UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
SAM NUNN
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA GEORGIA 30303-8960

SEP 0 1 2010

UNITED PARCEL SERVICE

Colon Robert Pastorelli
U.S. Army Aviation and Missile Command
AMSAM-L-G-G
5300 Martin Road
Redstone Arsenal, AL 35898

Re: Consent Agreement and Final Order
In the Matter of the Department of the Army
U.S. Army Garrison-Redstone Arsenal (Redstone Arsenal)
Docket No. CAA-04-2010-1522(b)

Dear Colonel Pastorelli:

Enclosed please find a copy of the ratified Consent Agreement and Final Order (CAFO) in the above-referenced matter. The original CAFO has been filed with the Regional Hearing Clerk as directed in Section 22.05(a) of the Consolidated Rules of Practice, as amended. Please refer to Section IV (Final Order), for the terms and instructions regarding Redstone Arsenal's implementation of the approved Supplemental Environmental Project (SEP) and final payment on the penalty due. Any questions regarding the processing of Redstone Arsenal's penalty may be directed to Ms. Lori Weidner, Financial Management Office, at (513) 487-2125.

If you have any other questions, please contact Shanieka Pennamon of the North Air Enforcement Section at (404) 562-9213 or Ellen Rouch, Associate Regional Counsel, at (404) 562-9575.

Sincerely,

Beverly A. Spagg
Chief
Air and EPCRA Enforcement Branch

Enclosure

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4

IN THE MATTER OF:	Docket Number: CAA-04-2010-1522(b)
The United States Army, Redstone Arsenal Respondent	

2010 SEP -1 PM 11:27

CONSENT AGREEMENT AND FINAL ORDER

I. NATURE OF THE ACTION

1. This is an administrative civil penalty proceeding, initiated pursuant to Section 113(d) of the Clean Air Act (CAA), 42 U.S.C. § 7413(d), and pursuant to the Consolidated Rules of Practice Governing the Administrative Assessment of Civil Penalties and the Revocation, Termination or Suspension of Permits ("Consolidated Rules"), as amended, found at 40 CFR Part 22. Complainant is the Director of the Air, Pesticides and Toxics Management Division, Region 4, United States Environmental Protection Agency (EPA).

2. Respondent is the Department of the Army, U.S. Army Garrison-Redstone Arsenal (hereinafter, Redstone).

3. Complainant and Respondent have conferred for the purpose of settlement pursuant to 40 CFR § 22.18 and desire to resolve this matter and settle the allegations described herein without a hearing. Therefore, without the taking of any evidence or testimony, the making of any argument, or the adjudication of any issue in this matter, and in accordance with 40 CFR § 22.13(b), this Consent Agreement and Final Order (CAFO) will simultaneously commence and conclude this matter.

4. The authority to take action under Section 113(d) of the CAA, 42 U.S.C. § 7413(d), is vested in the Administrator of EPA. The Administrator of EPA has delegated this authority under the CAA to the Regional Administrators by EPA Delegation 7-6-A, last updated on August 4, 1994. The Regional Administrator, Region 4, has redelegated this authority to the Director, Air, Pesticides, and Toxics Management Division, by EPA Region 4 Delegation 7-6-A, dated November 15, 1993. Pursuant to the aforementioned delegations, the Director of the Air, Pesticides and Toxics Management Division has the authority to commence an enforcement action as the Complainant in this matter.

5. Respondent is located in Madison County, Alabama and is the site for the Alabama U.S. Army Garrison-Redstone.

6. Respondent is a "person" as defined in Section 302 of the CAA, 42 U.S.C. § 7602.

7. Respondent is the owner and operator of a source subject to 40 CFR Part 70, as approved by EPA for the Alabama Department of Environmental Management (ADEM) on November 15, 1997, in 60 Fed. Reg. 57346 and August 28, 2001, in 66 Fed Reg. 452531 and ADEM Administrative Code Regulation 335-3-16.

8. Respondent was issued a Title V Operating Permit No. 709-0007 (hereinafter, Permit 0007) by ADEM on August 4, 2008.

9. ADEM Admin. Code R. 335-3-14-.01(b) is a part of a federally-approved and federally enforceable Alabama State Implementation Plan (SIP). See 40 CFR § 52.50. This regulation was originally adopted as part of the Alabama SIP upon approval in the May 31, 1972, Fed. Reg. (37 FR 10842). The regulation was revised on November 26, 1979, Fed. Reg. (44 FR 67375). Other revisions include, but are not limited to, September 14, 1998, Fed. Reg. (63 FR 49005).

10. ADEM conducted an inspection at Respondent's facility on September 11, 2007.

11. ADEM issued a Notice of Violation (NOV) to the Respondent on October 24, 2007.

12. As a federal facility, the Respondent has the privilege of claiming sovereign immunity. Therefore, ADEM referred the case to EPA on December 18, 2007.

13. EPA subsequently issued a NOV to the Respondent on March 16, 2009.

II. CLEAN AIR ACT REQUIREMENTS/FACTUAL ALLEGATIONS

Allegation No. 1

14. According to 40 CFR § 63.6645(f)(2), sources required to conduct performance tests or other initial compliance demonstrations must submit the Notification of Compliance Status, including the performance test results, before the close of business on the 60th day following the completion of the performance test according to § 63.10(d)(2).

15. Respondent submitted its performance test results to ADEM on June 22, 2007, for testing conducted on May 18, 2007. However, the Respondent failed to

submit to ADEM or EPA its complete Notification of Compliance Status Report (NOCSR) which should have been submitted by July 18, 2007. The NOCSR should also include: methods used to determine compliance: results of the performance test; method(s) used to determine continuing compliance; type and quantity of HAPs emitted by a source; description of air pollution control equipment for each emission point and control efficiency; and a statement by the owner/operator that the source has complied with the relevant standard.

16. Based on the information referenced in paragraph 15, EPA alleges that the Respondent failed to include all components of the NOCSR and is thereby in violation of 40 CFR § 63.6645(f)(2).

Allegation No. 2

17. Proviso No. 2 of Permit No. 0007 of the Emission Monitoring section for the Peak Shaving Generators, states the following:

> The permittee must install and maintain a continuous parameter monitoring system (CPMS) for each RICE in order to continuously monitor the catalyst inlet temperatures in accordance with 40 CFR § 63.6625(b). The catalyst inlet temperature data must be reduced to 4-hour rolling averages.

18. During an inspection by ADEM on September 11, 2007, it was noted that the Peak Shaving Generators were operating but the CPMS for each Reciprocating Internal Combustion Engine (RICE) was not functioning. As a result, records of the catalyst temperature data were unavailable at the time of the inspection.

19. Based on the information referenced in paragraph 18, EPA alleges that the the Respondent failed to continuously monitor the catalyst inlet temperature and is thereby in violation of Title V Permit No. 0007, Proviso No. 2 and 40 CFR § 63.6625 (b).

Allegation No. 3

20. 40 CFR § 63.6630(b) states: "During the initial performance test, the facility must establish each operating limitation in Table 2b(1)(a) & (b) of Subpart ZZZZ."

21. Proviso No. 2 of Permit No. 0007 of the Emissions Standards section for the Peak Shaving Generators, which references 40 CFR § 63.6600(b), Table 2b(1)(a) & (b), states the following:

> The facility must maintain the catalyst so that the pressure drop across the catalyst does not change by more than two inches of water at 100 percent load plus or minus 10 percent from the pressure drop across the catalyst

that was measured during the initial performance test; and maintain the temperature of each stationary RICE exhaust so that the catalyst inlet temperature is greater than or equal to 450°F and less than or equal to 1350° F.

22. Initial compliance testing for the generators did not indicate that operating limitations were established in a manner in which the pressure drop across the catalyst was measured and maintained within the required parameters. The inlet temperature of the catalyst for each stationary RICE was also not measured within the 450°F to 1350° F range.

23. Based on the information in paragraph 22, EPA alleges that the Respondent failed to establish operating limits for each stationary RICE and is thereby in violation of Proviso No. 2 of Permit No. 0007, 40 CFR § 63.6600 (b), and 40 CFR § 63.6630(b).

Allegation No. 4

24. 40 CFR § 63.6650(b)(4) requires that each subsequent Compliance Report must be postmarked or delivered no later than July 31 or January 31, whichever date is the first date following the end of the semi-annual reporting period.

25. The Respondent's first semi-annual reporting period ended on June 30, 2007. The Respondent sent in its first semi-annual report to ADEM on December 6, 2007. In the case of Redstone Arsenal, the first semi-annual report was to be postmarked or delivered on July 31, 2007.

26. Based on the date of submission of the first semi-annual report, EPA alleges that the Respondent failed to submit its semi-annual report on or before the due date and is therefore in violation of 40 CFR § 63.6650(b)(4).

Allegation No. 5

27. Proviso No. 12 of Permit 007 requires Respondent to submit a compliance certification annually within 60 days of the anniversary date of issuance of the permit. The certification shall include: 1) identification of each term or condition of the permit that is the basis of the certification; 2) the compliance status; 3) the method(s) used for determining the compliance status of the source...; 4) whether compliance has been continuous or intermittent; and 5) other facts as the Department may require.

28. EPA alleges that Respondent submitted the Title V annual certification to ADEM on August 23, 2007, certifying that the source was in continuous compliance with the recordkeeping and reporting requirements. Respondent violated Proviso No. 12 of its applicable Title V permit by incorrectly certifying that compliance was continuous.

III. CONSENT AGREEMENT

29. For the purposes of this CAFO, Respondent admits the jurisdictional allegations set out in Paragraphs 1 through 13 above, but Respondent neither admits nor denies the factual allegations set out above.

30. Complainant and Respondent agree to settle this matter by their execution of this CAFO. The parties agree that the settlement of this matter is in the public interest and that this CAFO is consistent with the applicable requirements of the CAA.

31. As provided in 40 CFR § 22.18(b)(2), Respondent waives any rights to contest the allegations listed above and its rights to appeal the proposed final order accompanying this consent agreement.

32. Respondent consents to the assessment of and agrees to pay the civil administrative penalty as set forth in this CAFO.

33. Respondent agrees to complete the Supplemental Environmental Project (SEP) set forth in this CAFO.

34. Respondent certifies that as of the date of its execution of this CAFO, it is in compliance with all relevant requirements of the CAA and its implementing regulations.

35. Compliance with this CAFO shall resolve the allegations of violations contained herein. This CAFO shall not otherwise affect any liability of Respondent to the United States. Other than as expressed herein, EPA does not waive any right to bring an enforcement action against Respondent for violation of any federal or state statute, regulation or permit, to initiate an action for imminent and substantial endangerment, or to pursue criminal enforcement for allegations of violations not contained in this CAFO. Respondent reserves the right to assert appropriate defenses.

