that

Create a fire or explosion hazard.

Are toxic or poisonous.

Waters or wastes having a pH lower than 5.5 or higher than 9.0.

Solid or viscous substances that can obstruct the sewer flow.

Interfere with the biological activity of a treatment plant.

Inhibit biological activity by increasing the temperature.

Any fats, wax, grease, or oils in excess of 100 mg/l, total petroleum hydrocarbons in excess of 25 mg/l, noxious or malodorous liquids.

Contain metals in excess of MAFB's industrial permit allowable limits of:

iron-0.03 mg/l  
 chromium-5.676 mg/l  
 copper-4.985 mg/l,  
 cyanide-0.505 mg/l,  
 zinc-1.019 mg/l,  
 arsenic-0.462 mg/l,  
 cadmium-3.551 mg/l,  
 lead-0.946 mg/l,  
 mercury-0.028 mg/l,  
 nickel-4.782 mg/l or  
 silver-0.531 mg/l,

Contain phenols or dyes; are radioactive.

Contain over 100 lbs per day of total suspended solids (TSS) or five day biochemical oxygen demand (BOD) or cause the Base waste water discharge to exceed 200 mg/l BOD or 250 mg/l TSS.

~~1.4.2.1~~1.5.2.1 Ground Water Discharge

For discharge of ground water, the Contractor shall obtain a State or Federal permit specific for pumping and discharging ground water prior to surface discharging.

~~1.4.3~~1.5.3 Storm Water Discharge Permit

~~1.4.3.1~~1.5.3.1 Construction Activities-Storm water Discharge Permit

MPDES General Permit for Storm Water Discharges Associated with Construction Activity is required for construction activity in which clearing, grading and excavation will result in disturbance of 1 acre or more of land. A completed Notice of Intent (NOI) package must be sent to MDEQ and consists of the following:

A. A Notice of Intent Form

B. A Storm Water Pollution Prevention Plan. This plan must meet the basic requirements of the SWPPP provided in Part IV of the General Permit.

C. Fees

- D. The NOI package shall be routed through the Civil Engineer Squadron Environmental Flight (341 CES/CEV) 10 days prior to construction start date.
- E. The SWPPP must be maintained on the construction site.
- F. During construction the contractor shall perform inspections as outlined in Part III of the General Permit.
- G. After the site has achieved final stabilization the contractor will submit the Notice of Termination.

The contractor should reference the Montana Department of Environmental Quality's Website:

<http://www.deq.state.mt.us/wqinfo/mpDES/stormwaterconstruction.asp> for Notice of Intent Forms, instructions, SWPPP information, and other guidelines for complying with Montana storm water requirements.

#### 1.51.6 EROSION, SEDIMENT CONTROLS, AND WETLANDS

##### 1.5.11.6.1 Wetlands

The Contractor shall not enter, disturb, destroy, place fill into, or allow discharge of contaminants into any wetlands except as specifically authorized herein. The Contractor shall be responsible for the protection of wetlands on Malmstrom AFB. Authorization to enter specific wetlands identified shall not relieve the Contractor from any obligation to protect other wetlands within, adjacent to, or in the vicinity of the construction site and associated boundaries. Maps showing locations of wetlands within Malmstrom AFB can be obtained from the 341 CES/CEV.

##### 1.5.21.6.2 Erosion and Sediment Control

The Contractor shall be responsible for providing erosion and sediment control measures in accordance with Federal, State, and local laws and regulations. The erosion and sediment controls selected and maintained by the Contractor shall be such that water quality standards are not violated as a result of the Contractor's construction activities. The area of bare soil exposed at any one time by construction operations should be kept to a minimum. The Contractor shall construct or install temporary and permanent erosion and sediment control best management practices (BMPs). BMPs may include, but not be limited to, vegetation cover, stream bank stabilization, slope stabilization, silt fences, construction of terraces, interceptor channels, sediment traps, inlet and outfall protection, diversion channels, and sedimentation basins. The Contractor's best management practices shall also be in accordance with the Base Montana Pollutant Discharge Elimination System (MPDES) Storm Water Pollution Prevention Plan (SWPPP) which may be reviewed at the Malmstrom AFB Environmental Office. Any temporary measures shall be removed after the area has been stabilized.

##### 1.61.7 TOXICS

The Contractor is responsible for ensuring that no employee is exposed to toxic materials like airborne asbestos, lead from lead base paint or polychlorinated biphenyls (PCB's).

~~1.6.11.7.1~~ Asbestos and Asbestos Hazards

The Contractor shall conform to all the requirements of 29 CFR 1926.1101, Occupational Exposure to Asbestos. Typical suspect asbestos containing materials include floor and/or ceiling tile, tile mastic, roofing materials and flashing mastics, pipe and boiler insulation, wall coverings, sheet rock joint compound, transite materials, etc.

~~1.6.1.11.7.1.1~~ Asbestos Containing Materials

No new asbestos containing materials shall be used or installed at any facilities under the jurisdiction of Malmstrom AFB.

~~1.6.1.21.7.1.2~~ Removal of Asbestos Containing Material

The contractor shall notify the Montana Department of Environmental Quality, Permitting & Compliance Division, Air & Waste Management Bureau, Asbestos Control Program, PO Box 200901, Helena, MT. 59620-0901, of all demolition and renovation work where asbestos containing material removal quantities meet minimums specified for notification. (Demolition work is defined as any alteration of a structure where a load bearing beam is removed.) Notification is required for demolition work even though the facility contains no asbestos containing material (40 CFR 61.145(a)(2)).

~~1.6.21.7.2~~ Paint and Paint Hazards

~~1.6.2.11.7.2.1~~ Existing Paint

Existing painted surfaces may contain lead based paint. The Contractor is responsible for ensuring that no employee is exposed to concentrations of lead in excess of the permissible exposure limit (PEL) equal to an eight hour time weighted average of 50 micrograms per cubic meter (:g/m3). The Contractor shall conform to all the requirements of 29 CFR 1926.62 Lead Exposure in Construction. Workers are to wear respirators unless air testing establishes that lower protection factors are sufficient. Engineering and work practice controls may be sufficient to reduce exposure to or below the PEL. If the lead PEL is exceeded all workers shall wear appropriate personal protective equipment. The Contractor shall adhere to all other requirements of 29 CFR 1926.62. The Contractor shall keep a steady spray of water on any demolition work that may cause exposures. Runoff shall be contained on the work site to prevent contamination to any watersheds or the sanitary sewer system. The Contractor shall not contaminate the soil with lead due to excessive use of water. The site shall be limited to access by the public and the Contractor is responsible for non-exposure of the public to any lead concentrations above the PEL.

~~1.6.2.21.7.2.2~~ New-Paint Restriction

- a) The Contractor shall not furnish or use any paints or coatings containing mercury or lead for interior or exterior applications.
- b) No oil-based paints or coatings are to be used on base unless the entire liquid material is applied to the intended surface. No oil based paint liquid is to be left for disposal by base personnel nor is any of this material to be improperly disposed of by the contractor.

c) Use of environmentally safe water base paints and stains is recommended.

~~1.6.3~~1.7.3 Polychlorinated Biphenyls (PCB's)

No PCB's or products containing PCB's shall be installed on Malmstrom AFB.

Turn in all light ballasts or electrical equipment with PCB's to the 341 CES/CEV. Transformers, capacitors, switching gear, etc., often contain PCB's for cooling purposes.

If hermetically sealed equipment, then turn in to 341 CES/CEV assuming it has a PCB concentration greater than the 500-ppm limit.

~~1.6.3.1~~1.7.3.1 Contractor shall

- 1) Count the number of units for turn in.
- 2) Place units in a 49 CFR 178.500, Subpart L shipping container furnished by him.
- 3) Call 341 CES/CEV (Ph x6163) three days in advance to schedule contractor delivery.
- 4) Contractor shall deliver to appropriate storage facility.

~~1.7.1~~1.8 HAZARDOUS MATERIALS (HAZMAT)

~~1.7.1.1~~1.8.1 Material Safety Data Sheets (MSDS)

The contractor shall maintain MSDS's for all hazardous materials used on base and the MSDS's shall be on file on site at the construction site office at all times.

~~1.7.21.8.2~~ ~~HAZMART account close out~~

~~Prior to completion of the contract, provide a finalized report of the actual quantities used during the contract, remove excess materials and close out the HAZMART account.~~

~~1.7.21.8.2~~ HAZARDOUS MATERIALS (HAZMAT) CONTRACTOR AUTHORIZATION PROCEDURES

1.7.2.1.8.2.1 Contractors must obtain an authorization prior to bringing any hazardous materials (Federal Standard 313D) on Air Force installations. Following contract award, the contractor must identify all hazardous materials the contractor plans to use and the amounts to 341 CES/CEV through the contracting officer. For those materials deemed by 341 CES/CEV to require authorization procedures, the contractor will fill-out an AF-EMIS 3952 Authorization Request Worksheet and attach the appropriate Material Safety Data Sheet (MSDS).

1.7.2.21.8.2.2 The contractor will provide all AF-EMIS 3952 worksheets and MSDS's to the HAZMART through the contracting officer. The HAZMART will then enter the authorization request data into the AF-EMIS approved tracking system. The authorization will require 341 CES/CEV approval for environmental and emergency response purposes.

1.7.2.31.8.2.3 The contractor will report to the HAZMART for bar code issuance each time they bring authorized hazardous materials onto the base. The contractor will report on a monthly basis their consumption of these hazardous materials to the HAZMART.

1.7.2.41.8.2.4 The contractor shall maintain MSDS's for all hazardous materials used on base and the MSDS's shall be on file on site at the construction site office at all times.

1.7.2.51.8.2.5 Prior to completion of the contract, the contractor will submit a final report of the actual quantities used on base. The report will be used to reconcile actual chemical usage during the contract period. The contractor will remove all excess hazardous materials from the base and close out the HAZMART account.

1.7.2.61.8.2.6 The contractor shall submit all of the above data as a formal contract submittal.

1.7.31.8.3 HAZMART account close out report

The Contractor shall submit all of the above data as a formal contract submittal.

1.81.9 EMERGENCY PLANNING AND COMMUNITY RIGHT-TO-KNOW ACT (EPCRA).

For contracts over \$100,000, contractors shall comply with the Toxic Release Inventory reporting provisions of EPCRA Section 313 by filing Form R reports during the life of the contract. Contractors shall provide a list of any extremely hazardous or hazardous substances listed under EPCRA along with maximum inventory and consumption. HAZMART registration fulfills this requirement. Contractors shall provide this information to 341 CES/CEVV and HAZMART. Should the potential contractor not be subject to reporting under EPCRA, he shall certify as such. References: Federal Register, August 10, 1995, Vol. 60, No. 154, p40987-40992 and Federal Register, September 29, 1995, Vol 60, No. 189, p50737-50743.

1.91.10 STORAGE OF HAZARDOUS MATERIALS

1.9.11.10.1 Storage Areas

All hazardous materials used by the contractor on base property shall be stored properly in special areas in accordance with all regulatory and MAFB Fire Department requirements. Storage shall include, but not be limited to:

- A. Keep containers closed when not in use
- B. Label containers with warning labels
- C. Post hazardous signs as required
- D. Provide storage with secondary containment and routinely check for leaks and spills
- E. Store materials at a central location

F. Flammable items must be stored in an approved flammable storage locker

G. All fuel storage tanks must have secondary containment

H. Fuel and Lubricants

~~1.9.21.10.2~~ Equipment Storage

Storage, fueling and lubrication of equipment and motor vehicles shall be conducted in a manner that affords the maximum protection against spill and evaporation. Fuel, lubricants and oil shall be managed and stored in accordance with all Federal, State, Regional, and local laws and regulations. Used lubricants and used oil to be discarded shall be stored in marked corrosion-resistant containers and recycled or disposed in accordance with 40 CFR 279, State, and local laws and regulations. There shall be no storage of fuel on the project site. Fuel must be brought to the project site each day that work is performed.

~~1.101.11~~ HAZARDOUS WASTE PROCEDURES

~~1.10.11.11.1~~ Disposal

All hazardous waste, except those that come under Universal Waste Rules, must be managed and disposed of in accordance with 40 Code of Federal Regulations (40 CFR ) Subchapter I, Parts 260-268.

~~1.10.1.11.11.1.1~~ The contractor is responsible for the disposal of all hazardous waste generated from his operations, including spill cleanup. The contractor shall bear all costs associated with hazardous waste disposal.

~~1.10.1.21.11.1.2~~ Contractors storing hazardous waste on site for more than 24 hours must follow the Malmstrom Hazardous Waste Plan OPLAN 32-7042. As a minimum he must establish satellite accumulation points, appoint and train satellite accumulation point managers. If more than 55 gallons of hazardous waste or more than 5 lbs. of acutely hazardous waste is generated then the contractor must obtain approval for and establish a 90 day accumulation site.

~~1.10.1.31.11.1.3~~ The contractor shall manage his generated waste accumulations in accordance with 40 CFR Section 262.34 (c)(1). The contractor shall characterize (including sampling, analysis and manifesting) hazardous waste to a RCRA permitted facility. The contractor must arrange for a DOT trained and authorized person from the environmental flight to inspect the shipment and sign the hazardous waste manifest before manifesting the waste off base. The contractor shall provide a copy of the manifest to the 341 CES/CEV, Bldg 1708, prior to hazardous waste being shipped off the installation. A signed copy of the manifest must be returned to the 341 CES/CEV within 45 days.

~~1.10.1.41.11.1.4~~ The contractor is responsible for all fines and penalties, which may stem from an EPA or State of Montana Department Environmental Quality hazardous waste inspection of his operation.

~~1.10.21.11.2~~ Fluorescent Light Tubes

~~1.10.2.11.11.2.1~~ All fluorescent light tubes are considered hazardous waste even if they are sent to a recycling facility (unless there is data showing otherwise). Fluorescent tubes are to be managed in compliance with RCRA, 40 CFR Part 273, Universal Waste Rules and sent to recycling. All fluorescent light tubes shall be handled in such a way as to prevent breakage and the subsequent release of mercury-containing vapor. All tube removal related work shall be performed in conformance with all environmental, safety and health regulations.

~~1.10.2.21.11.2.2~~ Fluorescent light tubes shall be carefully removed from fixtures and packaged to prevent breakage during subsequent handling and shipping. If fluorescent bulbs are broken, then the contractor must clean up immediately and the material must be treated as a hazardous waste. Broken bulbs must be managed under the provisions of 40 CFR, part 260. If bulbs are broken, they must be managed according to Section 10.1.

~~1.10.2.31.11.2.3~~ Fluorescent tube recycling must be performed at a qualified recycling center that complies with 40 CFR 273 Subpart E standards for destination facilities. Upon completion of recycling, the Contractor must provide the Contracting Officer and 341 CES/CEVV certificates detailing the number of tubes recycled, date of recycling, and name and location of the recycler. Each certificate shall be signed and dated by the contractor removing the tubes and by the recycling firm performing the recycling.

#### ~~1.10.31.11.3~~ Responsibility

The contractor may obtain guidance from the 341 CES/CEVV, 731-6163, on proper storage and handling of hazardous waste while on Malmstrom AFB. However, all responsibility rests with the contractor to comply with all federal and state hazardous waste requirements and any information obtained from the Environmental Flight does not remove responsibility from the contractor for proper waste management.

#### ~~1.111.12~~ SOLID WASTES

The contractor is responsible for handling and disposal of all solid waste generated at the job site including laboratory testing and any documentation submittals required by the landfill owner.

Solid wastes (excluding clearing debris) shall be placed in containers that are emptied on a regular schedule. Handling, storage, and disposal shall be conducted to prevent contamination. Segregation measures shall be employed so that no hazardous or toxic waste will become co-mingled with solid waste. The Contractor shall transport solid waste off Government property and dispose of it in compliance with Federal, State, and local requirements for solid waste disposal. A Subtitle D RCRA permitted landfill shall be the minimum acceptable off-site solid waste disposal option. The Contractor shall verify that the selected transporters and disposal facilities have the necessary permits and licenses to operate.