36. Complainant and Respondent agree to settle this matter by their execution of this CAFO. The parties agree that the settlement of this matter is in the public interest and that this CAFO is consistent with the applicable requirements of the CAA.

IV. FINAL ORDER

37. Respondent shall pay a civil penalty of **THIRTY SIX THOUSAND EIGHT HUNDRED AND ONE DOLLARS ($36,801)** within thirty (30) days of the effective date of this CAFO.

38. Respondent shall pay the penalty identified in Paragraph 37 utilizing a manual Military Interdepartmental Purchase Request (MIPR), DD-Form 448, an intergovernmental electronic payment procedure, which shall be faxed to:

Molly Williams
26 West Martin Luther King Drive
Mail Stop 002
Cincinnati, Ohio 45268
Fax Number: (513) 487-2063
Telephone Number: (513) 487-2076

Upon acceptance and then billing of the MIPR by EPA to the address provided in block 13 of the MIPR through the Intra-Government Payment and Collection (IPAC) system, the payment will be remitted to EPA. Respondent shall use EPA Region 4's accounting location code 68010727.

39. This settlement is further supported by, and Respondent also agrees to implement, the Supplemental Environmental Project (SEP) described in Exhibit A, as submitted to EPA on March 2, 2010. Respondent's estimated cost for completing the SEP is ONE HUNDRED FIFTY THOUSAND DOLLARS ($150,000). In order to meet its SEP obligations, Respondent must spend a minimum of FIFTY TWO THOUSAND SEVEN HUNDRED SIXTY NINE DOLLARS ($52,769). If the SEP is not completed to EPA's satisfaction or if Respondent does not fully complete any part of the SEP in a timely manner, Respondent shall pay the United States a stipulated penalty of TWENTY SIX THOUSAND THREE HUNDRED EIGHTY FIVE DOLLARS ($26,385) except as follows:

a. The SEP was completed satisfactorily, and Respondent expended at least 90 percent of the total amount required, Respondent shall not pay a stipulated penalty;

b. If the SEP was completed satisfactorily, but Respondent expended less than 90 percent of the total required, Respondent shall pay a stipulated penalty in the amount that is the difference between the amount spent on the SEP and the amount agreed upon, above; and

c. If the SEP was not fully and timely completed, but Respondent expended at least 90 percent of the total amount required, Respondent shall not pay a stipulated penalty if it made a good faith effort to fully and timely complete the SEP.

For the purposes of this Paragraph, whether Respondent has satisfactorily completed the SEP and whether Respondent made a good faith effort to do so shall be EPA's determination based on a comparison of the requirements contained in Appendix A and the actions performed by Respondent. If Respondent disputes the EPA determination, the issue shall be resolved under the Dispute Resolution procedures in Paragraph 48 of this CAFO.

40. The SEP shall be completed by May 17, 2011.

41. Respondent certifies that, as of this date, it is not required to perform any part of the SEP by any federal, state or local law, regulation, permit or order, or by any agreement or grant. Respondent further certifies that, as of this date, it has not received, and is not negotiating to receive, credit for any part of the SEP in any other enforcement action of any kind.

42. At the time the payment is made Respondent shall mail copies of the written confirmation to both Ms. Saundi Wilson (Office of Environmental Accountability) and Shanieka Pennamon (North Air Enforcement Section), at the following address:

U.S. EPA - Region 4
Atlanta Federal Center
61 Forsyth Street, S.W.
Atlanta, Georgia 30303-8960

The written confirmation shall reference on its face, the name of the Respondent and the Docket Number of the CAFO (Department of the Army, U.S. Army Garrison-Redstone Arsenal, Docket Number CAA-04-2010-1522(b).

43. Respondent shall submit a SEP Interim Report. The Interim Report should document the progress of the SEP, state what tasks are remaining, and any anticipated completion dates. The SEP Interim Report should be submitted six months (6 months) after the Respondent receives a copy of the fully executed CAFO. Interim Reports should be submitted every 6 months thereafter until the SEP is completed.

a. The Report shall be sent to Shanieka Pennamon at the address in Paragraph 42.

b. If Respondent fails to submit the SEP Interim Report in a timely manner pursuant to this Paragraph, Respondent shall pay to the United States a stipulated penalty of $100 for each day until the required documents or receipts are submitted.

44. Respondent shall submit a SEP Completion Report within 60 days of the completion of the SEP. The SEP Completion Report shall document the completion of the SEP and include the following:

a. an affidavit from an authorized Redstone Garrison Commander or his or her authorized representative, attesting that the SEP has been completed or explaining in detail any failure to complete it;

b. copies of appropriate documentation showing a minimum amount of FIFTY TWO THOUSAND SEVEN HUNDRED SIXTY NINE DOLLARS ($52,769) was spent on the SEP described in Attachment A, including invoices, computer printouts or other appropriate documentation. Upon request, Respondent shall immediately send EPA any additional documentation requested by EPA; and

c. If Respondent fails to submit copies of the receipts or other documentation for funds expended, or submit the SEP Completion Report in a timely manner pursuant to this Paragraph, Respondent shall pay to the United States a stipulated penalty of $100 for each day until required documents or receipts are submitted.

45. EPA acceptance of the SEP Completion Report:

a. Within sixty (60) days of receipt of the SEP Completion Report as described in the preceding paragraph, EPA will notify the Respondent, in writing, regarding: (i) any deficiencies in the SEP Report itself along with a grant of an additional fifteen (15) days for Respondent to correct any deficiencies; or (ii) indicate that EPA concludes that the project has been completed satisfactorily, and this CAFO has been satisfied and terminated or (iii) determine that the project has not been completed satisfactorily and seek stipulated penalties in accordance with Paragraph 30 of this CAFO.

b. If EPA elects to exercise option (i) above, EPA shall permit Respondent the opportunity to object in writing to the notification of deficiency or disapproval given pursuant to this paragraph, under the Dispute Resolution procedures of Paragraph 48 of this CAFO.

46. Respondent agrees that EPA may inspect the facility at any time in order to confirm that the SEP is being undertaken in conformity with the representations made herein.

47. Any public statement, oral or written, by Respondent making any reference to any part of the SEP shall include the following language: "This project was undertaken in connection with the settlement of an enforcement action taken by the U.S. Environmental Protection Agency for violations of Section 112 of the CAA."

48. Dispute Resolution

a. The parties shall use their best efforts to informally and in good faith resolve all disputes of differences of opinion. The parties agree that the procedures contained in this Paragraph are the sole procedures for resolving disputes arising under this CAFO.

b. If Respondent disagrees with any written decision or directive (Initial Written Decision) of EPA under this CAFO, Respondent shall notify EPA of the dispute (Notice of Dispute) in writing within fourteen (14) calendar days of Respondent's receipt of the Initial Written decision. The Notice of Dispute shall be mailed to:

Beverly A. Spagg
U.S. EPA Region 4
Air and EPCRA Enforcement Branch
61 Forsyth Street
Atlanta, Georgia 30303

c. Respondent and EPA shall attempt to resolve the dispute informally. The period for informal negotiations shall not exceed twenty-one (21) calendar days from the date of receipt of the Notice of Dispute, unless this period is modified by written agreement of the parties to the dispute. EPA agrees to confer in person or by telephone to resolve any such disagreement with the Respondent as long as Respondent requests for a conference will not extend the Negotiation Period, unless the Negotiation Period is modified by written agreement of the parties to the dispute.

d. If the parties cannot resolve the dispute informally under the preceding Paragraph, then the position advanced by EPA in its Initial Written decision shall be considered binding unless, within fourteen (14) calendar days after the conclusion of the informal negotiation period, Respondent invokes the formal dispute resolution procedures by serving on EPA at the address specified in the above-referenced paragraph 48b, and to the Director, Air, Pesticides & Toxics Management Division, (Division Director), EPA Region 4, a written Statement of Position on the matter in dispute, including but not limited to, the specific points of the dispute, the position Respondent claims should be adopted as consistent with the requirements of the CAFO, the basis for Respondent's position, any factual data, analysis or opinion supporting documentation relied upon by Respondent. If Respondent fails to follow any of the requirements contained in this Paragraph, then it shall have waived its right to further consideration of this disputed issue.

e. Within fourteen (14) calendar days after receipt of Respondent's Statement of Position, EPA will serve on Respondent and to the Division

Director, its Statement of Position, including but not limited to, any factual data, analysis or opinion supporting that position and any supporting documentation relied upon by EPA.

f. Within fourteen (14) calendar days following receipt of both Statements of Position, the Division director will issue a final written decision resolving the dispute, which sets forth the basis for EPA's decision. Such decision shall be incorporated into and become an enforceable element of this CAFO.

g. During the pendency of the dispute resolution process, unless there has been a modification by EPA of a compliance date, the existence of a dispute as defined in Paragraph 48, the existence of a dispute defined in this Section shall not excuse, toll, or suspend any compliance obligation or deadline required pursuant to this CAFO which is not directly in dispute. However, payment of stipulated penalties with respect to the disputed matter shall be stayed pending resolution of the dispute. Notwithstanding the stay of payment, penalties shall accrue from the first day of non-compliance with any applicable provision of this CAFO unless Respondent prevails on the disputed issue. The Respondent shall not be required to pay stipulated penalties as provided in Paragraphs 39, 43 and 44 as to the disputed issue if Respondent prevails or if so decided pursuant to Paragraph 48. In the event the Respondent does not prevail on the disputed issue, stipulated penalties shall be assessed and paid as provided in Paragraphs 39, 43 and 44 herein.

h. Respondent shall pay any stipulated penalties that accrue under this CAFO within fifteen (15) calendar days of the receipt by Respondent of written demand from EPA for such penalties. Such penalties shall be paid in accordance with procedures set forth above for the payment of a civil penalty. If Respondent believes the demand for payment of any stipulated penalty is erroneous or contrary to law, Respondent may pursue the issue in accordance with the Dispute Resolution procedures in Paragraph 48.

49. Respondent shall pay any penalties referenced in Paragraphs 39, 43 and 44 by the method identified in Paragraph 38. Copies of all checks or written confirmation of electronic payments shall be sent the persons identified in Paragraph 42.

50. No term or condition of this CAFO shall be interpreted to require the obligation or payment of funds in violation of the Anti-Deficiency Act, 31 U.S.C. § 1341. In cases where the payment or obligation of funds would constitute a violation of the Anti-Deficiency Act, the dates established requiring the payment or obligation of such funds shall be adjusted under the Dispute Resolution procedures at Paragraph 48 of this CAFO.