Contractors are required to divert / recycle any solid waste generated from their work. The following on-site generated waste must be recycled: glass, tin, aluminum, cardboard, newspaper and office paper.

The Contractor shall make all arrangements for disposal of any wastes including wastes requiring special handling such as asbestos and lead containing materials, rubble, sludge or non-hazardous chemical wastes.

~~1.11.11.12.1~~ Solid Waste Disposal Facilities

~~1.11.1.11.11.5.1~~ All non-hazardous wastes shall be properly disposed of through a licensed landfill or recycling center. Montana Dept of Environmental Quality written approval is required for any non-inert materials such as asphalt containing materials, asphalt roofing materials, steel containing materials, etc that are to be disposed of in a Class III landfill site. No written approval is required if a Class II or Class IV landfill site is used for disposal of these non-inert materials.

~~1.11.1.21.12.1.1~~ Class IV landfills accept Group VI wastes which include construction and demolition waste such as waste building materials, packaging, and rubble resulting from construction, remodeling, repair, and demolition operations on pavements (including asphalt waste), houses, commercial buildings, and other structures.

~~1.11.1.31.12.1.2~~ Regulated hazardous wastes are excluded from all Class II, III and IV landfill sites. Class II landfill sites can receive any wastes acceptable at Class III and Class IV landfill sites in addition to municipal and household solid wastes such as garbage and putrescible organic materials.

~~1.11.1.41.12.1.3~~ No landfill site is available on base. Demolition rubble shall not be buried or placed upon the land anywhere on base or at the work site.

~~1.11.1.51.12.1.4~~ The cost for cleanup of improperly disposed wastes and/or the costs for removals of improperly placed hazardous waste materials shall be the responsibility of the contractor.

~~1.11.1.61.12.1.5~~ Copies of all disposal documents and weight tickets shall be furnished to the Contracting Officer.

~~1.11.21.12.2~~ Non-Hazardous Solid Waste Diversion Report

The Contractor shall maintain an inventory of non-hazardous solid waste diversion and disposal of construction and demolition debris. The Contractor shall submit a report to the 341 CES/CEVV through the Contracting Officer ten days prior to the final acceptance inspection. The report "Waste Management Plan" is provided at Attachment 1 (1010-A).

~~1.121.13~~ AFFIRMATIVE PROCUREMENT

~~1.12.11.13.1~~ In compliance with the Affirmative Procurement requirements of Section 6002 of RCRA and Executive Order 13101, the Government requires the use of the recycled and recovered materials and products identified in the Environmental Protection Agency's Comprehensive Procurement Guidelines in all purchases.

~~1.12.1.11.13.1.1~~ These materials and products must meet the requirements of the specifications, must not delay the progress of the work, and must not be cost prohibitive.

~~1.12.21.13.2~~ EPA guideline items are seen as the minimum that should be considered when evaluating recycled/reuse materials. Other materials and

products not listed, but commonly used in industry outside of the government should also be considered.

~~1.12.31.13.3~~ Material and product submittals for all recycled-content items required will list the recycled and recovered materials used and the percentage content.

~~1.12.41.13.4~~ Any decision not to acquire guideline items as required in the contract must be approved by the Contracting Officer. All purchases of guideline items must be verified by the Contracting Officer before contract closure. Activities subject to upward reporting and verification will be contracts with a total value over \$100,000.

~~1.12.51.13.5~~ Paper products such as government documents, agreements, contracts, etc. shall be printed on paper containing 30% post consumer materials. The use of bio-based or bio-based containing products is encouraged.

~~1.12.61.13.6~~ All contractually required documents and reports produced by or for the Air Force longer than two pages shall be double-sided.

#### ~~1.131.14~~ SPILLS AND SPILL RESPONSE PROCEDURES

##### ~~1.13.11.14.1~~ Reporting

Spills of any type material (excluding clean water) shall be reported to the QAE and the 341 CES/CEVV, 731-6163, for evaluation to determine if cleanup is required and evaluate the need for reporting.

##### ~~1.13.21.14.2~~ Charges

The contractor will be charged for any cleanups & disposal costs accomplished by Malmstrom civilian or contract personnel.

##### ~~1.13.31.14.3~~ Cleanup

All spill cleanups will be completed in accordance with the Malmstrom AFB Integrated Hazardous Materials Emergency Response Plan OPLAN ~~32-432-4~~ and be handled by trained personnel only. Refer to the OPLAN 32-4 and 29 CFR 1910.120.

##### ~~1.13.41.14.4~~ Testing

Any hazardous products or materials of environmental concern cleaned up on Malmstrom facilities must be tested to determine if it is a hazardous waste.

##### ~~1.13.51.14.5~~ Spill Response procedures

~~1.13.5.11.14.5.1~~ Determine if the spill can be contained by the responsible organization. If it can be contained without injury to personnel and without assistance from response personnel. Observe the following: Contain and/or control the release. Clean up the release using proper absorbent media for the chemical spilled. Recover as much of the spill as possible using absorbent media or approved vacuum device to minimize hazardous waste volume. Do not hose down the spilled material into floor/storm drains. Report spill to the Contracting Officer and 341 CES/CEVV, 731-6163, for the proper reporting and guidance in the proper disposal of recovered material.

It is the contractor's responsibility to properly handle and dispose of clean up materials.

~~1.13.5.21.14.5.2~~ For spills beyond the capabilities of contractor personnel call the Base Fire Dept at 911.

~~1.13.5.31.14.5.3~~ Evacuate the area downwind of the spill if warranted by type of release.

~~1.13.5.41.14.5.4~~ Ensure all workers shut down their operations and secure their equipment, time permitting.

~~1.13.5.51.14.5.5~~ Stop source of spill with out undue risk of personal injury. Use on site containment, safety equipment, & materials.

#### ~~1.14.1.15~~ DISCOVERY OF CONTAMINATED SOILS, MILITARY MUNITIONS, AND HISTORIC, ARCHAEOLOGICAL, OR CULTURAL RESOURCES

##### ~~1.14.11.15.1~~ Contaminated Soil

If contaminated soil is encountered during any excavation work, the Spill Response procedure above shall be followed. Following site evaluation, the Contracting Officer will advise of the steps that the contractor must follow to complete the work through the contaminated area.

This may include a requirement for 40 hour Hazardous Waste Operations and Emergency Response training, Confined Space Entry training and permitting, respiratory protection, and completion of a Site Safety & Health Plan. Any additional cost, not specified in the original contract, of work performed by the contractor in the contaminated area, shall be negotiated through the Malmstrom Contracting office.

##### ~~1.14.21.15.2~~ Historical, Archaeological, and Cultural Resources

Historical, Archaeological, and Cultural Resources. The Contractor shall protect Historical, Archaeological, and Cultural Resources and shall be responsible for their preservation during the life of the Contract. If during excavation or other construction activities any previously unidentified or unanticipated historical, archaeological, and cultural resources are discovered or found, all activities that may damage or alter such resources shall be temporarily suspended. Resources covered by this paragraph include but are not limited to: any human skeletal remains or burials; artifacts; shell, midden, bone, charcoal, or other deposits; rock or coral alignments, paintings, wall, or other constructed features; and any indication of agricultural or other human activities. Upon such discovery or find, the Contractor shall immediately notify the Contracting Officer so that the appropriate authorities may be notified and a determination made as to their significance and what, if any, special disposition of the finds should be made. The Contractor shall cease all activities that may result in impact to or the destruction of these resources. The Contractor shall secure the area and prevent employees or other persons from trespassing on, removing, or otherwise disturbing such resources.

##### ~~1.14.31.15.3~~ Military Munitions

In the event the Contractor discovers or uncovers military munitions as defined in 40 CFR 260, the Contractor shall immediately stop work in that area and immediately inform the Contracting Officer.

PART 2 PRODUCTS -- NOT USED.

PART 3 EXECUTION -- NOT USED.

-- End of Section --

### Waste Management Plan

#### I. Total Project Waste

Quantity (tons)	Landfill Site	Tip fee/ton	Total cost of disposal, including hauling, container rental, tip fees	Total cost/ton

From: \_\_\_\_\_  
 Project: \_\_\_\_\_  
 Date: \_\_\_\_\_

#### II. Alternatives to Landfilling

Type of Material	Quantity (tons)	Destination and means of transportation	Cost to handle and transport	Expected revenue & tip fee earnings	Net cost	Cost if landfilled	Comparison cost (+) / savings (-)
Cardboard							
Dimensional wood							
Beverage containers							
Land debris							
Concrete							
CMU							
Asphalt							
Metals - all types							
Gypsum board							
Paint							
Carpet							
Insulation							
Glass							
Cast stone							
Wood materials							
Electric cable							
PVC piping							
Rubber flooring							
Raised flooring							
<b>III. Total net cost (+) or savings ( ) from all alternatives to landfilling all project waste</b>							

#### IV. Means of keeping recyclables free of contamination

#### V. Meetings to be held to address waste management

All similar materials will be grouped together based on the requirements of the recycling center. All dissimilar materials will be kept in separate containers/bins in order to avoid contamination.	At regularly scheduled jobsite coordination/progress meetings and at job safety meetings, waste management requirements will be discussed to clarify any confusion with the craftpeople.
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## SECTION 01110

## SUMMARY OF WORK

## PART 1 GENERAL

## 1.1 WORK COVERED BY CONTRACT DOCUMENTS

## 1.1.1 Project Description

The work includes:

- 1) Furnishing and Installing natural gas burners on High Temperature Hot Water (HTHW) Generators 1 & 3.
- 2) Removal of existing burner and controls as indicated.
- 3) Modification and repair of existing HTHW Generators.
- 4) Furnishing and replacing air heater baskets and seals on air heaters for HTHW Generators 1 & 3.
- 5) Furnishing and installing new VFD's on ID Fans on HTHW Generators 1 & 3.
- 6) Furnishing and installing new ID Fan drive motors on HTHW Generators 1 & 3.
- 7) Furnishing and installing SDA inlet temperature control bypass ductwork.
- 8) Furnishing and installing opacity monitor purge air fans on HTHW Generators 1 & 3.
- 9) Furnishing and installing an ash unloader system including a pug mill, rotary feeder, and knife gate valve.
- 10) Furnishing and installing a load simulator, and interconnecting piping.
- 11) Furnishing and installing a plant air receiver and instrument air receiver, desiccant air dryer, air compressor and interconnecting piping.
- 12) Furnishing and installing instrument air supply for modifications requiring instrument air.
- 13) Demolitions and relocations required for the above modifications.
- 14) Furnishing and placing concrete, steel and electrical work required for the above modifications.
- 15) Furnishing and installing all controls associated with the above, and all related incidental work.

## 1.1.2 Location

The work shall be located at the Central Heating Plant, approximately as indicated. The exact location will be shown by the Contracting Officer.

## 1.2 EXISTING WORK

In addition to "FAR 52.236-9, Protection of Existing Vegetation, Structures, Equipment, Utilities, and Improvements":

- a. Remove or alter existing work in such a manner as to prevent injury or damage to any portions of the existing work which remain.
- b. Repair or replace portions of existing work which have been altered during construction operations to match existing or adjoining work,

as approved by the Contracting Officer. At the completion of operations, existing work shall be in a condition equal to or better than that which existed before new work started.

### 1.3 FAILURE TO COMPLETE

If the Contractor fails to complete the work within the time specified in 00800 - SC - 1.c, or any extension, the Contractor shall:

a. ~~Immediately provide temporary portable hot water generator(s) or steam generator with steam to hot water heat exchangers to supply the proper temperature and pressure of hot water to heat all buildings served by the Central Heat Plant (see Table I), individual space heaters are not acceptable. Provide temporary heat by "sidewalk" HTHW generators, or steam boilers operating in conjunction with steam to HTHW converters. HTHW shall be provided at a minimum temperature of 350 degrees F, and the number of generators/boilers shall be as required to provide a minimum total output capacity of 55 MBTU/HR (55,000,000 BTU/HR). The fuel source for the temporary generating units shall be natural gas. Natural gas shall be provided by the government, however the contractor shall be responsible for all gas piping connections, as well as all temporary HTHW and steam generator connections to provide HTHW to the district heating system. Electrical power for operating the generators/boilers, and all necessary pumps shall be provided by the government, however all temporary and or permanent electrical connections shall be provided by the contractor.~~

b. Accomplish remaining work in the first plant shut down period following the contract completion period.

BLDG NO.	DESCRIPTION	SQ FT	HT SOURCE	HT (MBTU/HR)	YR BUILT	# STORIES
145	HQ GROUP	34,413	CHP	0.9774	76	1
160	HQ	18,458	CHP	1.3710	57	1
165	MISSILE OPS	28,442	CHP	1.5000	67	1
205	HTG FACILITY	1,305	CHP	10.3100		
218	HTG FACILITY	768	CHP	4.6320	69	1
220	CE SELF HELP & SHOPS	15,000	CHP	1.2600	90	2
250	ALERT CREW	21,785	CHP	3.0160	59	1+BSMNT
295	SP OPERATIONS	8,562	CHP	0.5040	69	1
300	HQ GROUP	13,162	CHP	1.1000	58	1
320	VEHICLE OPS HEAT	4,929	CHP	0.6469	88	1
330	LAB, PME	16,440	CHP	1.8000	59	1
349	FIRE STATION	20,616	CHP	3.2000	57	1
410	SUPPLY WAREHOUSE	86,412	CHP	1.1052	53	2
450	FUELS SHOP	3,644	CHP	0.8000	68	1
471	CE SHOPS	14,740	CHP	4.0200	59	1
500	HQ	192,841	CHP	10.0000	59	3+BSMNT
546	HEATING FACILITY	1,014	CHP	4.9600	51	1
610	FLIGHT SIMILTR	6,262	CHP	0.5272	91	1
630	DORMITORY	25,474	CHP	1.0080	68	3

635	DORMITORY	25,474	CHP	1.0080	67	3
640	DORMITORY	54,230	CHP	2.1460	0	3
655	DORMITORY	38,650	CHP	1.5290	97	3
1062	DORMITORY	39,500	CHP	1.5630	99	3
735	DORMITORY	25,474	CHP	1.5880	70	3
737	DORMITORY	23,873	CHP	1.5120	75	3
766	HQ	15,516	CHP	9.1086	54	1
	HQ GROUP 769	18,060	CHP	2.2180	58	1
770	LAW CENTER	16266	CHP	1.0080	57	1
772	PUBLICATIONS	7,728	CHP	0.4500	92	1
800	TRAFFIC MGT FACILITY	14,479	CHP	2.0090	77	1
850	VEHICLE MAINT SHOP	7973	CHP	1.2000	87	1
870	VEHICLE MAINT SHOP	27186	CHP	5.5000	60	1
882	VEHICLE MAINT SHOP	16964	CHP	1.9200	75	2
910	HEATED PARKING	20340	CHP	1.2800	68	1
1010	GYM	54877	CHP	4.7840	57	1
1020	SWIMMING POOL	13380	CHP	1.7000	75	1
1075	DINNING HAL	15006	CHP	6.6940	60	1
1082	COMM FACILITY 1082	6403	CHP	0.6320	56	1
1145	YOUTH CENTER	26561	CHP	2.8000	56	1
1150	BX	45899	CHP	2.0170	81	1
1152	LIBRARY	7891	CHP	0.4200	57	1
1154	BOWLING CENTER	16454	CHP	1.0000	66	1
1156	THEATER	9513	CHP	1.9536	57	1
1191	BASE PERSONNEL	35000	CHP	0.6800	73	2+BSMNT
1192	FAMILY SUPPORT CTR	5785	CHP	0.1490	69	1
1199	CHAPEL CENTER	18599	CHP	1.5720	57	2
1248	CONSOLIDATED SKILLS	19000	CHP	1.6000		1
1320	COMMISSARY	68200	CHP	2.0000	88	
1439	AIRCRAFT SHOPS	82404	CHP	8.1600	84	2
1440	3 BAY HANGER	80775	CHP	20.0000	93	1
1447	AGE SHOPS	23173	CHP	1.8880	59	1
1448	VEHICLE MAINT SHOP	13149	CHP	0.9325	70	1
1450	CORROSION HANGER	36565	CHP	14.2700	89	1
1460	MAINT DOCKS	28215	CHP	5.0000	59	1
1464	MAINT DOCKS	26482	CHP	6.3980	59	1
1467	VEHICLE SHOP	2750	CHP	2.5000	93	1
1482	CONTROL PUMP STN	812	CHP	0.2500	88	1
1600	OFFICIER CLUP	15130	CHP	2.8720	66	1
1620	QUARTERS	18153	CHP	1.0900	70	2
1680	VOQ	23560	CHP	1.3830	64	2
1700	HELO HANGER	21736	CHP	4.1072	56	1
1705	TRML AIR F/P	13048	CHP	1.1000	57	1
1708	MISSOLE OPS	17127	CHP	1.3360	57	2
2040	COMPOSITE MED	91950	CHP	4.3690	90	1
3080	MSL SVS SHOPS	49996	CHP	2.6776	76	1
3081	HEATED PARKING	17460	CHP	2.7290	76	1

82110	HEAT PLANT	35316	CHP	0.1475	87	
TOTAL		1,806,349		195.9887		

## PART 2 PRODUCTS

Not used.

## PART 3 EXECUTION

Not used.

-- End of Section --

## SECTION 15080A

## THERMAL INSULATION FOR MECHANICAL SYSTEMS

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only. At the discretion of the Government, the manufacturer of any material supplied will be required to furnish test reports pertaining to any of the tests necessary to assure compliance with the standard or standards referenced in this specification.

## AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 167	(1999) Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
ASTM A 580/A 580M	(1998) Stainless Steel Wire
ASTM B 209	(2001) Aluminum and Aluminum-Alloy Sheet and Plate
ASTM C 1126	(2000) Faced or Unfaced Rigid Cellular Phenolic Thermal Insulation
ASTM C 1136	(1995) Flexible, Low Permeance Vapor Retarders for Thermal Insulation
ASTM C 195	(1995) Mineral Fiber Thermal Insulating Cement
ASTM C 449/C 449M	(2000) Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement
ASTM C 533	(1995; R 2001) Calcium Silicate Block and Pipe Thermal Insulation
ASTM C 534	(2001a) Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form
ASTM C 547	(2000) Mineral Fiber Pipe Insulation
ASTM C 552	(2000) Cellular Glass Thermal Insulation
ASTM C 553	(2000) Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications
ASTM C 591	(2001) Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation

ASTM C 610	(1999) Molded Expanded Perlite Block and Pipe Thermal Insulation
ASTM C 612	(2000a) Mineral Fiber Block and Board Thermal Insulation
ASTM C 647	(1995; R 2000) Properties and Tests of Mastics and Coating Finishes for Thermal Insulation
ASTM C 795	(1992; R 1998e1) Thermal Insulation for Use in Contact with Austenitic Stainless Steel
ASTM C 920	(2002) Elastomeric Joint Sealants
ASTM C 921	(1989; R 1996) Determining the Properties of Jacketing Materials for Thermal Insulation
ASTM D 882	(1997) Tensile Properties of Thin Plastic Sheeting
ASTM E 84	(2001) Surface Burning Characteristics of Building Materials
ASTM E 96	(2000e1) Water Vapor Transmission of Materials

MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS  
INDUSTRY (MSS)

MSS SP-69	(1996) Pipe Hangers and Supports - Selection and Application
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MIDWEST INSULATION CONTRACTORS ASSOCIATION (MICA)

MICA Insulation Stds	(1999) National Commercial & Industrial Insulation Standards
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## 1.2 SYSTEM DESCRIPTION

Field-applied insulation and accessories on mechanical systems shall be as specified herein; factory-applied insulation is specified under the piping, duct or equipment to be insulated.

## 1.3 GENERAL QUALITY CONTROL

### 1.3.1 Standard Products

Materials shall be the standard products of manufacturers regularly engaged in the manufacture of such products and shall essentially duplicate items that have been in satisfactory use for at least 2 years prior to bid opening.

### 1.3.2 Installer's Qualifications

Qualified installers shall have successfully completed three or more similar type jobs within the last 5 years.

### 1.3.3 Surface Burning Characteristics

Unless otherwise specified, insulation not covered with a jacket shall have a flame spread index no higher than 25 and a smoke developed index no higher than 50. Flame spread, and smoke developed indexes, shall be determined by ASTM E 84. Insulation shall be tested in the same density and installed thickness as the material to be used in the actual construction. Material supplied by a manufacturer with a jacket shall be tested as a composite material. Jackets, facings, and adhesives shall have a flame spread index no higher than 25 and a smoke developed index no higher than 50 when tested in accordance with ASTM E 84.

### 1.3.4 Identification of Materials

Packages or standard containers of insulation, jacket material, cements, adhesives, and coatings delivered for use, and samples required for approval shall have manufacturer's stamp or label attached giving the name of the manufacturer and brand, and a description of the material.

## 1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330, "SUBMITTAL PROCEDURES":

### SD-02 Shop Drawings

#### Mica Plates; G.

After approval of materials and prior to applying insulation, a booklet shall be prepared and submitted for approval. The booklet shall contain marked-up MICA Insulation Stds plates (or detail drawings showing the insulation material and insulating system) for each pipe, duct, or piece of equipment that must be insulated per this specification. The MICA plates shall be marked up showing the materials to be installed in accordance with the requirements of this specification for the specific insulation application. The Contractor shall submit all MICA Plates required to show the entire insulating system, including Plates required to show insulation penetrations as applicable. If the Contractor elects to submit detailed drawings instead of marked-up MICA Plates, the detail drawings shall show cut-away, section views, and details indicating each component of the insulation system and showing provisions for insulating jacketing, and sealing portions of the equipment. For each type of insulation installation on the drawings, provide a label that identifies each component in the installation (i.e., the duct, insulation, adhesive, vapor retarder, jacketing, tape, mechanical fasteners, etc.) Indicate insulation by type and manufacturer. Three copies of the booklet shall be submitted at the jobsite to the Contracting Officer. One copy of the approved booklet shall remain with the insulation Contractor's display sample and two copies shall be provided for Government use.

## SD-03 Product Data

## General Materials; G.

A complete list of materials, including manufacturer's descriptive technical literature, performance data, catalog cuts, and installation instructions. The product number, k-value, thickness and furnished accessories for each mechanical system requiring insulation shall be included. Materials furnished under this section of the specification shall be submitted at one time.

## 1.5 STORAGE

Materials shall be delivered in the manufacturer's unopened containers. Materials delivered and placed in storage shall be provided with protection from weather, humidity, dirt, dust and other contaminants. The Contracting Officer may reject insulation material and supplies that become dirty, dusty, wet, or contaminated by some other means.

## PART 2 PRODUCTS

## 2.1 GENERAL MATERIALS

Materials shall be compatible and shall not contribute to corrosion, soften, or otherwise attack surfaces to which applied in either the wet or dry state. Materials to be used on stainless steel surfaces shall meet ASTM C 795 requirements. Materials shall be asbestos free and conform to the following:

## 2.1.1 Adhesives

## 2.1.1.1 Mineral Fiber Insulation Cement

Cement shall be in accordance with ASTM C 195.

## 2.1.1.2 Lagging Adhesive

Lagging is the material used for thermal insulation, especially around a cylindrical object. This may include the insulation as well as the cloth/material covering the insulation. Lagging adhesives shall be nonflammable and fire-resistant and shall have a flame spread rating no higher than 25 and a smoke developed rating no higher than 50 when tested in accordance with ASTM E 84. Adhesive shall be pigmented white and be suitable for bonding fibrous glass cloth to faced and unfaced fibrous glass insulation board; for bonding cotton brattice cloth to faced and unfaced fibrous glass insulation board; for sealing edges of and bonding fibrous glass tape to joints of fibrous glass board; for bonding lagging cloth to thermal insulation; or for attaching fibrous glass insulation to metal surfaces. Lagging adhesives shall be applied in strict accordance with the manufacturer's recommendations.

## 2.1.2 Contact Adhesive

Adhesives may be dispersed in a volatile organic solvent. Adhesives may be any of, but not limited to, the neoprene based, rubber based, or elastomeric type that have a flame spread index no higher than 25 and a smoke developed

index no higher than 50 when tested in the dry state in accordance with ASTM E 84. The adhesive shall not adversely affect, initially or in service, the insulation to which it is applied, nor shall it cause any corrosive effect on metal to which it is applied. Any solvent dispersing medium or volatile component of the adhesive shall have no objectionable odor and shall not contain any benzene or carbon tetrachloride. The dried adhesive shall not emit nauseous, irritating, or toxic volatile matters or aerosols when the adhesive is heated to any temperature up to 212 degrees F. The dried adhesive shall be nonflammable and fire resistant. Natural cross-ventilation, local (mechanical) pickup, and/or general area (mechanical) ventilation shall be used to prevent an accumulation of solvent vapors, keeping in mind the ventilation pattern must remove any heavier-than-air solvent vapors from lower levels of the workspaces. Gloves and spectacle-type safety glasses are recommended in accordance with safe installation practices.

#### 2.1.3 Caulking

ASTM C 920, Type S, Grade NS, Class 25, Use A.

#### 2.1.4 Corner Angles

Nominal 0.016 inch aluminum 1 x 1 inch with factory applied kraft backing. Aluminum shall be ASTM B 209, Alloy 3003, 3105, or 5005.

#### 2.1.5 Finishing Cement

ASTM C 449/C 449M: Mineral fiber hydraulic-setting thermal insulating and finishing cement. All cements that may come in contact with Austenitic stainless steel must include testing per ASTM C 795.

#### 2.1.6 Fibrous Glass Cloth and Glass Tape

Fibrous glass cloth and glass tape shall have flame spread and smoke developed ratings of no greater than 25/50 when measured in accordance with ASTM E 84. Tape shall be 4 inch wide rolls.

#### 2.1.7 Staples

Outward clinching type ASTM A 167, Type 304 or 316 stainless steel.

#### 2.1.8 Jackets

ASTM C 921, Type I, maximum moisture vapor transmission 0.02 perms, (measured before factory application or installation), minimum puncture resistance 50 Beach units on all surfaces except concealed ductwork, where a minimum puncture resistance of 25 Beach units is acceptable. Minimum tensile strength, 35 pounds/inch width. ASTM C 921, Type II, minimum puncture resistance 25 Beach units, tensile strength minimum 20 pounds/inch width. Jackets used on insulation exposed in finished areas shall have white finish suitable for painting without sizing. Based on the application, insulation materials that require factory applied jackets are mineral fiber, cellular glass, and phenolic foam. All non-metallic jackets shall have a maximum flame spread index of 25 and a maximum smoke developed index of 50 when tested in accordance with ASTM E 84.

#### 2.1.8.1 White Vapor Retarder All Service Jacket (ASJ)

For use on hot/cold pipes, ducts, or equipment vapor retarder jackets used on insulation exposed in finished areas shall have white finish suitable for painting without sizing.

#### 2.1.8.2 Aluminum Jackets

Aluminum jackets shall be corrugated, embossed or smooth sheet, 0.016 inch nominal thickness; ASTM B 209, Temper H14, Temper H16, Alloy 3003, 5005, or 3105 with factory applied moisture retarder. Corrugated aluminum jacket shall not be used outdoors. Aluminum jacket securing bands shall be Type 304 stainless steel, 0.015 inch thick, 1/2 inch wide for pipe under 12 inch diameter and 3/4 inch wide for pipe over 12 inch and larger diameter. Aluminum jacket circumferential seam bands shall be 2 x 0.016 inch aluminum matching jacket material. The jacket may, at the option of the Contractor, be provided with a factory fabricated Pittsburgh or "Z" type longitudinal joint. When the "Z" joint is used, the bands at the circumferential joints shall be designed by the manufacturer to seal the joints and hold the jacket in place.

#### 2.1.8.3 Polyvinyl Chloride (PVC) Jackets

Polyvinyl chloride (PVC) jacket and fitting covers shall have high impact strength, UV resistant rating or treatment and moderate chemical resistance with minimum thickness 0.030 inch.

#### 2.1.9 Vapor Retarder Required

##### 2.1.9.1 Vapor Retarder Mastic Coatings

The vapor retarder coating shall be fire and water resistant and appropriately selected for either outdoor or indoor service. Color shall be white. The water vapor permeance of the compound shall be determined according to procedure B of ASTM E 96 utilizing apparatus described in ASTM E 96. The coating shall be a nonflammable, fire resistant type. All other application and service properties shall be in accordance with ASTM C 647.

##### 2.1.9.2 Laminated Film Vapor Retarder

ASTM C 1136, Type I, maximum moisture vapor transmission 0.02 perms, minimum puncture resistance 50 Beach units on all surfaces except concealed ductwork, where Type II, maximum moisture vapor transmission 0.02 perms, a minimum puncture resistance of 25 Beach units is acceptable.

##### 2.1.9.3 Polyvinylidene Chloride (PVDC) Film Vapor Retarder

The PVDC film vapor retarder shall have a maximum moisture vapor transmission of 0.02 perms, minimum puncture resistance of 150 Beach units, a minimum tensile strength in any direction of 30 lb/inch when tested per ASTM D 882, and a maximum flame spread/smoke developed index of 25/50 per ASTM E 84.

##### 2.1.9.4 Polyvinylidene Chloride Vapor Retarder Adhesive Tape

Requirements must meet the same as specified for PVDC Film Vapor Retarder in paragraph 2.1.9.2 above.

#### 2.1.10 Vapor Retarder Not Required

ASTM C 1136, Type III, maximum moisture vapor transmission 0.10 perms, minimum puncture resistance 50 Beach units on all surfaces except ductwork, where Type IV, maximum moisture vapor transmission 0.10, a minimum puncture resistance of 25 Beach units is acceptable.

#### 2.1.11 Wire

Soft annealed ASTM A 580/A 580M Type 302, 304 or 316 stainless steel, 16 or 18 gauge.

#### 2.1.12 Sealants

Sealants shall be chosen from the butyl polymer type, the styrene-butadiene rubber type, or the butyl type of sealants. Sealants shall have a maximum moisture vapor transmission of 0.02 perms, and a maximum flame spread/smoke developed index of 25/50 per ASTM E 84.

### 2.2 PIPE INSULATION MATERIALS

The Contractor shall comply with EPA requirements in accordance with Section 0167001010 and 00800 SC-23 and App R, ~~"RECYCLED / RECOVERED MATERIALS"~~. Pipe insulation materials shall be limited to those listed herein and shall meet the following requirements:

#### 2.2.1 Aboveground Hot Pipeline

Insulation for above 60 degrees F shall meet the following requirements. Supply the insulation with manufacturer's recommended factory-applied jacket.

- a. Mineral Fiber: ASTM C 547, Types I, II or III, supply the insulation with manufacturer's recommended factory-applied jacket.
- b. Calcium Silicate: ASTM C 533, Type I indoor only, or outdoors above 250 degrees F pipe temperature. Supply insulation with the manufacturer's recommended factory-applied jacket.
- c. Cellular Glass: ASTM C 552, Type II and Type III. Supply the insulation with manufacturer's recommended factory-applied jacket.
- d. Perlite Insulation: ASTM C 610

### 2.3 DUCT INSULATION MATERIALS

Duct insulation materials shall be limited to those listed herein and shall meet the following requirements:

#### 2.3.1 Flexible Mineral Fiber

ASTM C 553: Type I, or Type II up to 250 F.