51. Complainant and Respondent shall bear their own costs and attorney fees in this matter.

52. This CAFO shall be binding upon the Complainant and Respondent, their officers, directors, servants, employees, agents, successors and assigns.

53. The following individual represents EPA in this matter and is authorized to receive service for EPA in this proceeding:

Shanieka Pennamon
U.S. EPA Region 4
North Air Enforcement Section
61 Forsyth Street
Atlanta, Georgia 30303
(404) 562-9213

54. A copy of any documents that EPA files in this action shall be sent to the following attorney who represents Respondent in this matter and who is authorized to receive service for Respondent in this proceeding:

U.S. Army Aviation and Missile Command
AMSAM-L-G (Patrick G. Smith)
5300 Martin Road, Room 5464
Redstone Arsenal, AL 35898-5000
Telephone Number: (256) 313-6782

55. Each undersigned representative of the parties to this CAFO certifies that he or she is fully authorized by the party to enter into this CAFO and legally bind the party to it.

VI. EFFECTIVE DATE

56. The effective date of this CAFO shall be the date on which the CAFO is filed with the Regional Hearing Clerk.

AGREED AND CONSENTED TO:

FOR COMPLAINANT:

Date: 7/20/2010

Carol L. Kemker, Acting Director
Air, Pesticides and Toxics
Management Division
Environmental Protection
Agency, Region 4

FOR RESPONDENT:
Department of the Army,
U.S. Army Garrison- Redstone Arsenal

Date: 8/3/2010

Robert M. Pastorelli
Colonel, OD
Garrison Commander

APPROVED AND SO ORDERED:

Date: 8/31/2010

Susan B. Schub
Regional Judicial Officer
EPA, Region 4

CERTIFICATE OF SERVICE

I hereby certify that I have on this day filed the original and one copy of the foregoing Consent Agreement and Final Order and served a true and correct copy of the foregoing Consent Agreement and Final Order, **In the Matter of the Department of the Army, U.S. Army- Redstone Arsenal, Docket No. CAA-04-2010-1522(b)**, on the parties listed below in the manner indicated:

Complainant/Designee Authorized to Receive Service (Via EPA's Internal Mail)

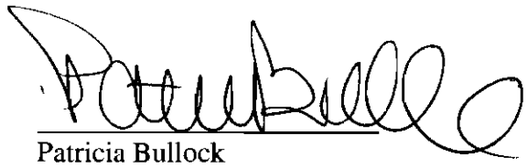
Ellen Rouch (OEA)
USEPA, Region 4
Atlanta Federal Center
61 Forsyth Street, S.W.
Atlanta, Georgia 30303

Shanieka Pennamon (AEEB) **(Via EPA's Internal Mail)**
USEPA, Region 4
Atlanta Federal Center
61 Forsyth Street, S.W.
Atlanta, Georgia 30303

Respondent/Designee **(Via United Parcel Service - Return Receipt Requested)**

Robert M. Pastorelli
Colonel, OD
Garrison Commander
U.S. Army Garrison- Redstone Arsenal
4488 Martin Road
Redstone Arsenal, Alabama 35898

9-1-10
Date



Patricia Bullock
Regional Hearing Clerk
USEPA, Region 4
Atlanta Federal Center
61 Forsyth Street, S.W.
Atlanta, Georgia 30303
(404) 562-9511

EXHIBIT A

SUPPLEMENTAL ENVIRONMENTAL PROJECT
U.S. ARMY GARRISON – REDSTONE ARSENAL
MARCH 2, 2010

The Respondent, U.S. Army Garrison – Redstone Arsenal, has proposed, as a Supplemental Environmental Project ("SEP"), to replace its two existing boilers housed in one building with a smaller, more energy efficient boiler. Exhibit A, which is attached hereto, provides a more detailed description of the proposed SEP.

The estimated cost of the SEP is $150,000, which includes costs associated with construction, operation and maintenance, and annual energy savings. These SEP costs are more fully described in Exhibit A.

CATEGORY OF SEP

This project qualifies as a SEP under the May 1, 1998 SEP Policy (the "Policy") as a Pollution Prevention SEP. Redstone Arsenal has proposed an environmental pollution prevention project. The company intends to replace old, fuel (oil fired) boilers with a smaller, more efficient, oil boiler in order to heat a building. The company has submitted emission reductions that will be achieved with the replacement of the older boilers. The SEP will reduce the generation of pollution through conservation or increased efficiency in the use of energy, water or other materials, thereby qualifying the SEP as a Pollution Prevention SEP.

ANALYSIS UNDER THE MAY 1, 1998 SEP POLICY

1. Nexus. The proposed SEP has adequate nexus. Redstone has been charged with violating 40 C.F.R Part 70, 40 C.F.R. Part 63, Subpart ZZZZ, and the State of Alabama's Administrative Code. The violations are monitoring, record keeping, reporting, and notification violations; there were no actual pollutants emitted. However, because the violations are regulated under the CAA, there is adequate nexus to the SEP because it addresses issues relevant/regulated under the CAA. Redstone's SEP involves replacing two less energy efficient oil fired boilers with a smaller, energy efficient oil boiler. Such a replacement will significantly decrease the amount of priority pollutants and formaldehyde (pollutant of concern under the MACT) and reduce the potential harm to the environment in the area. Also, the overall risk to public health and the environment is decreased because there will be an overall decrease in the amount of pollution released to the environment through the increased efficiency of the new boiler.

2. Declared Objectives. The implementation of the proposed SEP promotes the objectives of the CAA by ensuring that emissions of criteria pollutants are reduced by replacing larger, less energy efficient boilers with a smaller, more energy efficient boiler. The proposed SEP does not conflict with any provision of the CAA.

3. Lack of Federal Oversight. The proposed SEP does not require, in any manner, for the Environmental Protection Agency ("EPA") or any other Federal agency to (i) provide funds, or (ii) manage or administer the SEP. The only EPA involvement shall be to ensure that the proposed SEP is implemented in accordance with the Consent Agreement and Final Order ("CAFO") and that the EPA retains all legal recourse in the event the SEP is not completed in accordance therewith.

4. Determinative Requirement. The type and scope of the proposed SEP is determined in the CAFO and no issue remains for interpretation or negotiation after entry of the CAFO.

5. Non-EPA Project. The proposed SEP is not an activity in which the EPA is currently required to perform by any statute or act. The EPA will not be provided with additional resources under the proposed SEP to complete any action for which Congress has specifically appropriated funds to the EPA. Additionally, this proposed SEP is not an expansion of any EPA program currently in effect.

6. Performance by a Third Party. The implementation of the proposed SEP will be directly performed by the Respondent. No third party's involvement will be required for the SEP's successful implementation.

7. Oversight and Drafting Enforceable SEP. The CAFO that Respondent will enter into will require that the proposed SEP is completed within a certain timeframe and that Respondent will provide supporting documentation to illustrate the successful and timely completion of the SEP. Additionally, the CAFO shall provide that, in the event the SEP is not completed in accordance therewith Respondent will be subject to certain penalties. The CAFO shall be drafted in such a manner as to conform with the Policy requirements and to ensure its enforceability.

8. Failure of SEP and Stipulated Penalty. If the SEP is not completed within the timeframe specified in the CAFO, the Respondent will be subject to stipulated penalties in accordance with drafting guidance of the Policy.

DEPARTMENT OF THE ARMY
US ARMY INSTALLATION MANAGEMENT COMMAND
HEADQUARTERS, UNITED STATES ARMY GARRISON, REDSTONE
4488 MARTIN ROAD
REDSTONE ARSENAL, ALABAMA 35898-5000

REPLY TO
ATTENTION OF

MAR 0 2 2010

Directorate of Public Works

Ms. Shanieka Pennamon
US Environmental Protection Agency, Region 4
61 Forsyth Street, SW
Atlanta, Georgia 30303

Dear Ms. Pennamon:

In accordance with your February 9, 2010 email message, we are submitting our Supplemental Environmental Project (SEP) Formal Proposal to resolve the pending open air enforcement actions.

We request a boiler replacement project for your consideration. This project proposes the replacement of two 10.461 MMBtu/250 hp oil fired boilers with one smaller more efficient 3.350 MMBtu/80 hp oil fired boiler. The total cost for this project is approximately $152K. Enclosed are air emission reduction calculations for your review (only potential emissions were calculated). Actual emissions were not calculated due to unknown annual fuel use of the new boilers.

Due to the use of a more efficient and properly sized boiler, this project will fall in the Pollution Prevention category as it directly reduces the air emissions at the installation. An Executive Order is not required for this project and base operations support funding is being used. A Nexus exists as the project is at the site where the violation occurred. It reduces the adverse impact to public health and the environment to which the violation contributed by reducing the emissions of both hazardous air and criteria pollutants. We feel this meets the SEP guidelines.

My point of contact is Mr. Michael Wassell, Environmental Management Division (IMSE-RED-PWE), 256-876-8607, or email michael.wassell@us.army.mil.

Sincerely,

Robert M. Pastorelli
Colonel, US Army
Garrison Commander

Enclosure

Supporting Calculations for EPA SEP
Expected Boiler Emissions Reduction for Building 8028

Emissions Calculations for Current Boilers at Building 8028

1.0 Initial data needed for emission calculations for fuel oil fired boilers (< 100 MMBtu/hr)

Location (Building)	Rated Heat Input (MMBtu/hr)	Fuel Oil Usage (gal/yr)	Fuel Oil Sulfur Content (wt %)
Building 8024-1 current boiler	10.461		0.50
Building 8024-2 current boiler	10.461		
Total	20.922	-	-

Heat content of fuel oil - 139,600 Btu/gal

Emissions from Combustion of Fuel Oil

2.0 Emission factors, from AP-42, Section 1.3 Tables 1.3-1, 1.3-2, and 1.3-3 (9/98).

Constituent	Emission Factor
CO	5 lb/1000 gal fuel
NOx	20 lb/1000 gal fuel
Filterable Particulate (1)	2.00 lb/1000 gal fuel
Condensable PM (2)	1.30 lb/1000 gal fuel
SO_2	71.0 lb/1000 gal fuel
NMTOC, non-methane	0.34 lb/1000 gal fuel

(1) The particulate matter emission factors represent the filterable portion of particulate collected from Method 5 sampling filters. Condensable particulate is not included.
(2) The portion of the particulate that passes through the Method 5 filter, and condenses in the back half of the sampling system. It is all assumed to be < 10 microns in size.