### 2.4 EQUIPMENT INSULATION MATERIALS

Equipment insulation materials shall be limited to those listed herein and shall meet the following requirements:

#### 2.4.1 Hot Equipment Insulation

For equipment operating temperatures above 60 degrees F.

##### 2.4.1.1 Rigid Mineral Fiber

ASTM C 612: Type IA, IB, II, III, IV, or V as required for temperatures encountered to 1200 degrees F.

##### 2.4.1.2 Flexible Mineral Fiber

ASTM C 553: Type I, II, III, IV, V, VI or VII as required for temperatures encountered to 1200 degrees F.

##### 2.4.1.3 Calcium Silicate

ASTM C 533, Type I, indoors only, or outdoors above 250 degrees F.

##### 2.4.1.4 Cellular Glass

ASTM C 552: Type I, Type III, or Type IV as required.

##### 2.4.1.5 Flexible Elastomeric Cellular Insulation

ASTM C 534, Type II, to 200 degrees F.

##### 2.4.1.6 Phenolic Foam

ASTM C 1126, Type II, to 250 degrees F shall comply with ASTM C 795.

##### 2.4.1.7 Molded Expanded Perlite

ASTM C 610.

##### 2.4.1.8 Polyisocyanurate Foam:

ASTM C 591, Type I to 300 degrees F service. Supply the insulation with manufacturer's recommended factory-applied jacket.

### PART 3 EXECUTION

#### 3.1 APPLICATION - GENERAL

Insulation shall only be applied to unheated piping and equipment. The insulation shall not pull apart after a one hour period; any insulation found to pull apart after one hour, shall be replaced.

##### 3.1.1 Installation

Except as otherwise specified, material shall be installed in accordance with the manufacturer's written instructions. Insulation materials shall not be applied until tests specified in other sections of this specification are completed. Material such as rust, scale, dirt and moisture shall be removed from surfaces to receive insulation. Insulation shall be kept clean

and dry. Insulation shall not be removed from its shipping containers until the day it is ready to use and shall be returned to like containers or equally protected from dirt and moisture at the end of each workday. Insulation that becomes dirty shall be thoroughly cleaned prior to use. If insulation becomes wet or if cleaning does not restore the surfaces to like new condition, the insulation will be rejected, and shall be immediately removed from the jobsite. Joints shall be staggered on multi layer insulation. Mineral fiber thermal insulating cement shall be mixed with demineralized water when used on stainless steel surfaces. Insulation, jacketing and accessories shall be installed in accordance with MICA Insulation Stds plates except where modified herein or on the drawings.

### 3.1.2 Painting and Finishing

Painting shall be as specified in Section 09900, "PAINTS AND COATINGS".

### 3.1.3 Welding

No welding shall be done on piping, duct</TAI> or equipment without written approval of the Contracting Officer. The capacitor discharge welding process may be used for securing metal fasteners to duct.

### 3.1.4 Pipes/Ducts/Equipment which Require Insulation

Insulation is required on all pipes, ducts, or equipment, except for omitted items, as specified.

## 3.2 PIPE INSULATION INSTALLATION

### 3.2.1 Pipe Insulation

#### 3.2.1.1 General

Pipe insulation shall be installed on aboveground hot pipeline systems as specified below to form a continuous thermal retarder, including straight runs, fittings and appurtenances unless specified otherwise. Installation shall be with full length units of insulation and using a single cut piece to complete a run. Cut pieces or scraps abutting each other shall not be used. Pipe insulation shall be omitted on the following:

- a. Pipe used solely for fire protection.
- b. Natural gas piping.

#### 3.2.1.2 Pipes Passing Through Hangers

- a. Insulation shall be continuous through hangers. All horizontal pipes 2 inches and smaller shall be supported on hangers with the addition of a Type 40 protection shield to protect the insulation in accordance with MSS SP-69. Whenever insulation shows signs of being compressed, or when the insulation or jacket shows visible signs of distortion at or near the support shield, insulation inserts as specified below for piping larger than 2 inches shall be installed.
- b. Horizontal pipes larger than 2 inches at 60 degrees F and above shall be supported on hangers in accordance with MSS SP-69.

- c. Vertical pipes shall be supported with either Type 8 or Type 42 riser clamps with the addition of two Type 40 protection shields in accordance with MSS SP-69 covering the 360-degree arc of the insulation. An insulation insert of cellular glass or calcium silicate shall be installed between each shield and the pipe. The insert shall cover the 360-degree arc of the pipe. Inserts shall be the same thickness as the insulation, and shall extend 2 inches on each end beyond the protection shield. When insulation inserts are required per the above, and the insulation thickness is less than 1 inch, wooden or cork dowels or blocks may be installed between the pipe and the shield to prevent the hanger from crushing the insulation, as an option instead of installing insulation inserts. The insulation jacket shall be continuous over the wooden dowel, wooden block, or insulation insert. The vertical weight of the pipe shall be supported with hangers located in a horizontal section of the pipe. When the pipe riser is longer than 30 feet, the weight of the pipe shall be additionally supported with hangers in the vertical run of the pipe that are directly clamped to the pipe, penetrating the pipe insulation. These hangers shall be insulated and the insulation jacket sealed as indicated herein for anchors in a similar service.
- d. Inserts shall be covered with a jacket material of the same appearance and quality as the adjoining pipe insulation jacket, shall overlap the adjoining pipe jacket 1-1/2 inches, and shall be sealed as required for the pipe jacket.

### 3.2.1.3 Pipes in high abuse areas.

In high abuse areas such as mechanical rooms, welded PVC jackets shall be utilized. Pipe insulation to the 6 foot level shall be protected.

### 3.2.2 Aboveground Hot Pipelines

The following hot pipelines above 60 degrees F shall be insulated per Table II:

- a. High temperature hot water supply and return.

#### 3.2.2.1 Insulation Thickness

Table B  
Thickness of Pipe Insulation for Pipes Handling Steam and Fluids Other Than Domestic Hot Water (inches)

Fluid Temperature Range (F)	Insulation Conductivity		Run-outs* up to 2	Nominal Pipe Diameter (in)					
	Conductivity Range Btu in/ (h sf F)	Mean Rating Temperature F		1 & less	1.25 to 2	2.5 to 4	5 to 6	8 & lgr	
above 350	0.32 - 0.34	250	1.5	2.5	2.5	3.0	3.5	3.5	
251 - 350	0.29 - 0.31	200	1.5	2.0	2.5	2.5	3.5	3.5	

201 - 250	0.27 - 0.30	150	1.0	1.5	1.5	2.0	2.0	3.5
141 - 200	0.25 - 0.29	125	0.5	1.5	1.5	1.5	1.5	1.5
105 - 140	0.24 - 0.28	100	0.5	1.0	1.0	1.0	1.5	1.5

## Domestic and Service Hot Water Systems\*\*

> 105	0.24 - 0.28	100	0.5	1.0	1.0	1.5	1.5	1.5
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\* When run-outs to terminal units exceed 12 ft, the entire length of run-out shall be insulated like the main feed pipe.

\*\* Applies to re-circulating sections of service or domestic hot water systems and first 8 feet from storage tank for non-re-circulating systems.

Insulation thickness for hot pipelines shall be determined using Table II.

## LEGEND:

CG - Cellular Glass  
 CS - Calcium Silicate  
 MF - Mineral Fiber  
 PL - Perlite

Table II - Hot Piping Insulation Thickness  
 Pipe Size (inches)

Type of Service (degrees F) larger	Material	Run-outs up to 2 in *	1 in & less	1.25 - 2 in	2.5 - 4 in	5 - 6 in	8 in &
High Temp Hot Water (351 - 500 F)	CS	2.0	3.5	4.0	4.5	5.0	5.5

\* When run-outs to terminal units exceed 12 feet, the entire length of run-out shall be insulated like the main feed pipe.

## 3.2.2.2 Jacket for Insulated Hot Pipe

Insulation shall be covered, in accordance with manufacturer's recommendations, with a factory applied Type II jacket or seal welded PVC.

## 3.2.2.3 Insulation for Straight Runs

- Insulation shall be applied to the pipe with joints tightly butted.
- Longitudinal laps of the jacket material shall overlap not less than 1-1/2 inches, and butt strips 3 inches wide shall be provided for circumferential joints.

- c. Laps and butt strips shall be secured with adhesive and stapled on 4 inch centers if not factory self-sealing. Adhesive may be omitted where pipe is concealed.
- d. Factory self-sealing lap systems may be used when the ambient temperature is between 40 degrees and 120 degrees F and shall be installed in accordance with manufacturer's instructions. Laps and butt strips shall be stapled whenever there is non-adhesion of the system. Where gaps occur, the section shall be replaced or the gap repaired by applying adhesive under the lap and then stapling.
- e. Breaks and punctures in the jacket material shall be patched by either wrapping a strip of jacket material around the pipe and securing with adhesive and staple on 4 inch centers (if not factory self-sealing), or patching with tape and sealing with a brush coat of vapor retarder coating. Adhesive may be omitted where pipe is concealed. Patch shall extend not less than 1-1/2 inches past the break.

#### 3.2.2.4 Insulation for Fittings and Accessories

- a. Pipe insulation shall be tightly butted to the insulation of the fittings and accessories.
- b. Precut or preformed insulation shall be placed around all fittings and accessories and shall conform to MICA plates, except as modified herein: 5 for anchors; 10, 11, 12, and 13 for fittings; 14, 15 and 16 for valves; 17 for flanges and unions; and 18 for couplings. Insulation shall be the same as the pipe insulation, including same density, thickness, and thermal conductivity. Where precut/preformed is unavailable, rigid preformed pipe insulation sections may be segmented into the shape required. Insulation of the same thickness and conductivity as the adjoining pipe insulation shall be used. If nesting size insulation is used, the insulation shall be overlapped 2 inches or one pipe diameter. Elbows insulated using segments shall conform to MICA Tables 12.20 "Mitered Insulation Elbow".
- c. Upon completion of installation of insulation on flanges, unions, valves, anchors, fittings and accessories, terminations and insulation not protected by factory jackets or PVC fitting covers shall be protected with two coats of adhesive applied with glass tape embedded between coats. Tape seams shall overlap 1 inch. Adhesive shall extend onto the adjoining insulation not less than 2 inches. The total dry film thickness shall be not less than 1/16 inch.
- d. Insulation terminations shall be tapered to unions at a 45-degree angle.
- e. At the option of the Contractor, factory pre-molded one- or two-piece PVC fitting covers may be used in lieu of the adhesive and embedded glass tape. Factory pre-molded segments or factory or field cut blanket insert insulation segments shall be used under the cover and shall be the same thickness as adjoining pipe insulation. The covers shall be secured by PVC vapor retarder

tape, adhesive, seal welding or with tacks made for securing PVC covers.

### 3.3 DUCT INSULATION INSTALLATION

Duct insulation shall be omitted on supply ducts in heated spaces where the difference between supply air temperature and room air temperature is less than 15 degrees F unless otherwise shown.

#### 3.3.1 Duct Insulation Thickness

Duct Location	Minimum Duct Insulation (inches)			
	Cooling		Heating	
	Annual Cooling Degree Days Base 65 F	Insulation R-Value (h sf F)/Btu	Annual Heating Degree Days Base 65 F	Insulation R-Value (h sf F)/Btu
Exterior Of Building	<500 -	3.3	<1500	3.3
	500 - 1150	5.0	1500 - 4500	5.0
	1151 - 2000	6.5	4501 - 7500	6.5
	>2000	8.0	>7500	8.0
	Temperature Difference	Insulation R-Value (h sf F)/Btu	Temperature Difference	Insulation R-Value (h sf F)/Btu
Inside building envelope or in unconditioned spaces	<15	None reqd	<15	None reqd
	15<TD<40	3.3	15<TD<40	3.3
	40<TD	5.0	40<TD	5.0

These R-values do not include the film resistances. The required minimum thicknesses do not consider water vapor transmission and condensation. Additional insulation, vapor retarders, or both, may be required to limit vapor transmission and condensation. Where ducts are designed to convey both heated and cooled air, duct insulation shall be as required by the most restrictive condition. Where exterior walls are used as plenum walls, wall insulation shall be as required by the most restrictive condition of this section or the insulation for the building envelope. Cooling ducts are those designed to convey mechanically cooled air or return ducts in such systems. Heating ducts are those designed to convey mechanically heated air or return ducts in such systems. Thermal Resistance is to be measured in accordance with ASTM C 518 at a mean temperature of 75 degrees F. The temperature difference is at design conditions between the space within which the duct is located and the design air temperature in the duct. Resistance for run-outs to terminal devices less than 10 ft in length need not exceed 3.3 (h sf F)/Btu. Unconditioned spaces include crawlspaces and attics.

Duct insulation thickness shall be in accordance with Table III.

Table III - Minimum Duct Insulation (inches)

## Opacity Monitor Purge Air Supply Ducts

3.0

## 3.3.2 Insulation for Warm Air Duct

Insulation and vapor barrier shall be provided for the following warm air ducts and associated equipment:

- a. Opacity monitor purge air supply ducts exposed to weather

Flexible type insulation shall be used for round ducts, minimum density 3/4 pcf with a factory-applied Type II jacket. Adhesive finish where indicated to be used shall be accomplished by applying two coats of adhesive with a layer of glass cloth embedded between the coats. The total dry film thickness shall be approximately 1/16 inch. Duct insulation shall be continuous through sleeves and prepared openings. Duct insulation shall terminate at flexible connections.

## 3.3.2.1 Installation on Concealed Duct

- a. For round ducts, insulation shall be attached by applying adhesive around the entire perimeter of the duct in 6 inch wide strips on 12 inch centers.
- b. For round ducts, mechanical fasteners shall be provided on sides of duct risers for all duct sizes. Fasteners shall be spaced on 18 inch centers.
- c. The insulation shall be impaled on the mechanical fasteners where used. The insulation shall not be compressed to a thickness less than that specified. Insulation shall be carried over standing seams and trapeze-type hangers.
- d. Self-locking washers shall be installed where mechanical fasteners are used and the pin trimmed and bent over.
- e. Insulation jacket shall overlap not less than 2 inches at joints and the lap shall be secured and stapled on 4 inch centers.

## 3.3.3 Duct Test Holes

After duct systems have been tested, adjusted, and balanced, breaks in the insulation and jacket shall be repaired in accordance with the applicable section of this specification for the type of duct insulation to be repaired.

## 3.3.4 Duct Exposed to Weather

## 3.3.4.1 Installation

Ducts exposed to weather shall be insulated and finished as specified for the applicable service for concealed duct inside the building. After the above is accomplished, the insulation shall then be further finished as detailed in the following subparagraphs.

## 3.3.4.2 Round Duct

Aluminum jacket with factory applied moisture retarder shall be applied with the joints lapped not less than 3 inches and secured with bands located at circumferential laps and at not more than 12 inch intervals throughout. Horizontal joints shall lap down to shed water and located at 4 or 8 o'clock position. Joints shall be sealed with caulking to prevent moisture penetration. Where jacketing abuts an un-insulated surface, joints shall be sealed with caulking.

#### 3.3.4.3 Fittings and Other Irregular Shapes

Two coats of weather barrier mastic reinforced with fabric or mesh for outdoor application shall be applied to the entire surface. Each coat of weatherproof mastic shall be 1/16 inch minimum thickness. The exterior shall be a metal jacketing applied for mechanical abuse and weather protection, and secured with screws.

### 3.4 EQUIPMENT INSULATION INSTALLATION

#### 3.4.1 General

Removable insulation sections shall be provided to cover parts of equipment that must be opened periodically for maintenance including vessel covers, fasteners, flanges and accessories. Equipment insulation shall be omitted on the following:

- a. Hand-holes.
- b. Manholes.
- c. Cleanouts.
- d. ASME stamps.
- e. Manufacturer's nameplates.

#### 3.4.2 Insulation for Hot Equipment

Insulation shall be furnished on equipment handling media above 60 degrees F including the following:

- a. Boiler combustion air ductwork upstream and downstream of air heater.
- b. Boiler flue gas breeching upstream and downstream of air heater.

##### 3.4.2.1 Insulation

Insulation shall be suitable for the temperature encountered.

Insulation thickness for hot equipment shall be determined using Table IV:

#### Legend

RMF: Rigid Mineral Fiber  
FMF: Flexible Mineral Fiber  
CS: Calcium Silicate  
PL: Perlite

CG: Cellular Glass  
 FC: Flexible Elastomeric Cellular  
 PF: Phenolic Foam  
 PC: Polyisocyanurate Foam

TABLE IV  
 Insulation Thickness for Hot Equipment (Inches)

Equipment handling steam or media to indicated pressure or temperature limit:	Material	Thickness
15 psig or 250F	RMF	2.0 inches
	FMF	2.0 inches
	CS/PL	4.0 inches
	CG	3.0 inches
	PF	1.5 inches
	FC (<200F)	1.0 inches
200 psig or 400 F	RMF	3.0 inches
	FMF	3.0 inches
	CS/PL	4.0 inches
	CG	4.0 inches
600 F	RMF	5.0 inches
	FMF	6.0 inches
	CS/PL	6.0 inches
	CG	6.0 inches

>600 F: Thickness necessary to limit the external temperature of the insulation to 120F. Heat transfer calculations shall be submitted to substantiate insulation and thickness selection.

#### 3.4.2.2 Equipment

- a. Insulation shall be formed or fabricated to fit the equipment.
- b. Insulation shall be secured in place with bands or wires at intervals as recommended by the manufacturer but not greater than 12 inch centers except flexible elastomeric cellular which shall be adhered. Insulation corners shall be protected under wires and bands with suitable corner angles.
- c. On high vibration equipment, cellular glass insulation shall be set in a coating of bedding compound as recommended by the manufacturer, and joints shall be sealed with bedding compound. Mineral fiber joints shall be filled with finishing cement.
- d. Exposed insulation corners shall be protected with corner angles.
- e. On equipment with ribs, such as boiler flue gas breeching, insulation shall be applied over 6 x 6 inch by 12 gauge welded wire fabric which has been cinched in place, or if approved by the Contracting Officer, spot welded to the equipment over the ribs. Insulation shall be secured to the fabric with J-hooks and 2 x 2

inch washers or shall be securely banded or wired in place on 12 inch (maximum) centers.

- f. On equipment handling media above 600 degrees F, insulation shall be applied in two or more layers with joints staggered.
- g. Upon completion of installation of insulation, penetrations shall be caulked. Two coats of adhesive shall be applied over insulation, including removable sections, with a layer of glass cloth embedded between the coats. The total dry thickness of the finish shall be 1/16 inch. Caulking shall be applied to parting line between equipment and removable section insulation.

-- End of Section --

## SECTION 15555A

MODIFICATIONS TO CENTRAL HIGH TEMPERATURE WATER (HTW) GENERATING PLANT AND  
AUXILIARIES

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

## ASME INTERNATIONAL (ASME)

ASME B31.1	(2001) Power Piping
ASME BPVC SEC I	(2001) Boiler and Pressure Vessel Code; Section I, Power Boilers
ASME BPVC SEC IX	(2001) Boiler and Pressure Vessel Code; Section IX, Welding and Brazing Qualifications
ASME BPVC SEC VIII D1	(2001) Boiler and Pressure Vessel Code; Section VIII, Pressure Vessels Division 1 - Basic Coverage
ASME PTC 4.1	(1964; Addenda: 1968, 1969; R 1991) Steam Generating Units ++
ASME PTC 4.1	(1964; Addenda: 1968, 1969; R 1991) Steam Generating Units ++

## ASTM INTERNATIONAL (ASTM)

ASTM A 36/A 36M	(2001) Carbon Structural Steel
ASTM A 366/A 366M	(1997e1) Steel, Sheet, Carbon, Cold-Rolled, Commercial Quality **
ASTM A 568/A 568M	(2001) Steel, Sheet, Carbon, and High- Strength, Low-Alloy, Hot-Rolled and Cold- Rolled
ASTM A 653/A 653M	(2001a) Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM C 155	(1997) Standard Classification of Insulating Firebrick
ASTM C 27	(1998) Fireclay and High-Alumina Refractory Brick

ASTM C 34 (1996) Structural Clay Load-Bearing Wall Tile

ASTM C 401 (1991; R 2000) Alumina and Alumina-Silicate Castable Refractories

ASTM C 62 (2001) Building Brick (Solid Masonry Units Made from Clay or Shale)

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 85 (2001) Boiler and Combustion Systems Hazard Code

UNDERWRITERS LABORATORIES (UL)

UL 795 (1999) Commercial-Industrial Gas Heating Equipment

## 1.2 GENERAL REQUIREMENTS

### 1.2.1 Standard Products

Material and equipment shall be the standard products of a manufacturer regularly engaged in the manufacture of the products and shall essentially duplicate items that have been in satisfactory use for at least 2 years prior to bid opening. Equipment shall be supported by a service organization that is, in the opinion of the Contracting Officer, reasonably convenient to the site.

### 1.2.2 Nameplates

Each major item of equipment shall have the manufacturer's name, address, type or style, model or serial number, and catalog number on a plate secured to the item of equipment.

### 1.2.3 Prevention of Rust

Unless otherwise specified, surfaces of ferrous metal subject to corrosion shall be factory prime painted with a rust inhibiting coating and subsequently factory finish painted in accordance with the manufacturer's standard practice. Equipment exposed to high temperature when in service shall be prime and finish painted with the manufacturer's standard heat resistant paint to a minimum thickness of 1 mil.

### 1.2.4 Equipment Guards and Access

Belts, pulleys, chains, gears, couplings, projecting setscrews, keys, and other rotating parts exposed to personnel contact shall be fully enclosed or guarded. High temperature equipment and piping exposed to contact by personnel or where it creates a fire hazard shall be properly guarded or covered with insulation of a type specified.

### 1.2.5 Use of Asbestos Products

Products which contain asbestos are prohibited. This prohibition includes items such as packings or gaskets, even though the item is encapsulated or the asbestos fibers are impregnated with binder material.

### 1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. The following shall be submitted in accordance with Section 01330, "SUBMITTAL PROCEDURES":

#### SD-02 Shop Drawings

##### Gas Burners; G.

Detail drawings consisting of schedules, performance charts, brochures, diagrams, drawings, and instructions necessary for installation of equipment, and for piping, wiring, and devices. Complete setting plans certified by the equipment manufacturers. Drawings shall indicate clearances required for maintenance and operation and shall contain complete wiring and schematic diagrams, equipment layout and anchorage, and any other details required to demonstrate that the system has been coordinated and will properly function as a unit.

##### Combustion Air Ductwork; G.

##### Flue Gas Breeching; G.

##### Replacement Tubes; G.

Detail drawings describing materials of construction, dimensions, weights, support, and layout in both plan and elevation.

#### SD-03 Product Data

##### Spare Parts;

Spare parts data for each item of equipment provided, after approval of the drawings and not later than 3 months before the date of beneficial occupancy. The data shall include a complete list of spare parts and supplies, with current unit prices and source of supply, and a list of the parts recommended by the manufacturer to be replaced after 1 and 3 years of service.

##### Manufacturer's Instructions;

Proposed diagrams, instructions, and other sheets, before posting. Framed instructions under glass or in laminated plastic, including wiring and control diagrams showing the complete layout of the entire system, shall be posted where directed. Condensed operating instructions explaining preventive maintenance procedures, methods of checking the system for normal safe operation, and procedures for safely starting and stopping the system shall be prepared in typed form, framed as specified above for the wiring and control diagrams, and posted beside the diagrams. The framed instructions shall be posted before acceptance testing of the systems.

## Welding Qualifications;

A copy of qualified welding procedures and a list of names and identification symbols of qualified welders and welding operators.

## Field Training;

Proposed schedule for field training, at least 2 weeks prior to the start of related training.

## SD-06 Test Reports

## Test Schedule; G.

A written schedule, 7 days before tests are performed. Schedule will be approved by the Contracting Officer.

## Proposed Test Procedure;

A proposed performance test procedure, 30 days prior to the proposed test date. The submittal shall contain a complete description of the proposed test with calibration curves or test results furnished by an independent testing laboratory of each instrument, meter, gauge, and thermometer to be used in the tests. The test shall not commence until the procedure has been approved.

## Boiler Emissions Report; G.

Boiler emissions report of air pollutants showing compliance with the limits established in the environmental permit and as specified herein.

## Adjusting, Balancing, Testing and Inspecting; .

Test reports in booklet form showing field tests performed to adjust each component and field tests performed to prove compliance with the specified performance criteria, upon completing and testing the installed system. Each test report shall indicate the final position of controls. A written statement from the manufacturer's representative certifying that combustion control equipment has been properly installed and is in proper operating condition, upon completion of the installation. The action settings for automatic controls in the form of a typed, tabulated list indicating the type of control, location, setting, and function shall be included.

## Startup Test Hardcopy Printout; .

Printed report of control system startup test.

## SD-07 Certificates

Environmental Permit Compliance;  
Experience; G.

Evidence of the Contractor's prior experience in installing similar equipment, including a list of 5 co-firing (simultaneous

natural gas & coal) and stoker applications combustion control installations (Bailey/ABB INFI-90) on boilers of equal or larger size that have been in satisfactory operation for 2 years prior to bid opening. Provide the location of the combustion control installations.

#### Certificates of Inspection, Test, and Calibration

Certificate of inspection, test, and calibration of instrumentation to be used during acceptance testing. Certificate of compliance with applicable codes after installation.

#### SD-10 Operation and Maintenance Data

##### Gas Burners;

Operating instructions, prior to the field training course. Six copies of operating instructions outlining the step-by-step procedures required for system startup, operation, and shutdown. The instructions shall include the manufacturer's name, model number, service manual, parts list, and brief description of all equipment and their basic operating features. Maintenance instructions, prior to the field training course. Six complete copies of maintenance instructions listing routine maintenance procedures, possible breakdowns and repairs, and troubleshooting guides. The instructions shall include piping layout, equipment layout, and simplified wiring and control diagrams of the system as installed. The manuals shall also include equipment lubrication requirements and schedules, recommended spare parts list, index, instruction book binders with hard back covers and printing to identify the name of the facility, Government entity operating the facility, Contractor, shop order, equipment, and volume number if required. Operation and maintenance manuals shall be approved prior to the training course.

#### 1.4 WELDING QUALIFICATIONS

Piping shall be welded in accordance with qualified procedures using performance qualified welders and welding operators. Procedures and welders shall be qualified in accordance with ASME BPVC SEC IX. Welding procedures qualified by others, and welders and welding operators qualified by another employer may be accepted as permitted by ASME B31.1. The Contracting Officer shall be notified 24 hours in advance of tests and the tests shall be performed at the work site if practicable. The welder or welding operator shall apply his assigned symbol near each weld he makes as a permanent record.

#### 1.5 DELIVERY AND STORAGE

All equipment delivered and placed in storage shall be stored with protection from the weather, humidity and temperature variation, dirt and dust, or other contaminants.

#### 1.6 VERIFICATION OF DIMENSIONS

The Contractor shall become familiar with all details of the work, verify all dimensions in the field, and shall advise the Contracting Officer of any discrepancy before performing the work.

## PART 2 PRODUCTS

### 2.1 MODIFICATIONS TO HIGH TEMPERATURE WATER GENERATORS

Existing HTW generator (boiler) No. 1 is capable of operation on coal or natural gas. Existing Boiler No. 2 is capable of operation on natural gas only. Existing Boiler No. 3 is capable of operation on coal only. Boiler No. 1 and No. 3 each have an input capacity of 106 MMBtu/hr and an output capacity of 85 MMBtu/hr when operating on coal, when operating with 305 degrees F entering water temperature and 414 degrees F leaving water temperature with a water flow of 736,249 pounds per hour. Boiler No. 1 and No. 2 each have a capacity of approximately 30 MMBtu/hr when operating on natural gas only. Each boiler has a design pressure of 500 psig.

Modifications shall include all controls, piping, insulation, miscellaneous plant equipment, and other accessories indicated or necessary for the following major work elements:

- a. Removal of gas burner from HTW generator No. 1 and associated new tubes straightening and boiler wall repair.
- b. Addition of two 25 MMBtu/hr input to each gas burner on each HTW generator. No. 1 and No. 3, one on each side of boiler and associated tube bending and boiler wall work.
- c. Addition of combustion air bypass and flue gas bypass around existing air heater on HTW generator No. 1 and No. 3.
- d. Replacement of baskets and seals in Ljungstrom air heaters for Generators No. 1 and No. 3.

The equipment design and accessory locations shall permit accessibility for maintenance and service. Design conditions shall be as follows:

- a. Site elevation, 3,527 feet.
- b. Combustion air temperature, 80 degrees F.

The HTW generators shall be capable of operating continuously at maximum specified capacity without damage or deterioration to the generator, its setting, or firing equipment or auxiliaries. The generator shall be operable automatically while burning the fuel specified.

#### 2.1.1 Electrical Equipment

Electric motor-driven equipment shall be provided complete with motors and necessary motor control devices. Motors and motor control devices shall be as specified in Division 16 specifications ~~including requirements for hazardous area locations~~. Enclosures for electrical equipment shall be NEMA 4 of NEMA 12. Motors shall have electrical characteristics and enclosure type as shown. Unless otherwise indicated, motors of 1 hp and above shall be high efficiency type.

#### 2.1.1.1 Motor Ratings

Motors shall be suitable for the voltage and frequency provided. Motors 1/2 horsepower and larger shall be three phase, unless otherwise indicated. Ratings shall be adequate for the duty imposed, but shall not be less than indicated.

#### 2.1.1.2 Motor Starters

Where a motor starter is not indicated in a motor control center on the electrical drawings, a motor starter shall be provided under this section of the specifications. Motor starters shall be provided complete with properly sized thermal overload protection and other equipment at the specified capacity including an allowable service factor, and other appurtenances necessary. Manual or automatic control and protective or signal devices required for the operation specified, and any wiring required to such devices, shall be provided whether indicated or not. Where two-speed or variable-speed motors are indicated, solid-state variable-speed controllers may be provided to accomplish the same function.

#### 2.1.2 HTW Generator Design Requirements

##### 2.1.2.1 Furnace Dimensions

Existing furnace dimensions are as follows:

- a. Width (new burner firing direction), 12.46 feet.
- b. Depth, 13.13 feet.
- c. Height, 22 feet.

##### 2.1.2.2 Burners

Burners shall conform to requirements of NFPA 85, except as otherwise specified. Flame safeguard controls shall be equipped with repetitive self-checking circuits.

#### 2.2 HIGH TEMPERATURE WATER GENERATOR MODIFICATION DETAILS

##### 2.2.1 HTW Generators and Components

Watertube, waterwall type HTW generating units shall be modified for the installation of gas burners, with the associated modifications to the existing over fire air system. Walls of the HTW generating units shall be modified to accommodate the installation, removal and rearrangement of gas burner using similar materials of construction and as shown on the contractors drawings.