3.0 Calculation of Criteria Pollutant Emission Rates.

Constituent	Annual Actual (lb/yr)	Annual Actual (ton/yr)	Hourly Potential to Emit (lb/hr)	Annual Potential to Emit (lb/yr)	Annual Potential to Emit (ton/yr)
CO	0.00	0.00	0.749	6,564	3.3
NOx	0.00	0.00	3.00	26,257	13.1
Filterable Particulate (1)	0.00	0.00	0.300	2,626	1.3
Condensable PM (2)	0.00	0.00	0.195	1,707	0.9
SO_2	0.00	0.00	10.64	93,214	46.6
NMTOC, non-methane	0.00	0.00	0.051	446	0.2

3.1 Calculation of Annual Emissions

Emission Factor (lb/1000 gal) x Fuel Usage (gal/yr) = Actual Emissions (lb/yr)
Actual Emissions (ton/yr) = Actual Emissions (lb/yr) / 2000 (lb/ton)

3.2 Calculation of Hourly PTE

Emission Factor (lb/1000 gal) x Total Heat Input (MMBtu/hr) x 10^6 / (Heating Content (Btu/gal) x 1000)
= Emissions (lb/hr)

3.3 Calculation of Annual PTE

Hourly PTE (lb/hr) x 8760 hr/yr = Potential Emissions (lb/yr)
Potential Emissions (ton/yr) = Potential Emissions (lb/yr) / 2000 (lb/ton)

4.0 Emission rate calculations for organic HAPs

Emission factors were obtained from AP-42, Section 1.3, Tables 1.3-9 (9/98).

Constituent	Emission Factor ($lb/10^3$ gal)	Annual Actual (lb/yr)	Annual Actual (ton/yr)	Hourly Potential to Emit (lb/hr)	Annual Potential to Emit (lb/yr)	Annual Potential to Emit (ton/yr)
Benzene	2.14E-04	0.00	0.00	3.21E-05	0.281	1.40E-04
Ethyl Benzene	6.36E-05	0.00	0.00	9.53E-06	0.083	4.17E-05
Formaldehyde	3.30E-02	0.00	0.00	4.95E-03	43.3	2.17E-02
Naphthalene	1.13E-03	0.00	0.00	1.69E-04	1.484	7.42E-04
1,1,1-Trichloroethane	2.36E-04	0.00	0.00	3.54E-05	0.310	1.55E-04
Toluene	6.20E-03	0.00	0.00	9.29E-04	8.14	4.07E-03
o-Xylene	1.09E-04	0.00	0.00	1.63E-05	0.143	7.16E-05
Acenaphthene	2.11E-05	0.00	0.00	3.16E-06	0.028	1.39E-05
Anthracene	1.22E-06	0.00	0.00	1.83E-07	1.60E-03	8.01E-07
Benz(a)anthracene	4.01E-06	0.00	0.00	6.01E-07	5.26E-03	2.63E-06
Benzo(b)fluoranthene	1.48E-06	0.00	0.00	2.22E-07	1.94E-03	9.72E-07
Benzo(k)fluoranthene	1.48E-06	0.00	0.00	2.22E-07	1.94E-03	9.72E-07
Benzo(g,h,i)perylene	2.26E-06	0.00	0.00	3.39E-07	2.97E-03	1.48E-06
Chrysene	2.38E-06	0.00	0.00	3.57E-07	3.12E-03	1.56E-06
Dibenzo(a,h)anthracene	1.67E-06	0.00	0.00	2.50E-07	2.19E-03	1.10E-06
Fluoranthene	4.84E-06	0.00	0.00	7.25E-07	6.35E-03	3.18E-06
Fluorene	4.47E-06	0.00	0.00	6.70E-07	5.87E-03	2.93E-06
Indeno(1,2,3-cd)pyrene	2.14E-06	0.00	0.00	3.21E-07	2.81E-03	1.40E-06
Phenanthrene	1.05E-05	0.00	0.00	1.57E-06	1.38E-02	6.89E-06
Pyrene	4.25E-06	0.00	0.00	8.37E-07	5.58E-03	2.79E-06
OCDD	3.10E-09	0.00	0.00	4.65E-10	4.07E-06	2.03E-09
Total		**0.00**	**0.00**	**0.006**	**53.8**	**2.7E-02**

4.1 Calculation of Annual Emissions

Emission Factor (lb/1000 gal) x Fuel Usage (gal/yr) = Actual Emissions (lb/yr)

Actual Emissions (ton/yr) = Actual Emissions (lb/yr) / 2000 (lb/ton)

4.2 Calculation of Hourly PTE

Emission Factor (lb/1000 gal) x Total Heat Input (MMBtu/hr) x 10^6 / (Heating Content (Btu/gal) x 1000)

= Emissions (lb/hr)

4.3 Calculation of Annual PTE

Hourly PTE (lb/hr) x 8760 hr/yr = Potential Emissions (lb/yr)

Potential Emissions (ton/yr) = Potential Emissions (lb/yr) / 2000 (lb/ton)

5.0 Emission rate calculations for inorganic HAPs

Emission factors were obtained from AP-42, Section 1.3, Table 1.3-10 (9/98).
(Emission factors in $lb/10^{12}$ Btu were converted to $lb/10^3$ gal by multiplying
$lb/10^{12}$ Btu by 140 MMBtu/10^3 gal for distillate fuel oil).

Constituent	Emission Factor ($lb/10^3$ gal)	Actual Annual (lb/yr)	Actual Annual (ton/yr)	Hourly Potential to Emit (lb/hr)	Annual Potential to Emit (lb/yr)	Annual Potential to Emit (ton/yr)
Arsenic	5.60E-04	0.00	0.00	8.39E-05	0.735	3.68E-04
Beryllium	4.20E-04	0.00	0.00	6.29E-05	0.551	2.76E-04
Cadmium	4.20E-04	0.00	0.00	6.29E-05	0.551	2.76E-04
Chromium	4.20E-04	0.00	0.00	6.29E-05	0.551	2.76E-04
Copper	8.40E-04	0.00	0.00	1.26E-04	1.103	5.51E-04
Lead	0.001	0.00	0.00	1.95E-04	1.707	8.53E-04
Manganese	8.40E-04	0.00	0.00	1.26E-04	1.103	5.51E-04
Mercury	4.20E-04	0.00	0.00	6.29E-05	0.551	2.76E-04
Nickel	4.20E-04	0.00	0.00	6.29E-05	0.551	2.76E-04
Selenium	0.002	0.00	0.00	3.15E-04	2.76	1.38E-03
Zinc	5.60E-04	0.00	0.00	8.39E-05	0.74	3.68E-04
Total		**0.00**	**0.00**	**1.24E-03**	**10.90**	**5.45E-03**

5.1 Calculation of Annual Emissions

Emission Factor (lb/1000 gal) x Fuel Usage (gal/yr) = Actual Emissions (lb/yr)

Actual Emissions (ton/yr) = Actual Emissions (lb/yr) / 2000 (lb/ton)

5.2 Calculation of Hourly PTE

Emission Factor (lb/1000 gal) x Total Heat Input (MMBtu/hr) x 10^6 / (Heating Content (Btu/gal) x 1000)

= Emissions (lb/hr)

5.3 Calculation of Annual PTE

Hourly PTE (lb/hr) x 8760 hr/yr = Potential Emissions (lb/yr)

Potential Emissions (ton/yr) = Potential Emissions (lb/yr) / 2000 (lb/ton)

Potential Emission Summary

Constituent	Annual Actual (lb/yr)	Annual Actual (ton/yr)	Hourly Potential to Emit (lb/hr)	Annual Potential to Emit (lb/yr)	Annual Potential to Emit (ton/yr)
CO	0.00	0.00	0.749	6,564	3.28
NOx	0.00	0.00	3.00	26,257	13.13
Filterable Particulate	0.00	0.00	0.300	2,626	1.31
Condensable PM	0.00	0.00	0.195	1,707	0.85
SO_2	0.00	0.00	10.64	93,214	46.61
NMTOC, non-methane	0.00	0.00	0.051	446	0.22
HAPs					
Benzene	0.00	0.00	3.21E-05	2.81E-01	1.40E-04
Ethyl Benzene	0.00	0.00	9.53E-06	8.35E-02	4.17E-05
Formaldehyde	0.00	0.00	4.95E-03	4.33E+01	2.17E-02
Naphthalene	0.00	0.00	1.69E-04	1.48E+00	7.42E-04
1,1,1-Trichloroethane	0.00	0.00	3.54E-05	3.10E-01	1.55E-04
Toluene	0.00	0.00	9.29E-04	8.14E+00	4.07E-03
o-Xylene	0.00	0.00	1.63E-05	1.43E-01	7.16E-05
Acenaphthene	0.00	0.00	3.16E-06	2.77E-02	1.39E-05
Anthracene	0.00	0.00	1.83E-07	1.60E-03	8.01E-07
Benz(a)anthracene	0.00	0.00	6.01E-07	5.26E-03	2.63E-06
Benzo(b)fluoranthene	0.00	0.00	2.22E-07	1.94E-03	9.72E-07
Benzo(k)fluoranthene	0.00	0.00	2.22E-07	1.94E-03	9.72E-07
Benzo(g,h,i)perylene	0.00	0.00	3.39E-07	2.97E-03	1.48E-06
Chrysene	0.00	0.00	3.57E-07	3.12E-03	1.56E-06
Dibenzo(a,h)anthracene	0.00	0.00	2.50E-07	2.19E-03	1.10E-06
Fluoranthene	0.00	0.00	7.25E-07	6.35E-03	3.18E-06
Fluorene	0.00	0.00	6.70E-07	5.87E-03	2.93E-06
Indeno(1,2,3-cd)pyrene	0.00	0.00	3.21E-07	2.81E-03	1.40E-06
Phenanthrene	0.00	0.00	1.57E-06	1.38E-02	6.89E-06
Pyrene	0.00	0.00	6.37E-07	5.58E-03	2.79E-06
OCDD	0.00	0.00	4.65E-10	4.07E-06	2.03E-09
Arsenic	0.00	0.00	8.39E-05	0.735	3.68E-04
Beryllium	0.00	0.00	6.29E-05	0.551	2.76E-04
Cadmium	0.00	0.00	6.29E-05	0.551	2.76E-04
Chromium	0.00	0.00	6.29E-05	0.551	2.76E-04
Copper	0.00	0.00	1.26E-04	1.103	5.51E-04
Lead	0.00	0.00	1.95E-04	1.707	8.53E-04
Manganese	0.00	0.00	1.26E-04	1.103	5.51E-04
Mercury	0.00	0.00	6.29E-05	0.551	2.76E-04
Nickel	0.00	0.00	6.29E-05	0.551	2.76E-04
Selenium	0.00	0.00	3.15E-04	2.76	1.38E-03
Zinc	0.00	0.00	8.39E-05	0.735	3.68E-04
Total HAPs	**0.00**	**0.00**	**0.007**	**64.7**	**0.032**

Supporting Calculations for EPA SEP
Expected Boiler Emissions Reduction for Building 8028

Emissions Calculations for New Boiler at Building 8028

1.0 Initial data needed for emission calculations for fuel oil fired boilers (< 100 MMBtu/hr)

Location (Building)	Rated Heat Input (MMBtu/hr)	Fuel Oil Usage (gal/yr)	Fuel Oil Sulfur Content (wt %)
Building 8024 new boiler	3.350		0.50
Total	3.350	-	-

Heat content of fuel oil - 139,600 Btu/gal

Emissions from Combustion of Fuel Oil

2.0 Emission factors, from AP-42, Section 1.3 Tables 1.3-1, 1.3-2, and 1.3-3 (9/98).

Constituent	Emission Factor
CO	5 lb/1000 gal fuel
NOx	20 lb/1000 gal fuel
Filterable Particulate (1)	2.00 lb/1000 gal fuel
Condensable PM (2)	1.30 lb/1000 gal fuel
SO_2	71.0 lb/1000 gal fuel
NMTOC, non-methane	0.34 lb/1000 gal fuel

(1) The particulate matter emission factors represent the filterable portion of particulate collected from Method 5 sampling filters. Condensable particulate is not included.
(2) The portion of the particulate that passes through the Method 5 filter, and condenses in the back half of the sampling system. It is all assumed to be < 10 microns in size.

3.0 Calculation of Criteria Pollutant Emission Rates.

Constituent	Annual Actual (lb/yr)	Annual Actual (ton/yr)	Hourly Potential to Emit (lb/hr)	Annual Potential to Emit (lb/yr)	Annual Potential to Emit (ton/yr)
CO	0.00	0.00	0.120	1,051	0.5
NOx	0.00	0.00	0.480	4,204	2.1
Filterable Particulate (1)	0.00	0.00	0.048	420	0.2
Condensable PM (2)	0.00	0.00	0.031	273	0.1
SO_2	0.00	0.00	1.704	14,925	7.5
NMTOC, non-methane	0.00	0.00	0.008	71	0.0

3.1 Calculation of Annual Emissions
Emission Factor (lb/1000 gal) x Fuel Usage (gal/yr) = Actual Emissions (lb/yr)
Actual Emissions (ton/yr) = Actual Emissions (lb/yr) / 2000 (lb/ton)

3.2 Calculation of Hourly PTE
Emission Factor (lb/1000 gal) x Total Heat Input (MMBtu/hr) x 10^6 / (Heating Content (Btu/gal) x 1000)
= Emissions (lb/hr)

3.3 Calculation of Annual PTE
Hourly PTE (lb/hr) x 8760 hr/yr = Potential Emissions (lb/yr)
Potential Emissions (ton/yr) = Potential Emissions (lb/yr) / 2000 (lb/ton)

4.0 Emission rate calculations for organic HAPs

Emission factors were obtained from AP-42, Section 1.3, Tables 1.3-9 (9/98).

Constituent	Emission Factor ($lb/10^3$ gal)	Annual Actual (lb/yr)	Annual Actual (ton/yr)	Hourly Potential to Emit (lb/hr)	Annual Potential to Emit (lb/yr)	Annual Potential to Emit (ton/yr)
Benzene	2.14E-04	0.00	0.00	5.14E-06	0.045	2.25E-05
Ethyl Benzene	6.36E-05	0.00	0.00	1.53E-06	0.013	6.68E-06
Formaldehyde	3.30E-02	0.00	0.00	7.92E-04	6.9	3.47E-03
Naphthalene	1.13E-03	0.00	0.00	2.71E-05	0.238	1.19E-04
1,1,1-Trichloroethene	2.36E-04	0.00	0.00	5.66E-06	0.050	2.48E-05
Toluene	6.20E-03	0.00	0.00	1.49E-04	1.30	6.52E-04
o-Xylene	1.09E-04	0.00	0.00	2.62E-06	0.023	1.15E-05
Acenaphthene	2.11E-05	0.00	0.00	5.06E-07	0.004	2.22E-06
Anthracene	1.22E-06	0.00	0.00	2.93E-08	2.56E-04	1.28E-07
Benz(a)anthracene	4.01E-06	0.00	0.00	9.62E-08	8.43E-04	4.21E-07
Benzo(b)fluoranthene	1.48E-06	0.00	0.00	3.55E-08	3.11E-04	1.56E-07
Benzo(k)fluoranthene	1.48E-06	0.00	0.00	3.55E-08	3.11E-04	1.56E-07
Benzo(g,h,i)perylene	2.26E-06	0.00	0.00	5.42E-08	4.75E-04	2.38E-07
Chrysene	2.38E-06	0.00	0.00	5.71E-08	5.00E-04	2.50E-07
Dibenzo(a,h)anthracene	1.67E-06	0.00	0.00	4.01E-08	3.51E-04	1.76E-07
Fluoranthene	4.84E-06	0.00	0.00	1.16E-07	1.02E-03	5.09E-07
Fluorene	4.47E-06	0.00	0.00	1.07E-07	9.40E-04	4.70E-07
Indeno(1,2,3-cd)pyrene	2.14E-06	0.00	0.00	5.14E-08	4.50E-04	2.25E-07
Phenanthrene	1.05E-05	0.00	0.00	2.52E-07	2.21E-03	1.10E-06
Pyrene	4.25E-06	0.00	0.00	1.02E-07	8.93E-04	4.47E-07
OCDD	3.10E-09	0.00	0.00	7.44E-11	6.52E-07	3.26E-10
Total		**0.00**	**0.00**	**0.001**	**8.6**	**4.3E-03**

4.1 Calculation of Annual Emissions

Emission Factor (lb/1000 gal) x Fuel Usage (gal/yr) = Actual Emissions (lb/yr)
Actual Emissions (ton/yr) = Actual Emissions (lb/yr) / 2000 (lb/ton)

4.2 Calculation of Hourly PTE

Emission Factor (lb/1000 gal) x Total Heat Input (MMBtu/hr) x 10^6 / (Heating Content (Btu/gal) x 1000)
= Emissions (lb/hr)

4.3 Calculation of Annual PTE

Hourly PTE (lb/hr) x 8760 hr/yr = Potential Emissions (lb/yr)
Potential Emissions (ton/yr) = Potential Emissions (lb/yr) / 2000 (lb/ton)

5.0 Emission rate calculations for Inorganic HAPs

Emission factors were obtained from AP-42, Section 1.3, Table 1.3-10 (9/98).
(Emission factors in $lb/10^{12}$ Btu were converted to $lb/10^3$ gal by multiplying
$lb/10^{12}$ Btu by 140 MMBtu/10^3 gal for distillate fuel oil).

Constituent	Emission Factor ($lb/10^3$ gal)	Actual Annual (lb/yr)	Actual Annual (ton/yr)	Hourly Potential to Emit (lb/hr)	Annual Potential to Emit (lb/yr)	Annual Potential to Emit (ton/yr)
Arsenic	5.60E-04	0.00	0.00	1.34E-05	0.118	5.89E-05
Beryllium	4.20E-04	0.00	0.00	1.01E-05	0.088	4.41E-05
Cadmium	4.20E-04	0.00	0.00	1.01E-05	0.088	4.41E-05
Chromium	4.20E-04	0.00	0.00	1.01E-05	0.088	4.41E-05
Copper	8.40E-04	0.00	0.00	2.02E-05	0.177	8.83E-05
Lead	0.001	0.00	0.00	3.12E-05	0.273	1.37E-04
Manganese	8.40E-04	0.00	0.00	2.02E-05	0.177	8.83E-05
Mercury	4.20E-04	0.00	0.00	1.01E-05	0.088	4.41E-05
Nickel	4.20E-04	0.00	0.00	1.01E-05	0.088	4.41E-05
Selenium	0.002	0.00	0.00	5.04E-05	0.44	2.21E-04
Zinc	5.60E-04	0.00	0.00	1.34E-05	0.12	5.89E-05
Total		**0.00**	**0.00**	**1.99E-04**	**1.74**	**8.72E-04**

5.1 Calculation of Annual Emissions

Emission Factor (lb/1000 gal) x Fuel Usage (gal/yr) = Actual Emissions (lb/yr)

Actual Emissions (ton/yr) = Actual Emissions (lb/yr) / 2000 (lb/ton)

5.2 Calculation of Hourly PTE

Emission Factor (lb/1000 gal) x Total Heat Input (MMBtu/hr) x 10^6 / (Heating Content (Btu/gal) x 1000)

= Emissions (lb/hr)

5.3 Calculation of Annual PTE

Hourly PTE (lb/hr) x 8760 hr/yr = Potential Emissions (lb/yr)

Potential Emissions (ton/yr) = Potential Emissions (lb/yr) / 2000 (lb/ton)