##### 2.2.1.1 Headers

Existing HTHW generator nameplate data is as follows:

HTHW Generator No. 1:  
International Boiler Works Co.  
Model TJW-VC-85

Serial No. 14891  
IBW Job No. 2068-69-70  
Heating Surface:  
Boiler: 5,975 square feet  
Waterwall: 1,284 square feet

HTHW Generator No. 3:  
International Boiler Works Co.  
Model TJW-VC-85  
Serial No. 14892  
IBW Job No. 2068-69-70  
Heating Surface:  
Boiler: 5,975 square feet  
Waterwall: 1,284 square feet

Note: The International Boiler Works Co. is defunct. For information concerning existing HTW Generators and Components contact:

International Boiler, Inc.  
Attn: Jeffrey Beals  
3000 NE 30 Place, Suite 109  
Ft. Lauderdale, FL 33306  
phone: (954) 537-7787  
fax: (954) 537-7785

#### 2.2.1.2 Tubes

Replacement tubes for tube sections shown on the contract drawings shall be provided by International Boiler, Inc. Tubes shall be electric welded or seamless steel. Boilers shall have water-cooled furnace walls of a design suitable for the application. Tubes located in the primary furnace shall be designed for inclined or upflow of water. The water shall be distributed to the heating surface in proportion to the heat absorbing capacities of these surfaces. Tube heat absorbing surfaces shall be located so that radiant and convection sections provide for series flow of water, from generator inlet to outlet, to ensure uniform water distribution and uniform temperature rise from inlet to outlet.

#### 2.2.1.3 Furnace

Furnace side walls and rear wall shall be water-cooled by vertical tubes with center-to-center spacing not to exceed twice the tube diameter, and shall be furnished with cast-iron, water-cooled armor block at the grate line to a height of not less than 18 inches above the grate line. The armor block shall be keyed and held in place without the use of bolts, pins, or mastic. The armor block shall be readily replaceable without the use of special tools.

#### 2.2.2 HTW Generator Setting Materials

Materials shall conform to the following:

- a. Firebrick: ASTM C 27, class shall ~~be as recommended by the HTW generator manufacturer~~ conform to industry standards and ASME.
- b. Insulating Brick: ASTM C 155, Class A.

- c. Castable Refractory: ASTM C 401. The minimum modulus of rupture for transverse strength shall not be less than 600 psi after being heat-soaked for 5 hours or more at a temperature in excess of ~~3200~~ 3000 degrees F.
- d. Mortar, Air-Setting, Refractory: ~~As recommended by the HTW generator manufacturer~~ Shall conform to industry standards and ASME.
- e. Brick, Common: ASTM C 62.
- f. Tile, Load-Bearing, Hollow: ASTM C 34, Grade LBX.
- g. Iron and Steel Sheets: Galvanized, ASTM A 653/A 653M; gauge numbers specified refer to United States Standard gauge. Uncoated, black: ASTM A 568/A 568M, ASTM A 366/A 366M, or ASTM A 36/A 36M.

#### 2.2.2.1 HTW Generator Casing

HTW generator walls shall be steel-encased wall construction with fabrication details as recommended by the HTW generator manufacturer. HTW generator wall lining shall consist of a continuous screen of closely spaced water tubes. Casing for HTW generators shall be double wall construction. Reinforced, welded, gas-tight inner casing shall be constructed of not lighter than 10 gauge black steel sheets. Outer casing shall be constructed of not less than 10 gauge steel sheets. Outer casing may be either bolted or welded. Inner casing shall be reinforced with structural steel to provide rigidity and prevent buckling. Inner casing in furnace section shall abut furnace tubes with no foreign sealer between the tube steel and the casing steel. Casing shall not be attached to tubes. The inner casing shall be applied so as to form expansion joints at the point of tube support. Welded joints and openings shall be checked by a pressure test. Any casing leakage shall be repaired and made pressure-tight. The maximum deflection of the reinforced panels shall not exceed 1/360 of the length of the maximum span. Block insulation shall be applied between the inner and outer casings and held securely with insulating pins. The casing tested shall be capable of holding a pressure of 1-1/2 times the predicted maximum furnace operating pressure.

#### 2.2.2.2 Walls

Refractory behind the waterwall tubes shall be high-duty refractory not less than 2-1/2 inches thick conforming to manufacturer's requirements. High temperature block and mineral wool blanket shall be provided between the refractory backup and steel casing or between an inner and outer casing. Thickness of insulation shall be such that an average casing temperature in the furnace area will not exceed 130 degrees F with a surface air velocity of 100 fpm, and an ambient air temperature of 80 degrees F when operating at full capacity.

#### 2.2.2.3 Firebrick

Firebrick shall be laid up in air-setting mortar. Each brick shall be dipped in mortar, rubbed, shoved into its final place, and then tapped with a wooden mallet until it touches the adjacent bricks. Mortar thick enough to lay with a trowel shall not be permitted. Maximum mortar joint thickness shall not exceed 1/8 inch and average joint thickness shall not exceed 1/16 inch.

## 2.2.2.4 Plastic Refractory

Plastic refractory shall be installed in accordance with the manufacturer's recommendation and by workmen skilled in its application.

## 2.2.3 Boiler Fittings and Appurtenances

HTW generator fittings and appurtenances suitable for a HTW design pressure of 500 psig and 470 degrees F shall be installed with each HTW generator in accordance with ASME BPVC SEC I.

## 2.3 NATURAL GAS FUEL BURNING EQUIPMENT

MW Output	(Size) Type of Grate and Stoker
735 - 5860	Single retort, stationary grate, underfeed stokers
5860 - 8800	Single retort, moving grate, underfeed stoker
1465 - 22000 stoker	Reciprocating grate, front continuous ash discharge
1465 - 29500 discharge stoker	Vibrating conveyor grate, front continuous ash
5860 - 36500 grate stoker	Water-cooled, incline grate, hopper fed vibrating
8800 - 120,000	Spreader stoker, continuous front ash discharge

(MBtuh Output	(Size) Type of Grate and Stoker
2,500 - 20,000	Single retort, stationary grate, underfeed stokers
20,000 - 30,000	Single retort, moving grate, underfeed stoker
5,000 - 75,000 stoker	Reciprocating grate, front continuous ash discharge
5,000 - 100,000 discharge stoker	Vibrating conveyor grate, front continuous ash
20,000 - 125,000 grate stoker	Water-cooled, incline grate, hopper fed vibrating
30,000 - 400,000	Spreader stoker, continuous front ash discharge)

Natural gas fuel burning equipment shall be provided complete with flame safeguard system, forced draft low NO<sub>x</sub> burner, combustion air windbox, piping, fuel train and instrumentation. Fuel burning equipment shall be designed for a maximum allowable working pressure of 40 psig. Each burner shall be capable of firing at a continuous rating of 25 MMBtu/hr input when the boiler is firing natural gas only, using natural gas at 9 psi. When co-firing with coal, each burner shall not run higher than 15 MMBtu/hr input. Provisions shall be incorporated for withdrawing and shielding the gas burner from over heating while firing coal only. Emissions guarantees shall apply through specified turndown range. Flue gas recirculation shall not be utilized. Burner shall have a stable flame over the turndown range. Primary air spinner zone, zone divider and main burner shall be removable without removing the entire register or windbox. Register front plate shall have a swivel scanner and observation port. Natural gas fuel burning equipment shall limit emissions to 0.15 pounds of NO<sub>x</sub>/MMBtu of heat input.

#### 2.3.1 Pilot

- a. Pilot burner shall be natural gas-electric type with the capacity required to reliably light off the boiler. A high voltage secondary side ignition transformer shall be supplied and mounted backside of the windbox.
- b. Provision shall be made in the burner housing for inspection of the pilot flame.
- c. Pilot shall be provided with individual manual shut-off valve, pressure gauge, strainer, pressure regulation separate from the main burner, self closing solenoid valve and vent valve in accordance with FM P7825a, FM P7825b and UL 795. Pilot and valving shall be in accordance with NFPA 85.

#### 2.3.2 Burner Refractory Throat

Burner refractory throat shall be made of high quality castable refractory suitable for ~~3200~~-3000 degrees F. The precast refractory in a steel retaining ring with stainless steel anchors shall be shipped separately for field mounting on the boiler. Burner refractory throat shall be concentric with the burner, contoured to ensure complete mixing of air and natural gas, and designed to assist in complete combustion by radiating heat to the fuel. Burner shall be so positioned that the flame parallels the contour of the burner refractory throat but avoids striking the refractory.

#### 2.3.3 Windbox

Windbox shall provide even airflow. Windbox shall not interfere with boiler smoke box door operation and shall have a flange bottom for easy firm mounting on a support structure.

#### 2.3.4 Combustion Air Fan

Combustion air fan shall be centrifugal type with backwardly inclined air foil bladed wheel. Combustion air-fan wheel shall be directly driven by a TEFC NEMA frame motor and shall be complete with inlet cone and screen and flange outlet. Combustion air fan shall be bottom flanged to be mounted on same structural member as windbox. Combustion air-fan shall be minimum

sized to provide sufficient static pressure to overcome system losses when providing 15 percent excess air at maximum firing rate.

#### 2.3.5 Combustion Air Damper and Jack Shaft Control

Combustion air damper shall be flanged and located between combustion air fan and windbox. Combustion air damper shall be mechanically linked with an adjustable jack shaft that automatically adjusts the amount of combustion air supply required for the specified burner capacity turndown.

#### 2.3.6 Natural Gas Burner

Natural gas burner shall be a multi-spud burner with gas feed pipe in center of air register for easy removal. Natural gas burner shall be forced draft type and shall be suitable for efficiently burning natural gas having a calorific value of 1,000 Btu per cubic foot when supplied at a pressure of approximately 9 psig. Natural gas shall be discharged in burner throat area. Natural gas-air premix or natural gas discharged outside of burner throat are not acceptable. Main natural gas burner shall be capable of firing the boiler to maximum capacity with a turndown of five (5) to one (1) with a 4-20 mA signal.

#### 2.3.7 Natural Gas Burner Retract Equipment

Each natural gas burner shall be provided with a pneumatic actuator for retracting the gas burner nozzle from the refractory burner throat and a guillotine refractory damper with a pneumatic actuator that seals the refractory burner throat opening after the natural gas burner nozzle is retracted. The damper shall be provided with a seal air fan that limits the amount of air leakage to the furnace to a maximum of 55 scfm when the damper is in the closed position. Refractory for the guillotine damper shall be as specified herein. Pneumatic actuators shall be piston and cylinder type, sealed and double acting. Cylinders and pistons shall be sized for operating 125 percent of the required load with an instrument air pressure range of 70-120 psig. Piping for each pneumatic actuator shall be complete including tubing, fittings, filter regulator set, four-way 120 VAC solenoid valve, speed control valves, isolation and bypass valves and a single point connected with the instrument air system. The assembly shall include mechanically operated position switches, DPDT, to indicate inserted and retracted positions for the gas burner nozzle retract actuator and open and closed positions for the guillotine damper actuator. The natural gas burner retract equipment shall be manually controlled from the burner management system control panels next to the new burner platforms. Controls shall be provided with appropriate interlocks for safe operation of the burner retract equipment. As a minimum, the burner shall not be capable of being retracted with natural gas flow. The burner management system control panel shall be provided with position indicating lights for burner nozzle inserted and retracted and guillotine damper closed and open.

#### 2.3.8 Flame Safeguard System

- a. The flame safeguard system per burner shall be manufactured by burner manufacturer and mounted near the boiler as a panel. Flame safeguard system components shall be UL listed. Complete and automatic flame safeguard system shall be provided in accordance with NFPA requirements for safe start-up, on-line operation and shut-down of package burner.

- b. Flame safeguard system shall be micro-processor per boiler based system including, but not limited to, automatic burner sequencing, flame supervision, status indication, fire-out annunciation and self diagnostics.
- c. Flame safeguard system cabinet shall house overcurrent protective devices and motor starters for the combustion air fan motor and burner damper motor. Control transformers and an RS-232C serial communication port shall also be included.
- d. Flame scanner shall not require a separate purge air supply. Flame scanner output signal shall be connected to flame amplifier module in microprocessor based unit. Within four seconds after loss of flame, flame safeguard controller shall shut the automatic safety shut-off fuel valves and open the gas automatic vent valve. Flame failure signal shall be displayed on flame safeguard display or burner control panel.
- e. A separate adjustable coal grate flange scanner shall be provided for each boiler above the grate as shown on the contract drawings.
- f. Logic provided with flame safeguard system shall:
  - 1. Prevent introduction of ignitor flame (pilot) or main fuel flame to furnace until furnace, boiler passes, breeching and stack have been purged of combustible gases.
  - 2. Prevent opening of automatic fuel shut-off valves in main fuel line until ignitor flame is proven.
  - 3. Limit trial for main fuel ignition to ten (10) seconds from time ignitor flame is proven.
  - 4. In event of burner failure, operator intervention shall be required to manually reset flame safeguard controller prior to restart.
  - 5. Allow gas burner startup without a pre-purge cycle, when coal is being combusted as detected by the coal grate flame scanner.
- g. First-out annunciation per burner shall be provided by an expansion module. Alarms and flame-outs shall be individually annunciated at panel front and transmitted along with other process points monitored by the panel to existing Bailey DCS for graphic display. The following points, at a minimum, shall be individually annunciated by flame safeguard system:
  - 1. High outlet water temperature (from DCS).
  - 2. High and low natural gas pressure.
  - 3. Low oxygen concentration (from DCS).
  - 4. Low water flow (from DCS).
  - 5. Combustion airflow.

6. Ignitor failure.
7. Main flame failure.
8. Furnace pressure (from DCS).
- h. Flame safeguard system cabinet shall be provided for natural gas fuel.
- i. Indicating lights shall also be provided for following:
  1. Limits satisfied.
  2. Purging.
  3. Pilot ON.
  4. Main flame ON.
  5. Flame failure.
  6. Natural gas ON.
- j. Indicating pilot lights shall be industrial, oil-tight construction with push-to-test feature or "All-Pilot Lights" test button.

#### 2.3.9 Boiler Piping Trains

Piping train shall be completely prepiped, wired and mounted on boiler. Natural gas train shall be in accordance with NFPA and FM standards and requirements and shall include but not be limited to following items:

##### 2.3.9.1 Natural Gas Trains

- a. NFPA 54 and ANSI Z83.3.
- b. Natural gas flow control valve with characterizing adjustments to match airflow.
- c. Y-type strainer supplied in ignitor natural gas line.
- d. Two (NC) solenoid safety shut-off valves, in series, in ignitor line with one (NO) solenoid vent valve located between safety shut-off valves, piped independently to atmosphere through the roof.
- e. Two motorized shut-off valves with proof of closure, piped in series in main gas line with one (NO) solenoid vent valve located between safety shut-off valves, piped independently to atmosphere through the roof.
- f. One pressure regulating valve in ignitor natural gas line to regulate natural gas pressure to ignitor.
- g. Pressure gauge, with shut-off valve for main natural gas at burner.
- h. Pressure gauge, with shut-off valve for natural gas ignitor.

- i. Low natural gas pressure switch.
- j. High natural gas pressure switch.

#### 2.4 WASTE HEAT RECOVERY EQUIPMENT

Each existing boiler is equipped with an air preheater, separate from the boiler, which preheats combustion air that is delivered beneath the grate when firing coal. Bypasses, complete with opposed or parallel blade dampers as shown on the contract drawings, shall be added on both the combustion air and flue gas sides of the existing air heaters serving Boiler No. 1 and No. 3.

#### 2.5 OVERFIRE AIR DUCT MODIFICATIONS

Overfire air ducts shall be relocated to accommodate burner installation on the right side of HTHW Generators No. 1 & 3. In addition, cast iron fly ash reinjection nozzles (three per generator) shall be removed and a new 2 inch diameter overfire air duct shall be installed from the existing overfire air header to the new Detroit Stoker overfire air nozzles in the rear wall of HTHW Generators No. 1 & 3. Size of overfire air nozzles shall match existing.