Potential Emission Summary

Constituent	Annual Actual (lb/yr)	Annual Actual (ton/yr)	Hourly Potential to Emit (lb/hr)	Annual Potential to Emit (lb/yr)	Annual Potential to Emit (ton/yr)
CO	0.00	0.00	0.120	1,051	0.53
NOx	0.00	0.00	0.48	4,204	2.10
Filterable Particulate	0.00	0.00	0.048	420	0.21
Condensable PM	0.00	0.00	0.031	273	0.14
SO_2	0.00	0.00	1.70	14,925	7.46
NMTOC, non-methane	0.00	0.00	0.008	71	0.04
HAPs					
Benzene	0.00	0.00	5.14E-06	4.50E-02	2.25E-05
Ethyl Benzene	0.00	0.00	1.53E-06	1.34E-02	6.68E-06
Formaldehyde	0.00	0.00	7.92E-04	6.94E+00	3.47E-03
Naphthalene	0.00	0.00	2.71E-05	2.38E-01	1.19E-04
1,1,1-Trichloroethane	0.00	0.00	5.66E-06	4.96E-02	2.48E-05
Toluene	0.00	0.00	1.49E-04	1.30E+00	6.52E-04
o-Xylene	0.00	0.00	2.62E-06	2.29E-02	1.15E-05
Acenaphthene	0.00	0.00	5.06E-07	4.44E-03	2.22E-06
Anthracene	0.00	0.00	2.93E-06	2.56E-04	1.28E-07
Benz(a)anthracene	0.00	0.00	9.62E-08	8.43E-04	4.21E-07
Benzo(b)fluoranthene	0.00	0.00	3.55E-06	3.11E-04	1.56E-07
Benzo(k)fluoranthene	0.00	0.00	3.55E-06	3.11E-04	1.56E-07
Benzo(g,h,i)perylene	0.00	0.00	5.42E-06	4.75E-04	2.38E-07
Chrysene	0.00	0.00	5.71E-06	5.00E-04	2.50E-07
Dibenzo(a,h)anthracene	0.00	0.00	4.01E-06	3.51E-04	1.76E-07
Fluoranthene	0.00	0.00	1.16E-07	1.02E-03	5.09E-07
Fluorene	0.00	0.00	1.07E-07	9.40E-04	4.70E-07
Indeno(1,2,3-cd)pyrene	0.00	0.00	5.14E-06	4.50E-04	2.25E-07
Phenanthrene	0.00	0.00	2.52E-07	2.21E-03	1.10E-06
Pyrene	0.00	0.00	1.02E-07	8.93E-04	4.47E-07
OCDD	0.00	0.00	7.44E-11	6.52E-07	3.26E-10
Arsenic	0.00	0.00	1.34E-05	0.118	5.89E-05
Beryllium	0.00	0.00	1.01E-05	0.088	4.41E-05
Cadmium	0.00	0.00	1.01E-05	0.088	4.41E-05
Chromium	0.00	0.00	1.01E-05	0.088	4.41E-05
Copper	0.00	0.00	2.02E-05	0.177	8.83E-05
Lead	0.00	0.00	3.12E-05	0.273	1.37E-04
Manganese	0.00	0.00	2.02E-05	0.177	8.83E-05
Mercury	0.00	0.00	1.01E-05	0.088	4.41E-05
Nickel	0.00	0.00	1.01E-05	0.088	4.41E-05
Selenium	0.00	0.00	5.04E-05	0.44	2.21E-04
Zinc	0.00	0.00	1.34E-05	0.118	5.89E-05
Total HAPs	**0.00**	**0.00**	**0.001**	**10.4**	**0.005**

Supporting Calculations for EPA SEP

Expected Boiler Emissions Reduction for Building 8028

Emissions Reduction Summary

Constituent	Current Boilers Annual Actual (lbs/yr)	New Boilers Annual Actual (lbs/yr)	Expected Reductions Annual Actual (lbs/yr)	Current Boilers Annual Potential (lbs/yr)	New Boilers Annual Potential (lbs/yr)	Expected Reductions Annual Potential (lbs/yr)
CO	0	0	0	6,564	1,051	5,513
NOx	0	0	0	26,257	4,204	22,053
Filterable Particulate	0	0	0	2,628	420	2,205
Condensable PM	0	0	0	1,707	273	1,433
SO_2	0	0	0	93,214	14,925	78,289
NMTOC, non-methane	0	0	0	446	71	375
HAPs						
Benzene	0.00E+00	0.00E+00	0.00E+00	2.81E-01	4.50E-02	2.36E-01
Ethyl Benzene	0.00E+00	0.00E+00	0.00E+00	8.35E-02	1.34E-02	7.01E-02
Formaldehyde	0.00E+00	0.00E+00	0.00E+00	4.33E+01	6.94E+00	3.64E+01
Naphthalene	0.00E+00	0.00E+00	0.00E+00	1.48E+00	2.38E-01	1.25E+00
1,1,1-Trichloroethane	0.00E+00	0.00E+00	0.00E+00	3.10E-01	4.96E-02	2.60E-01
Toluene	0.00E+00	0.00E+00	0.00E+00	8.14E+00	1.30E+00	6.84E+00
o-Xylene	0.00E+00	0.00E+00	0.00E+00	1.43E-01	2.29E-02	1.20E-01
Acenaphthene	0.00E+00	0.00E+00	0.00E+00	2.77E-02	4.44E-03	2.33E-02
Anthracene	0.00E+00	0.00E+00	0.00E+00	1.60E-03	2.56E-04	1.35E-03
Benz(a)anthracene	0.00E+00	0.00E+00	0.00E+00	5.26E-03	8.43E-04	4.42E-03
Benzo(b)fluoranthene	0.00E+00	0.00E+00	0.00E+00	1.94E-03	3.11E-04	1.63E-03
Benzo(k)fluoranthene	0.00E+00	0.00E+00	0.00E+00	1.94E-03	3.11E-04	1.63E-03
Benzo(g,h,i)perylene	0.00E+00	0.00E+00	0.00E+00	2.97E-03	4.75E-04	2.49E-03
Chrysene	0.00E+00	0.00E+00	0.00E+00	3.12E-03	5.00E-04	2.62E-03
Dibenzo(a,h)anthracene	0.00E+00	0.00E+00	0.00E+00	2.19E-03	3.51E-04	1.84E-03
Fluoranthene	0.00E+00	0.00E+00	0.00E+00	6.35E-03	1.02E-03	5.34E-03
Fluorene	0.00E+00	0.00E+00	0.00E+00	5.87E-03	9.40E-04	4.93E-03
Indeno(1,2,3-cd)pyrene	0.00E+00	0.00E+00	0.00E+00	2.81E-03	4.50E-04	2.36E-03
Phenanthrene	0.00E+00	0.00E+00	0.00E+00	1.38E-02	2.21E-03	1.16E-02
Pyrene	0.00E+00	0.00E+00	0.00E+00	5.58E-03	8.93E-04	4.69E-03
OCDD	0.00E+00	0.00E+00	0.00E+00	4.07E-06	6.52E-07	3.42E-06
Arsenic	0.00E+00	0.00E+00	0.00E+00	7.35E-01	1.18E-01	6.17E-01
Beryllium	0.00E+00	0.00E+00	0.00E+00	5.51E-01	8.83E-02	4.63E-01
Cadmium	0.00E+00	0.00E+00	0.00E+00	5.51E-01	8.83E-02	4.63E-01
Chromium	0.00E+00	0.00E+00	0.00E+00	5.51E-01	8.83E-02	4.63E-01
Copper	0.00E+00	0.00E+00	0.00E+00	1.10E+00	1.77E-01	9.26E-01
Lead	0.00E+00	0.00E+00	0.00E+00	1.71E+00	2.73E-01	1.43E+00
Manganese	0.00E+00	0.00E+00	0.00E+00	1.10E+00	1.77E-01	9.26E-01
Mercury	0.00E+00	0.00E+00	0.00E+00	5.51E-01	8.83E-02	4.63E-01
Nickel	0.00E+00	0.00E+00	0.00E+00	5.51E-01	8.83E-02	4.63E-01
Selenium	0.00E+00	0.00E+00	0.00E+00	2.76E+00	4.41E-01	2.32E+00
Zinc	0.00E+00	0.00E+00	0.00E+00	7.35E-01	1.18E-01	6.17E-01
Total HAPs	0.00	0.00	0.00	64.74	10.37	54.38

DEPARTMENT OF THE ARMY
US ARMY INSTALLATION MANAGEMENT COMMAND
HEADQUARTERS, UNITED STATES ARMY GARRISON, REDSTONE
4488 MARTIN ROAD
REDSTONE ARSENAL, ALABAMA 35898-5000

REPLY TO
ATTENTION OF

APR 07 2010

Directorate of Public Works

Ms. Shanieka Pennamon
Air Enforcement Section
US Environmental Protection Agency, Region 4
61 Forsyth Street, SW
Atlanta, Georgia 30303

Dear Ms. Pennamon:

The Directorate of Public Works, Environmental Management Division submits their responses to the questions contained in the email from US Environmental Protection Agency (EPA), Air Pesticides and Toxics Management Division, March 29, 2010, subject: SEP Project.

My point of contact is Mr. Michael Wassell, Environmental Management Division, (IMSE-RED-PWE), 256-876-8607, or email michael.wassell@us.army.mil.

Sincerely,

Robert M. Pastorelli
Colonel, US Army
Garrison Commander

Enclosures

Response to Email:

EPA has approved the SEP. However, the following information needs to be included with the SEP so as to be deemed complete.

-Redstone needs to provide a more substantial paper trail for the funding that clearly indicates that the funding for the SEP is base operations money and not American Reinvestment and Recovery Act (ARRA) money. **The base operations contractor pays for all material and labor until the job is complete then they invoice the government for payment. We will be able to document the money trail after we are invoiced for the job.**

-Please provide a schedule of construction for the project (order of supplies (i.e. boilers), demolition, installation, completion date, etc.) **See attachment 1**

-Please note that there is a reporting element associated with the SEP Project (i.e. Interim reports every 6 months and a completion report within 60 days of project completion). **Noted**

-Please breakout capital and other onetime costs associated with the project (this may just be the cost of the SEP). **See attachment 1**

-Please provide any annually recurring cost associated with the SEP project. **See attachment 2**

-Please provide an estimate of annual actual emissions for the boilers being replaced. **See Attachment 3**

PROJECT COST ESTIMATE

PROJECT ENGINEER	DESCRIPTION OF PROJECT	DWG. NRS.	DATE
	ROM ESTIMATE TO DEMO TWO BOILERS AND INSTALL ONE NEW 80HP FUEL FIRED STEAM BOILER.		03-30-2010
REQUEST NUMBER			PAGE 1 OF 1
BUILDING NUMBER 8028			ESTIMATED BY BROOKS

ITEM	DESCRIPTION OF ITEM	UNIT	QUAN.	MATERIAL		LABOR		TOTAL MATL. & LABOR COST
				UNIT COST	TOTAL	UNIT COST	TOTAL	
1	DEMO TWO BOILERS, FURNISH AND INSTALL ONE NEW 80HP CLEAVER BROOKS STEAM BOILER FIRING #2 FUEL OIL WITH GAS PILOT IN LIEU OF DIRECT SPARK. FURNISH AND INSTALL NEW DOUBLE WALL UL LISTED PRESSURE VENT AS NEEDED, FURNISH AND INSTALL ASSOCIATED PIPING, VALVES, FITTINGS, DISCONNECTS, FUSES, CONDUIT, WIRING AS NEEDED.	1	EA		$71,898.00		$78,102.00	$150k
2	DEMO STARTED ON: 03-24-2010							
3	DEMO COMPLETION: APPROX. 04-16-2010							
4	INSTALLATION START DATE: APPROX. 04-16- 2010							
5	COMPLETION DATE: APPROX. 05-17- 2010							
6	ANNUAL BOILER INSPECTIONS SCHEDULED AROUND 04-1- 2010							
	BOILER ORDERED ON 12-10-09							

AMSMI-RA FORM 36-1. 1 DEC 85 REPLACED DRSMI-K FORM 36-1 WHICH MAY BE USED

ANNUAL OPERATING COST FOR NEW BOILER AT BUILDING 8028

Operator	25,380
Fuel Oil	83,100
TOTAL	108,480

Fuel oil cost based on an estimates use of 30,000 gal/yr
at $2.77/gal (current pricing).

Encl 2

Actual Emissions Calculations for Building 8028 Boiler

1 **Initial data needed for emission calculations for Large Fuel Oil Boilers (< 100 MMBtu/hr)**

Location (Building)	Actual Rated Heat Input (MMBtu/hr)	Potential Rated Heat Input (MMBtu/hr)	Fuel Oil Usage (gal/yr)	Fuel Oil Sulfur Content (wt %)
8028 #1	10.461	10.461	100,668	0.50
Total	**10.461**	**10.461**	**100,668**	–
Fuel Usage is for 01 Jan 2009 to 01 Jan 2010				

Heat content of fuel oil - 139,600 Btu/gal

Emissions from Combustion of Fuel Oil

2 Emission factors, from AP-42, Section 1.3 Tables 1.3-1 and 1.3-2, Commercial/Institutional/ Residential Heating Units (9/98)

Constituent	Emission Factor
CO	5 lb/1000 gal fuel
NO_2	20 lb/1000 gal fuel
PM-10 (1)	2.38 lb/1000 gal fuel
PM-2.5 (1)	2.13 lb/1000 gal fuel
SO_2	71 lb/1000 gal fuel
VOC, non-methane	0.34 lb/1000 gal fuel

(1) The particulate metter emission factors were derived by adding together the applicable filterable particulate matter emission factors and the applicable condensable particulate emission factors (Tables 1.3-2 and 1.3-7 of AP-42, 9/98).

3 Calculation of Criteria Pollutant Emission Rates.

Constituent	Annual Actual (lb/yr)
CO	503
NO_2	2,013
PM-10	240
PM-2.5	214
SO_2	7,147
VOC	34.2

3.1 **Calculation of Annual Emissions**
Emission Factor (lb/1000 gal) x Fuel Usage (gal/yr) = Actual Emissions (lb/yr)

Enc 1 3

4 Emission rate calculations for organic HAPs

Emission factors were obtained from AP-42, Section 1.3, Tables 1.3-8 and 1.3-9, Distillate Fuel Oil Combustion Sources (9/98).

Constituent	Emission Factor ($lb/10^3$ gal)	Annual Actual (lb/yr)
Formaldehyde	0.048	4.83
Polycyclic Organic Matter	0.003	0.33
Benzene	2.14E-04	0.022
Ethylbenzene	6.36E-05	0.006
Methyl Chloroform (1,1,1-trichloroethane)	2.36E-04	0.024
Naphthalene	1.13E-03	0.114
Toluene	0.006	0.62
O-Xylene	1.09E-04	0.011
Total		**6.0**

4.1 Calculation of Annual Emissions
Emission Factor (lb/1000 gal) x Fuel Usage (gal/yr) = Actual Emissions (lb/yr)

5 Emission rate calculations for inorganic HAPs

Emission factors were obtained from AP-42, Section 1.3, Table 1.3-10, Distillate Fuel Oil Combustion Sources (9/98). Emission factors in $lb/10^{14}$ Btu were converted to $lb/10^3$ gal by multiplying $lb/10^{14}$ Btu by 140 $MMBtu/10^3$ gal for distillate fuel oil).

Constituent	Emission Factor ($lb/10^3$ gal)	Actual Annual (lb/yr)
Arsenic	5.58E-04	0.06
Beryllium	4.19E-04	0.04
Cadmium	4.19E-04	0.04
Chromium	4.19E-04	0.04
Lead	0.001	0.13
Manganese	8.38E-04	0.08
Mercury	4.19E-04	0.04
Nickel	4.19E-04	0.04
Selenium	0.002	0.21
Total		**0.69**

5.1 Calculation of Annual Emissions
Emission Factor (lb/1000 gal) x Fuel Usage (gal/yr) = Actual Emissions (lb/yr)

Summary of Emissions

Constituent	Actual Annual Emissions (lb/yr)
CO	503.3
NO_2	2,013
PM-10	239.6
PM-2.5	214.4
SO_2	7,147
VOC	34.23
HAPs	
Benzene	2.15E-02
Ethylbenzene	0.006
Formaldehyde	4.83
Napthalene	0.114
Toluene	0.62
Methyl Chloroform	0.024
O-Xylene	0.011
Polycyclic Organic Matter	0.332
Arsenic	0.056
Beryllium	0.042
Cadmium	0.042
Chromium	0.042
Lead	0.126
Manganese	0.084
Mercury	0.042
Nickel	0.042
Selenium	0.211
Total HAPs	**6.65**

DEPARTMENT OF THE ARMY
US ARMY INSTALLATION MANAGEMENT COMMAND
HEADQUARTERS, UNITED STATES ARMY GARRISON, REDSTONE
4488 MARTIN ROAD
REDSTONE ARSENAL, ALABAMA 35898-5000

REPLY TO
ATTENTION OF

_ 3 2010

Directorate of Public Works

Ms. Shanieka Pennamon
Air Enforcement Section
US Environmental Protection Agency, Region 4
61 Forsyth Street, SW
Atlanta, Georgia 30303

Dear Ms. Pennamon:

The Directorate of Public Works, Environmental Management Division submits their responses to the questions contained in the email from US Environmental Protection Agency (EPA), Air Pesticides and Toxics Management Division, April 7, 2010, subject: Redstone SEP Questions.

My point of contact is Mr. Michael Wassell, Environmental Management Division (IMSE-RED-PWE), 256-876-8607, or email michael.wassell@us.army.mil.

Sincerely,

Appreciate your support
v/r
COL P

Robert M. Pastorelli
Colonel, US Army
Garrison Commander

Enclosures

Response to Email:

-Is Bldg. 8028 #1 boiler the new boiler or a replacement? Is the new boiler going into the same building that the old boilers are being removed from? **The new boiler is going in the same building as the old boiler. Both boilers are designated as 8028 #1 because they are in the same building.**

-For the supplemental information submitted on April 1, 2010, are the calculations for the new boiler or an old boiler. I couldn't tell because the heat input rating is 10.461 MMbtu/hr which should match the old boilers? (See Redstone's Attachment 3) **The calculations submitted on April 1, 2010 are for the old boiler. The old boilers are 10.461 MMBtu/hr and the new boilers are 3.36 MMBtu/hr.**

-Please include actual (estimates) of emissions for both old boilers and the new boiler. The April submittal only included actual emissions for the 8028 #1 boiler. **See attachment 1.**

- What work is currently underway? It looks like demolition of the old boilers is underway and will be complete on April 16, 2010. At which time the new boiler will be installed. What's the annul boiler inspection scheduled around April 1, 2010. Is that part of this project? **The old boilers are in the process of being removed and will be complete on April 16, 2010. The new boiler is on site and will be installed after the old boiler is removed. The boiler inspection is not part of this project. The annual boiler inspection is done each year. Those inspections typically start around April 14 th. The next boiler inspection will be 14-15 April with 25 boilers scheduled for inspection.**

-What was the cost of the new boiler ordered on December 10, 2009? It is an oil fired boiler and not a natural gas boiler? **The cost of the new boiler is $68,398.54. The new boiler is an oil fired boiler with propane pilot.**

-Does Redstone have any idea what the annual costs savings will be with the new boiler? **The cost savings will be the difference in the cost of the 100,000 gallons of fuel consumed by the old boiler at 8028 and the 30,000 gallons estimated to be used annually by the new 80 HP replacement boiler being installed. Fuel oil cost $2.77 a gallon which makes the cost savings of $193,000.00 annually.**

-Has the new boiler been permitted? If in the process, please send a copy of the permit application. **The new boiler has not been permitted yet however the permit application has been submitted. A copy of the permit application and draft permit can be found in attachment 2.**

Supporting Calculations for EPA SEP
Expected Boiler Emissions Reduction for Building 8028

Emissions Calculations for Current Boilers at Building 8028

1.0 Initial data needed for emission calculations for fuel oil fired boilers (< 100 MMBtu/hr)

Location (Building)	Rated Heat Input (MMBtu/hr)	Fuel Oil Usage (gal/yr)	Fuel Oil Sulfur Content (wt %)
Building 8024-1 current boiler	10.461	100,668	0.50
Total	10.461	100,668	-
Fuel Usage is for 01 Jan 2009 to 01 Jan 2010			

Heat content of fuel oil - 139,600 Btu/gal

Emissions from Combustion of Fuel Oil

2.0 Emission factors, from AP-42, Section 1.3 Tables 1.3-1, 1.3-2, and 1.3-3 (9/98).

Constituent	Emission Factor
CO	5 lb/1000 gal fuel
NOx	20 lb/1000 gal fuel
Filterable Particulate (1)	2.00 lb/1000 gal fuel
Condensable PM (2)	1.30 lb/1000 gal fuel
SO_2	71.0 lb/1000 gal fuel
NMTOC, non-methane	0.34 lb/1000 gal fuel

(1) The particulate matter emission factors represent the filterable portion of particulate collected from Method 5 sampling filters. Condensable particulate is not included.
(2) The portion of the particulate that passes through the Method 5 filter, and condenses in the back half of the sampling system. It is all assumed to be < 10 microns in size.

3.0 Calculation of Criteria Pollutant Emission Rates.

Constituent	Annual Actual (lb/yr)	Annual Actual (ton/yr)
CO	503.34	0.25
NOx	2013.36	1.01
Filterable Particulate (1)	201.34	0.10
Condensable PM (2)	130.87	0.07
SO_2	7147.43	3.57
NMTOC, non-methane	34.23	0.02

3.1 Calculation of Annual Emissions
Emission Factor (lb/1000 gal) x Fuel Usage (gal/yr) = Actual Emissions (lb/yr)
Actual Emissions (ton/yr) = Actual Emissions (lb/yr) / 2000 (lb/ton)

3.2 Calculation of Hourly PTE
Emission Factor (lb/1000 gal) x Total Heat Input (MMBtu/hr) x 10^6 / (Heating Content (Btu/gal) x 1000)
= Emissions (lb/hr)

3.3 Calculation of Annual PTE
Hourly PTE (lb/hr) x 8760 hr/yr = Potential Emissions (lb/yr)
Potential Emissions (ton/yr) = Potential Emissions (lb/yr) / 2000 (lb/ton)

F. / /

4.0 Emission rate calculations for organic HAPs

Emission factors were obtained from AP-42, Section 1.3, Tables 1.3-9 (9/98).