#### 2.6 UNDER GRATE AIR DUCT MODIFICATIONS

Under grate air duct bypasses around air heaters shall be constructed of 3/16 inch thick steel plate conforming to ASTM A 36/A 36M. Ductwork shall be adequately reinforced and braced with structural steel angles not smaller than 2 x 2 x 3/16 inches on no more than 10 foot spacing, and all joints and seams in the sheets and angles shall be welded. Expansion joints shall be installed as indicated and as required to suit the installation and shall be flexible type requiring no packing. Ductwork shall have angle flanges and gaskets for connection to equipment. Ductwork connections shall be gas-tight and caulked-tight all around and sealed with cement to form an air-tight joint. Clean-out openings of suitable size and at approved locations shall be provided for access to all sections of the breeching and shall have tight-fitting, hinged, cast-iron doors with cast-iron frames.

#### 2.7 BREECHING MODIFICATIONS

Breeching bypasses around air heaters shall be constructed of 3/16 inch thick steel plate conforming to ASTM A 36/A 36M. Breeching shall be adequately reinforced and braced with structural steel angles not smaller than 2 x 2 x 5/16 inches on no more than 2 foot spacing, and all joints and seams in the sheets and angles shall be welded. Expansion joints shall be installed as indicated and as required to suit the installation and shall be flexible type requiring no packing. Breeching shall have angle flanges and gaskets for connection to equipment. Breeching connections shall be gas-tight and caulked-tight all around and sealed with cement to form an air-tight joint. Clean-out openings of suitable size and at approved locations shall be provided for access to all sections of the breeching and shall have tight-fitting, hinged, cast-iron doors with cast-iron frames.

#### 2.8 FABRIC EXPANSION JOINTS

### 2.8.1 General

Fabric expansion joints shall be integral flanged, U-belt design consisting of flexible element, backing bars, flow baffle, nuts, bolts and washers. Flexible element, backing bars, and flow baffle shall be drilled to match adjacent breeching or equipment flanges. In open sections of breeching, the maximum spacing between hole centers shall be 6 inches. Design shall allow fit between adjacent breeching or equipment without disassembly of the adjoining breeching or equipment. Flow direction shall be marked on the expansion joint.

### 2.8.2 Flexible Element

The flexible element shall be designed to uncouple the forces and moments between adjoining sections due to thermal expansion while maintaining structural integrity. Design shall simultaneously allow .5 inches of compression, 1 inch of lateral relative motion and 1 degree of rotation in any plane. The flexible element material shall be suitable for the design temperature and contact with flue gas from coal combustion with a 2.50 to 3.81 percent sulfur coal.

### 2.8.3 Backing Bars

Backing bars shall be provided for the full width and circumference of the seal. Backing bars shall be ASTM A 36, a minimum of 2 inches wide by 3/8 thick, free of burrs and sharp edges, and coated with a rust-resistant primer.

### 2.8.4 Flow Baffle

The flow baffle shall be ASTM A 36 carbon steel, 1/8 inch thick, bolt-in design, fastened between flexible element and adjacent breeching or equipment flange, designed to protect flexible element from particulate abrasion throughout the range of thermal movements.

### 2.8.5 Fasteners

Fasteners shall be 5/8 inch bolts with flat washer between the bolt head and the backing bar, and a lock washer between the nut and adjacent breeching or equipment flange. Bolts shall be of adequate length to expose a minimum of two (2) threads beyond the nut after tightening. Bolts dimensions shall be in accordance with ASME B18.2.1 and be threaded in accordance with ASME B1.1, Class 2A. Bolts shall be ASTM A 307, Grade B, zinc-coated for operating temperatures up to 550 degrees F and ASTM A 193, Grade B7, heavy hex for operating temperatures above 550 degrees F. Nut dimensions shall be in accordance with ASME B18.2.2 and threaded in accordance with ASME B1.1, Class 2B. Nuts shall be ASTM A 563, Grade A, zinc-coated, heavy hex for operating temperatures up to 550 degrees F and ASTM A 194 Grade 7, heavy hex for operating temperatures above 550 degrees F.

## 2.9 LOUVER DAMPERS

### 2.9.1 General

Louver dampers shall be balanced weight, multiple blade type. Blades shall be opposed blade (combustion air) or parallel blade (flue gas and minimum leak,) as indicated on the Contract Drawings. Opposed blade dampers shall

be designed for throttling service. Blade dampers shall be designed for shut-off service and shall be provided with sealed blade ends. Dampers shall be designed for a maximum shut-off pressure of 5 inches of water and a maximum temperature of 550 degrees F. Design shall allow fit between adjacent breeching or equipment without disassembly of the adjoining breeching or equipment.

#### 2.9.2 Detailed Requirements

The frame shall be 12 inch, 20.7 pound channel with 5/8 inch diameter holes on a maximum of 6 inch center spacing. Blades shall be 10 gauge carbon (minimum) steel, bolted, double skin, air foil design. Blade seals shall be overlap and stepped. Shafts shall extend the total length of the blades and be Type 304 stainless steel. Brackets, linkages, bearings and packing shall be located and be serviceable from outside the gas stream. Bearings shall be graphite, self-lubricated, rated for 1000 degrees F service. The brackets and linkages shall be carbon steel. Non-machined, metal surfaces shall be power tool cleaned, solvent washed, and coated with a primer suitable for 500 degrees F.

#### 2.9.3 Operator

The dampers shall be provided with a pneumatic actuator integrally mounted on the frame. The design shall be sized to operate satisfactorily with a 60 to 80 psig instrument air supply. Dampers designed for modulating service shall be provided with positioners suitable for 4 to 20 mA signal, with direct or reverse feedback. The selection and arrangement of the spring, solenoid, positioner, if required for modulating service, and the wiring and pneumatic connections shall meet the air and electrical failure positions specified on the Contract Drawings. Speed control on damper to open to closed in 1.0 minutes and closed to open in 1.0 minutes.

#### 2.10 INSULATION

Shop and field applied insulation shall be as specified in Section 15080A "THERMAL INSULATION FOR MECHANICAL SYSTEMS".

#### 2.11 TOOLS

Special tools only shall be furnished and shall include all uncommon tools necessary for the operation and maintenance of controls, meters and other equipment. Small hand tools shall be furnished with a suitable cabinet, mounted where directed.

#### 2.12 ASH HANDLING SYSTEM

##### 2.12.1 Boiler Room Ash Handling System

The existing ash handling system is of the dry pneumatic type. This system gathers ash from the boiler under grate and bottom ash hoppers, mechanical dust collector, and the baghouse hoppers, and discharges to the ash storage silo located outside of the building. An existing ash dust control conditioner is used to reduce fugitive dust emissions during discharge of ash from the storage silo. This ash dust conditioner (dustless unloader) shall be replaced with a new ash unloader system in accordance with Section 14710, "Ash Unloader System."

### 2.13 MODIFICATIONS TO EXISTING LJUNGSTROM AIR HEATERS (GENERATORS NO. 1 & 3)

Existing air heaters are the regenerative type constructed of materials adequate to withstand the corrosion effects of the flue gases. Modifications shall preclude cold-end corrosion of the air heater under any load condition. Temperatures of all metals in contact with flue gas shall be above the flue gas maximum dewpoint temperature for the fuel being fired under all load conditions. Control shall be by automatic bypass and shall be integrated with the combustion control system.

The existing air heaters were manufactured by:

Air Preheater Company  
 Alstom Power Inc.  
 3020 Traux Road, P.O. Box 372  
 Wellsville, NY 14895  
 Contract No. LAP-4128  
 Size 3-13 FIK  
 Serial Nos. 6992, 6993 or 6994

#### 2.13.1 Modifications to Reduce the Heat Transfer Rate and Meet the Following Operating Conditions

Contractor shall replace existing hot end and cold end gasketed heating elements with new having reduced heat transfer capabilities. Seals and mounting hardware installation shall also be replaced to reduce leakage from air side to flue gas side.

Combustion air and flue gas bypasses shall be installed around the air heater to provide further reduction of heat transfer. With HTHW generator loads above approximately 80 percent, spray dryer absorber (SDA) inlet temperature shall be controlled using modulating dampers on the combustion air side of the air heater (D-1 & D-2). This normal mode of operation shall maintain a flue gas temperature of 350 degrees F to the SDA, allowing the SDA to operate at its optimum efficiency. A special condition will exist when HTHW generator outlet flue gas temperature drops below 414 degrees F. At this time the combustion air side shall track in full bypass, and the flue gas side shall go into bypass. As the load increases and the HTHW generator outlet flue gas temperature increases above 430 degrees F, the flue gas bypass dampers (D-3 & D-4) shall go out of bypass mode. The combustion air side shall be released from track and allowed to modulate, controlling the SDA inlet temperature at 350 degrees F.

Load	100%	90%	80%
Flow Rates Lbs/Hr			
Air Entering	80,066	56,100	25,500
Air Leaving	65,266	42,000	13,000
Gas Entering	92,693	88,270	80,872
Gas Leaving	107,493	102,370	93,372
Cold Air Bypassed	7,495	26,583	50,889
Leakage	14,800	14,100	12,500
	15.97%	15.97%	15.46%

Temperatures Deg. F

Air Entering	68	68	68
Air Leaving	152	157	226
Mixed Air to Grate	143	121	100
Gas Entering	448	431	414
Gas Leaving w/o Leakage	393	392	391
Gas Leaving w/ Leakage	351	350	350
Average Cold End	231	230	230
Pressure Diff.	In. W.G.		
Pressure Drop Air	0.15	0.10	0.05
Pressure Drop Gas	0.35	0.30	0.30
Hot End Diff.	8.90	8.20	7.10
Cold End Diff.	9.40	8.60	7.45

### 2.13.2 Material List of Changes

Material list of changes shall include:

Item No.	Description	Qty	U/M
1	Cold End Full Sector Baskets	2	Sets
2	Hot End Full Sector Baskets	2	Sets
3	Hot & Cold Radial Seals; Holding Strips; Heavy Fasteners	2	Sets
4	Hot & Cold Circ. Seals; Holding Strips; Fasteners	2	Sets
5	Hot & Cold Post Seals	2	Sets
6	Hot End Circ. Clamp Assy.	2	Sets

### 2.13.3 Service Engineer

Service engineer from manufacturer shall perform:

Inspection during field construction and approval of construction methods/quality.

Field performance test on each unit in operation over operating load range.

## PART 3 EXECUTION

### 3.1 MODIFICATION OF BOILER AND AUXILIARY EQUIPMENT

Equipment shall be installed as indicated and in accordance with manufacturers' instructions.

Alternations to HTHW generators shall be made in accordance with the established standards, procedures, and applicable codes. Maintenance of the HTHW generator ASME stamp certification shall be ensured. Alternations to HTHW generators shall not be initiated without authorization of a special boiler inspector authorized by the State of Montana and the National Board of Boiler and Pressure Vessel Inspectors. Contractor performing alterations to HTHW generators shall hold a National Board "R" stamp. Special boiler inspector shall inspect HTHW generator alterations.

### 3.2 FIELD PAINTING AND COATING

Except as otherwise specified, ferrous metal shall be cleaned, prepared, and painted as specified in Section 09900 PAINTS AND COATINGS. Exposed pipe covering shall be painted as specified in Section 09900 PAINTS AND COATINGS. Aluminum sheath over insulation shall not be painted.

### 3.3 TESTS

#### 3.3.1 Hydrostatic Tests

Following modification of tubes, HTW generator No. 1 and No. 3 shall be tested hydrostatically and proved tight under a gauge pressure of 1-1/2 times the specified working pressure. Following the installation of all piping and boiler house equipment, but before the application of any insulation, hydrostatic tests shall be made and the system proved tight under gauge pressures of 1-1/2 times the specified working pressure. Tests shall be made under the direction of, and subject to, the approval of the Contracting Officer. The Contractor shall adjust all equipment and controls before the scheduled operational test. A testing schedule shall be submitted at least 15 days before scheduled test.

##### 3.3.1.1 Water Sides Including Fittings and Accessories

Water sides shall be hydrostatically tested in accordance with the requirements of ASME BPVC SEC I and ASME BPVC SEC VIII D1 as applicable.

##### 3.3.1.2 Generator Casing, Air Casings, and Ducts

Air casing and ducts exterior to the generators shall be tested pneumatically at the maximum working pressure. The soap bubble or smoke bomb method shall be used to verify tightness. Gas sides of the generators normally operated under pressure shall be tested for tightness at 1-1/2 times the predicted operating pressure in the furnace at maximum predicted output. For this test the generator shall be tightly sealed with a suitable means to blank off all openings. Air shall be admitted to the generator until the test pressure is reached and then shall be held. If in a 10-minute period the pressure drop does not exceed 5 inches water gauge, the casing shall be regarded as tight and accepted. Air pressure and smoke bomb or comparative CO(2) readings shall be used for induced draft generators.

##### 3.3.2 Capacity and Efficiency Tests, Burners Only

The capacity and efficiency at the specified capacity of the generator shall be determined in accordance with the ASME PTC 4.1 for steam generating units adjusted for High Temperature Hot Water units. The efficiency shall be determined by the direct input-output method and shall be checked with the loss method computation. Test runs shall be made at the maximum capacity for 4 hours; at the minimum capacity and at 50 percent capacity for 2 hours each, respectively. Test reports and performance curves shall be submitted to the Contracting Officer. Before any operational tests are conducted, the system shall be correctly balanced within 5 percent of that indicated. Corrections and adjustments shall be made as necessary to produce the required conditions. Approved methods shall be used to measure all rates of flow. The efficiency and general performance tests on the boilers shall be conducted by a qualified test engineer furnished by the Contractor, and observed by a representative of the Contracting Officer. Testing apparatus shall be set up, calibrated, tested, and readied for testing the boiler before the arrival of the

representative of the Contracting Officer. Calibration curves or test results furnished by an independent testing laboratory for each instrument, meter, gauge, and thermometer to be used in efficiency and capacity test shall be furnished before the test. A test report including logs, heat balance calculations, and tabulated results together with conclusions shall be delivered in quadruplicate. An analysis of the fuel being burned on the test shall be submitted to the Contracting Officer. The analysis shall include all pertinent data tabulated in the ASME PTC 4.1 abbreviated efficiency test. The Contractor shall provide and install all necessary piping, valves, controls, and heat exchanger to provide a load for testing each HTW generator. If any system load is available, the Contracting Officer will provide for loading the heating system for the test, but full-load capability will probably require the supplementary heat exchanger for the test.

### 3.3.3 Operating Tests, Burners Only

After adjustment and achievement of stable operation of the HTW generators, each shall be tested continuously for 12 hours, minimum, to demonstrate control and operational conformance to the requirements of this specification under varying load conditions ranging from the specified capacity to the minimum burner turndown ratio without on-off cycling. In each case, the operating tests shall cover the periods for the capacities tabulated below:

#### Waterwall Watertube Boilers

Time (minimum)	Percent of Capacity
First 2 hours	20
Next 2 hours	50
Next 2 hours	75
Next 6 hours*	100

\* The efficiency tests may be conducted either concurrently with the operating tests or separately at the option of the Contractor.

### 3.3.4 Operating Tests, Burners and Stoker

After adjustment and achievement of stable operation of the HTW generators, each shall be tested continuously for 12 hours, minimum, to demonstrate control and operational conformance to the requirements of this specification under varying load conditions ranging from the specified capacity to the minimum burner and stoker turndown ratio without on-off cycling. In each case, the operating tests shall cover the periods for the capacities tabulated below:

#### Waterwall Watertube Boilers

Time (minimum)	Boiler Percent of Capacity	Burners Heat Input
First 2 hours	35	<del>10 x 10</del> 100 MMBtu/hr
Next 2 hours	50	<del>10 x 10</del> 100 MMBtu/hr
Next 2 hours	75	<del>12 x 10</del> 120 MMBtu/hr
Next 6 hours*	100	<del>15 x 10</del> 150 MMBtu/hr

\* The efficiency tests may be conducted either concurrently with the operating tests or separately at the option of the Contractor.

### 3.3.5 Test of Natural Gas Fuel Burning Equipment

- a. Test of fuel burning equipment shall demonstrate that equipment installed will meet requirements of specifications, and that overall efficiency is as specified, with not over 15 percent excess air, can be obtained with burners operating at 100 percent capacity without flame impingement on any combustion chamber wall, floor, baffle or watertube. Protect the grates from overheating.
- b. Test shall include all boiler and burner interlocks, safety interlocks, combustion controls, actuators, valves, controllers, gauges, thermometers, pilot lights, switches, etc. prior to combustion testing. All malfunctioning components shall be replaced. Submit an itemized data record sheet of this component testing.
- c. Each boiler control system and all boiler appurtenances shall be calibrated and set to ensure the specified performance. The fuel burner, forced-draft fan, controls, etc. shall be fully coordinated, manually capable, and automatically controllable to hold the required settings. The boiler fuel burning system shall be continuously variable throughout the specified operating range without manual adjustment of burner, register or nozzle, and turndown shall be achieved without manual adjustment. Testing apparatus shall be set up, calibrated, tested and ready for use prior to final combustion testing. Calibration certificates for all test instruments shall be furnished with test data.

#### 3.3.5.1 Sequencing

The HTW generator shall start, operate, and stop in accordance with the specified operating sequence.

#### 3.3.5.2 Flame Safeguard

The operation of the flame safeguard control on gas-fired burners shall be verified by simulated flame and ignition failures. Burners having continuous or intermittent pilots shall be tested by simulating main flame failure while the pilot is burning. The trial-for-pilot ignition, trial-for-main-flame ignition, combustion control reaction, and valve closing times shall be verified by stop watch.

- a. Immunity to Hot Refractory: The burner shall be operated at high fire until the combustion chamber refractory reaches maximum temperature. The main fuel valve shall then be closed manually. The combustion safeguard shall drop out immediately causing the safety shutoff valves to close within the specified control reaction and valve closing times.
- b. Pilot Intensity Required: The fuel supply to the pilot flame shall be gradually reduced to the point where the combustion safeguard begins to drop out (sense "no flame") but holds in until the main fuel valve opens. At this point of reduced pilot fuel supply, the pilot flame shall be capable of safely igniting the main burner.

If the main fuel valve can be opened on a pilot flame of insufficient intensity to safely light the main flame, the generator shall be rejected.

- c. Turndown Ratio: The specified turndown ratio shall be verified by firing at the minimum firing rate.
- d. HTW Generator Limit and Fuel Safety Interlocks: Safety shutdown shall be caused by simulating interlock actuating conditions for each generator limit and fuel and safety interlock. Safety shutdowns shall occur in the specified manner.
- e. Combustion Controls: The accuracy range and smoothness of operation of the combustion controls shall be demonstrated by varying the demand throughout the entire firing range required by the turndown ratio specified for the burner and stoker and in the case of automatic sequenced burners by further varying the firing rate to require on-off cycling. The control accuracy shall be as specified.
- f. Safety Valves: Safety valves on HTW generators shall not be tested under operating conditions.

### 3.4 CLEANING OF HTW GENERATORS AND PIPING

#### 3.4.1 HTW Generator Cleaning

After the hydrostatic tests have been made, and before performance of the operating tests, the boilers shall be thoroughly and effectively cleaned of foreign materials. Wherever possible, surfaces in contact with water shall be wire brushed to remove loose material. The Contractor may use the following procedure or may submit his own standard procedure for review and approval by the Contracting Officer. HTW generators shall be filled with a solution consisting of the following proportional ingredients for every 1000 gallons of water, and operated at approximately 30 to 50 psig for a period of 24 to 48 hours:

24 lb. caustic soda; 8 lb. sodium nitrate; 24 lb. disodium phosphate, anhydrous; and 1/2 lb. approved wetting agent.

Chemicals in the above proportions, or as otherwise approved, shall be thoroughly dissolved in the water before being placed in the HTW generator. After the specified boiling period, the boilers shall be allowed to cool, and then drained and thoroughly flushed. Piping shall be cleaned by operating the HTW generators for a period of approximately 48 hours.

### 3.5 MANUFACTURER'S SERVICES

Services of a manufacturer's representative who is experienced in the installation, adjustment, and operation of the equipment specified shall be provided. The representative shall supervise the installing, adjusting, and testing of the equipment. Contractor shall provide a minimum of two (2) weeks of burner manufacturer's representative on site for combustion control adjustment. Scheduling shall coincide with the visit of the manufacturer's representative for the variable frequency drives for the ID fan motors.

Service engineers shall startup, calibrate and place in automatic operation the following:

1. Burner & Burner Management System
2. Bypass dampers and controls
3. I.D. fan motor VFD

The following additional field services shall be provided:

1. One day of field labor to witness loop testing of burner management field wiring. Indicated in writing if not satisfied with all field wiring at the end of this period, or wiring will be treated as acceptable.
2. Three days of field assistance during boiler "ASME power code test". The above assistance time periods are not necessarily contiguous. Field service engineer shall oversee and manage the boiler "boil-out", burner adjustment, ASME power code test, and Demonstration. This field service engineer will not be replaced during startup without prior written notice and consent of the Contracting Officer. If any phase of startup or commissioning is delayed because additional parts are required, the burner and burner management service engineer shall remain in the field.
3. System will be acceptable when the system is in automatic control operating at 10 MMBtu/hour load changes in one (1) minute from low load to high load or high to low load, or intermittent swing loads without noticeable pulsation, and the manufacturer's service engineer is not adjusting controllers on natural gas. The following performance guarantees shall be demonstrated to the Contracting Officer. The system shall be operated within the range of 10 MMBtu/hour to 50 MMBtu/hour (heat input) with load swings of 10 MMBtu/hour/minute in either direction. All measurements will be made using 15 minute averaging. The system shall be operated in the automatic mode only without burner and combustion controls adjustment. The following guarantees shall be demonstrated:

	Natural Gas Only
Particulate Matter EPA Method 1-5 (270 degrees F Filter)	0.005 lbs/10 million Btu
Particulate Matter (Opacity EPA Method 9)	Less than 10%
Nitrogen Oxides (NO & NO2) EPA Method 7E	0.15 lbs/million Btu Heat Input
Carbon Monoxide EPA Method 10B	0.11 lbs/million Btu Heat Input
From Minimum Load, Heat Input	20%
To Maximum Load, Heat Input	100%

4. Provide five (5) man days of operational training by the burner service engineer. The service shall not adjust the system during this week. This week will also be used as the operational acceptance test. If the service engineer needs to adjust the burner or controls, then this week will be repeated at no additional cost.

5. Retain the services of ~~the HTHW generator manufacturer~~ (International Boiler, Inc.) to inspect and approve all generator tube work and casing/insulation work.

### 3.5.1 Field Training

A field training course shall be provided for designated operating staff members. Training shall be provided for a total period of 2 weeks of normal working time and shall start after the system is functionally complete and adjusted, but prior to final acceptance tests. Field training shall cover all of the items contained in the approved operating and maintenance instructions. Field training time is separate from startup and adjustment.

-- End of Section --





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# Central Heat Plant Application of Low Emissions Tech.

## Malmstrom AFB, MT



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# Pre-proposal Conference

15 April 2004

10:00 a.m.

W912DW-04-R-0017

Issued April 6, 2004

One Amendment issued to date



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# INTRODUCTION

- Welcome
- Meeting Minutes – The minutes from this meeting and written questions and their answers from the site visit will be posted to the Solicitation by Amendment. This is for information purposes only.
- Comments/clarifications made today will not change the solicitation in any way.
- Changes to the solicitation will ONLY be made through written Amendments.
- Today's Attendance List – Will be posted to the Solicitation by Amendment.



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# QUESTIONS DURING THE PROPOSAL STAGE



- Contracting Web Address:
  - ***www.nws.usace.army.mil***
- Technical Questions
  - ***www.projnet.org***
- For Any Other Questions:
  - ***Sherrye.L.Schmahl@usace.army.mil***
  - ***Phone – (206) 764-6588***
  - ***Federal Acquisition Regulation: <http://farsite.hill.af.mil/>***



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# PROJECT DESCRIPTION



- See Section 00110, para 1.2 for complete description. (Section 00100, page 00110-1)
- Removing existing burners & controls on 2 HTHW generators and furnishing and installing natural gas burners.
- Contractor responsible for demolitions and relocations work, furnishing and placing concrete, steel and electrical work, and all controls.



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# Solicitation General Information



- **SOLICITATION NUMBER:** W912DW-04-R-0017
- **AMENDMENTS:** To date, one Amendment has been issued.
- **MAGNITUDE OF CONSTRUCTION:** The range is \$1 Million to \$5 Million. (See Section 00100, page 12. )
- **BID GUARANTEE:** A Bid Guarantee is required in the amount of 20% of the bid price or \$3 Million, whichever is less. (See Section 00100, page 10.)



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# Extent of Competition

- **Unrestricted competition – Subcontracting Plan Required for Large Business** (Refer to Subcontracting Plan for goals. Contact SADBUE for further information regarding Small Business Concerns).
- **NAICS Code: 238220**
- **Small Business Size Standard** : A firm having an average annual gross revenue of \$12 Million or less for the last three fiscal years.
- **SADBUE: (Acting) Susan Sherrell, Ph: 206-764-3203**



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# SOLICITATION GENERAL INFORMATION



- This Project is a Request for Proposal (RFP). There is no public bid opening. Information, other than technical changes or administrative clarifications, will not be provided during the evaluation process.
- Requires submission of a Technical and Price Proposal (Refer to Section 00100, page 6 of 126 and See Section 00110.)
- *Technical and price proposals are required to be submitted to The Corps of Engineers, Seattle District, by 2:00 P.M. local time, 6 May 2004. (Refer to block 8 on SF1442)*
- No offers will be accepted after the noted time/date. (Refer to Section 00100, Page 6, FAR 52.215-1, Instructions to Offerors, paragraph (c)(3))



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# STANDARD FORM 1442-Solicitation, Offer and Award:



- Block 8 gives the address for submittal of your proposal.
- Block 13a states gives the due date and time for proposals.
- Refer to Section 00100, Page 6, “Instructions to Offerors, Competitive Acquisition” with details the instructions and procedures for submitting your proposal.
- Ensure all amendments are acknowledged (SF1442, Back, block 19)
- Ensure offer is signed (SF1442, Back, blocks 20a,b,c),
- Ensure the “Corporate Certificate” is correctly completed. If you are a partnership or a joint venture, the “Authority to Bind Partnership” section must be signed by all partners.
- Ensure the Schedule, Page 00010-5 is completely filled out.



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# SECTION 00110 PROPOSAL AND EVALUATION

Pages 00110-1 – 00110-13



- Contract will be awarded to the firm submitting the proposal that (a) conforms to the RFP, (b) is considered to offer the best value to the Government in terms of the evaluation factors, and (c) determined to be in the best interest of the Government.
- Proposal preparation costs will not be paid by the Government.
- Debriefings may be requested IAW FAR 15.505 & 15.506.
  - Pre-award debriefing: All offerors excluded before award, must submit request to Contracting within 3 calendar days after offeror received notice of exclusion (NOE) from competition.
  - Post-award debriefing: Any unsuccessful offeror who has not had a pre-award debriefing, must submit request to Contracting within 3 days after notification of contract award is received.



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# EVALUATION FACTORS FOR AWARD



(SEE Section 00110)

- Provides the Technical Evaluation Criteria, as well as the Evaluation & Award Procedures.
- Technical Evaluation Criteria are:
  - Criterion 1. Relevant Experience of the Prime – 3 projects within last ten years
  - Criterion 2. Qualifications of Key Team Members
  - Criterion 3. Past Performance – last ten years, CCASS or Customer Survey (no more than five) form
  - Criterion 4. Project Schedule – Gantt chart
  - Criterion 5. Temporary Heat Plan
  - Criterion 6. Extent of Small Business Participation – no submittal required; based on CCASS.



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# EVALUATION FACTORS



See Section 00110

- Read descriptions of evaluation criteria thoroughly.
- Ensure proposal is complete and reflects all elements required by the solicitation.
- Technical Proposals are evaluated on their own merit and against the evaluation criteria only--not against other proposals.
- Proposals submitted in two parts:
  - Technical
  - Price



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# TECHNICAL EVALUATION

See page 00110-2



- Technical Evaluation Standards - Definitions
  - Outstanding = Very High Probability of Success
  - Above Average = High Probability of Success
  - Satisfactory (Neutral) = Reasonable Probability of Success
  - Marginal = Low Probability of Success
  - Unsatisfactory = Very Low Probability of Success



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# PRICE EVALUATION



See Page 00110-8 – 00110-9

- Price Evaluation
  - Price will be evaluated for reasonableness and to assess the offeror's understanding of the contract requirements and any risk inherent in the offeror's approach.
  - Financial capacity will be checked.
- It is the intent of the Government to make award based upon initial offers without further discussions or additional information. Therefore, each initial offer should contain the offeror's most favorable terms from a price and technical standpoint. (See page 00110-11 & 12, Paragraph 8 through 8.3.4).



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# COMPETITIVE RANGE

(Developed after Technical Evaluation)

See Page 00110-12



- The Government shall evaluate all proposals in accordance with FAR 15.305(a) and, if discussions are to be conducted, establish a competitive range. Based on the ratings of each proposal against all evaluation criteria, the Contracting Officer shall establish a competitive range comprised of all of the most highly rated proposals, unless the range is further reduced for purposes of efficiency pursuant to FAR 15.306 ( c ) (2). (See Page 00110-12, paragraph 8.3.4-8.3.5).



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# COMPETITIVE RANGE

(Developed after Technical Evaluation)

See Page 00110-12



- Discussions are usually conducted in writing, but may also be by telephone or in person. Discussions are tailored to each offeror's proposal and are only conducted with offeror(s) in the competitive range.
- The primary objective of discussions is to maximize the Government's ability to obtain the best value, based on the requirement and the evaluation criteria set forth in this solicitation. If a firm's proposal is eliminated or otherwise removed from consideration for award during discussions, no further revisions to that firm's proposal will be accepted or considered.
- Discussions will culminate in a request for Final Proposal Revision the date and time of which will be common to all remaining firms.



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# SECTION 0600

## Representations and Certifications



- Must be completed and submitted with price proposal.
- Be sure to carefully check and make sure all certifications are filled out correctly and signed if required.



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# SECTION 0700

## Contract Clauses



- Contains contract clauses in full text.
- All Contractors are required to register in the Central Contractor Registration (CCR) Database.  
(Refer to FAR 252.204-7001, Page 117.)



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# SPECIAL CONTRACT CLAUSES Section 0800



- Unique to this requirement
  - Commencement of this contract – See Table 1: HEAT PLANT SCHEDULE in SC-1 in Section 00800; see Section 01110 (paragraph 1.3).



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# WAGE

# DETERMINATIONS



Found at the back of Section 00800

- Davis-Bacon wage rates shall be utilized for this contract. Wage decisions will be updated as changes occur, prior to award of this contract. DOL establishes minimum monetary wages/fringe benefits to be paid in performance of this contract.
  - Wage Determination for the geographical area of this project: MT20030005 (Building)



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# CONCLUSION

1. It is advisable to refer to the Corps of Engineers web site for Amendments. Please check the website constantly up until the due date and time for proposals.
2. Ensure you have completed all information required by the solicitation package and submit those items with your proposals.
3. Ensure compliance with the solicitation requirements.
4. Solicitation is only changed via written Amendment.
5. The Government intends to award on initial offers, to the firm that is the Best Value to the Government.