Constituent	Emission Factor ($lb/10^3$ gal)	Annual Actual (lb/yr)	Annual Actual (ton/yr)
Benzene	2.14E-04	2.15E-02	1.08E-05
Ethyl Benzene	6.36E-05	6.40E-03	3.20E-06
Formaldehyde	3.30E-02	3.32E+00	1.66E-03
Naphthalene	1.13E-03	1.14E-01	5.69E-05
1,1,1-Trichloroethane	2.36E-04	2.38E-02	1.19E-05
Toluene	6.20E-03	6.24E-01	3.12E-04
o-Xylene	1.09E-04	1.10E-02	5.49E-06
Acenaphthene	2.11E-05	2.12E-03	1.06E-06
Anthracene	1.22E-06	1.23E-04	6.14E-08
Benz(a)anthracene	4.01E-06	4.04E-04	2.02E-07
Benzo(b)fluoranthene	1.48E-06	1.49E-04	7.45E-08
Benzo(k)fluoranthene	1.48E-06	1.49E-04	7.45E-08
Benzo(g,h,i)perylene	2.26E-06	2.28E-04	1.14E-07
Chrysene	2.38E-06	2.40E-04	1.20E-07
Dibenzo(a,h)anthracene	1.67E-06	1.68E-04	8.41E-08
Fluoranthene	4.84E-06	4.87E-04	2.44E-07
Fluorene	4.47E-06	4.50E-04	2.25E-07
Indeno(1,2,3-cd)pyrene	2.14E-06	2.15E-04	1.08E-07
Phenanthrene	1.05E-05	1.06E-03	5.29E-07
Pyrene	4.25E-06	4.28E-04	2.14E-07
OCDD	3.10E-09	3.12E-07	1.56E-10
Total		**4.13**	**2.06E-03**

4.1 Calculation of Annual Emissions

Emission Factor (lb/1000 gal) x Fuel Usage (gal/yr) = Actual Emissions (lb/yr)

Actual Emissions (ton/yr) = Actual Emissions (lb/yr) / 2000 (lb/ton)

4.2 Calculation of Hourly PTE

Emission Factor (lb/1000 gal) x Total Heat Input (MMBtu/hr) x 10^6 / (Heating Content (Btu/gal) x 1000) = Emissions (lb/hr)

4.3 Calculation of Annual PTE

Hourly PTE (lb/hr) x 8760 hr/yr = Potential Emissions (lb/yr)

Potential Emissions (ton/yr) = Potential Emissions (lb/yr) / 2000 (lb/ton)

5.0 Emission rate calculations for Inorganic HAPs

Emission factors were obtained from AP-42, Section 1.3, Table 1.3-10 (9/98).
(Emission factors in $lb/10^{12}$ Btu were converted to $lb/10^3$ gal by multiplying $lb/10^{12}$ Btu by 140 $MMBtu/10^3$ gal for distillate fuel oil).

Constituent	Emission Factor ($lb/10^3$ gal)	Actual Annual (lb/yr)	Actual Annual (ton/yr)
Arsenic	5.60E-04	5.64E-02	2.82E-05
Beryllium	4.20E-04	4.23E-02	2.11E-05
Cadmium	4.20E-04	4.23E-02	2.11E-05
Chromium	4.20E-04	4.23E-02	2.11E-05
Copper	8.40E-04	8.46E-02	4.23E-05
Lead	0.001	1.31E-01	6.54E-05
Manganese	8.40E-04	8.46E-02	4.23E-05
Mercury	4.20E-04	4.23E-02	2.11E-05
Nickel	4.20E-04	4.23E-02	2.11E-05
Selenium	0.002	2.11E-01	1.06E-04
Zinc	5.60E-04	5.64E-02	2.82E-05
Total		**0.84**	**4.18E-04**

5.1 Calculation of Annual Emissions

Emission Factor (lb/1000 gal) x Fuel Usage (gal/yr) = Actual Emissions (lb/yr)

Actual Emissions (ton/yr) = Actual Emissions (lb/yr) / 2000 (lb/ton)

5.2 Calculation of Hourly PTE

Emission Factor (lb/1000 gal) x Total Heat Input (MMBtu/hr) x 10^6 / (Heating Content (Btu/gal) x 1000)

= Emissions (lb/hr)

5.3 Calculation of Annual PTE

Hourly PTE (lb/hr) x 8760 hr/yr = Potential Emissions (lb/yr)

Potential Emissions (ton/yr) = Potential Emissions (lb/yr) / 2000 (lb/ton)

Potential Emission Summary

Constituent	Annual Actual (lb/yr)	Annual Actual (ton/yr)
CO	503.34	0.25
NOx	2,013.36	1.01
Filterable Particulate	201.34	0.10
Condensable PM	130.87	0.07
SO_2	7,147.43	3.57
NMTOC, non-methane	34.23	0.02
HAPs		
Benzene	2.15E-02	1.08E-05
Ethyl Benzene	6.40E-03	3.20E-06
Formaldehyde	3.32E+00	1.66E-03
Naphthalene	1.14E-01	5.69E-05
1,1,1-Trichloroethane	2.38E-02	1.19E-05
Toluene	6.24E-01	3.12E-04
o-Xylene	1.10E-02	5.49E-06
Acenaphthene	2.12E-03	1.06E-06
Anthracene	1.23E-04	6.14E-08
Benz(a)anthracene	4.04E-04	2.02E-07
Benzo(b)fluoranthene	1.49E-04	7.45E-08
Benzo(k)fluoranthene	1.49E-04	7.45E-08
Benzo(g,h,i)perylene	2.28E-04	1.14E-07
Chrysene	2.40E-04	1.20E-07
Dibenzo(a,h)anthracene	1.68E-04	8.41E-08
Fluoranthene	4.87E-04	2.44E-07
Fluorene	4.50E-04	2.25E-07
Indeno(1,2,3-cd)pyrene	2.15E-04	1.08E-07
Phenanthrene	1.06E-03	5.29E-07
Pyrene	4.28E-04	2.14E-07
OCDD	3.12E-07	1.56E-10
Arsenic	5.64E-02	2.82E-05
Beryllium	4.23E-02	2.11E-05
Cadmium	4.23E-02	2.11E-05
Chromium	4.23E-02	2.11E-05
Copper	8.46E-02	4.23E-05
Lead	1.31E-01	6.54E-05
Manganese	8.46E-02	4.23E-05
Mercury	4.23E-02	2.11E-05
Nickel	4.23E-02	2.11E-05
Selenium	2.11E-01	1.06E-04
Zinc	5.64E-02	2.82E-05
Total HAPs	**4.96**	**2.48E-03**

Supporting Calculations for EPA SEP
Expected Boiler Emissions Reduction for Building 8028

Emissions Calculations for New Boiler at Building 8028

1.0 Initial data needed for emission calculations for fuel oil fired boilers (< 100 MMBtu/hr)

Location (Building)	Rated Heat Input (MMBtu/hr)	Fuel Oil Usage (gal/yr)	Fuel Oil Sulfur Content (wt %)
Building 8024 new boiler	3.360	30,000	0.50
Total	3.360	30,000	-
Fuel usage is estimated			

Heat content of fuel oil - 139,600 Btu/gal

Emissions from Combustion of Fuel Oil

2.0 Emission factors, from AP-42, Section 1.3 Tables 1.3-1, 1.3-2, and 1.3-3 (9/98).

Constituent	Emission Factor
CO	5 lb/1000 gal fuel
NOx	20 lb/1000 gal fuel
Filterable Particulate (1)	2.00 lb/1000 gal fuel
Condensable PM (2)	1.30 lb/1000 gal fuel
SO_2	71.0 lb/1000 gal fuel
NMTOC, non-methane	0.34 lb/1000 gal fuel

(1) The particulate matter emission factors represent the filterable portion of particulate collected from Method 5 sampling fitent. Condensable particulate is not included.
(2) The portion of the particulate that passes through the Method 5 filter, and condenses in the back half of the sampling system. It is all assumed to be < 10 microns in size.

3.0 Calculation of Criteria Pollutant Emission Rates.

Constituent	Annual Actual (lb/yr)	Annual Actual (ton/yr)
CO	150.00	0.08
NOx	600.00	0.30
Filterable Particulate (1)	60.00	0.03
Condensable PM (2)	39.00	0.02
SO_2	2130.00	1.07
NMTOC, non-methane	10.20	0.01

3.1 Calculation of Annual Emissions
Emission Factor (lb/1000 gal) x Fuel Usage (gal/yr) = Actual Emissions (lb/yr)
Actual Emissions (ton/yr) = Actual Emissions (lb/yr) / 2000 (lb/ton)

3.2 Calculation of Hourly PTE
Emission Factor (lb/1000 gal) x Total Heat Input (MMBtu/hr) x 10^6 / (Heating Content (Btu/gal) x 1000)
= Emissions (lb/hr)

3.3 Calculation of Annual PTE
Hourly PTE (lb/hr) x 8760 hr/yr = Potential Emissions (lb/yr)
Potential Emissions (ton/yr) = Potential Emissions (lb/yr) / 2000 (lb/ton)

4.0 Emission rate calculations for organic HAPs

Emission factors were obtained from AP-42, Section 1.3, Tables 1 3-9 (9/98).

Constituent	Emission Factor ($lb/10^3$ gal)	Annual Actual (lb/yr)	Annual Actual (ton/yr)
Benzene	2.14E-04	6 42E-03	3 21E-06
Ethyl Benzene	6.36E-05	1 91E-03	9.54E-07
Formaldehyde	3 30E-02	9 90E-01	4.95E-04
Naphthalene	1 13E-03	3 39E-02	1 70E-05
1,1,1-Trichloroethane	2.36E-04	7 08E-03	3 54E-06
Toluene	6 20E-03	1 86E-01	9 30E-05
o-Xylene	1.09E-04	3 27E-03	1 64E-06
Acenaphthene	2.11E-05	6 33E-04	3.17E-07
Anthracene	1 22E-06	3 66E-05	1.83E-08
Benz(a)anthracene	4 01E-06	1 20E-04	6 02E-08
Benzo(b)fluoranthene	1 48E-06	4 44E-05	2.22E-08
Benzo(k)fluoranthene	1 48E-06	4.44E-05	2 22E-08
Benzo(g,h,i)perylene	2.26E-06	6.78E-05	3.39E-08
Chrysene	2.38E-06	7.14E-05	3 57E-08
Dibenzo(a,h)anthracene	1.67E-06	5.01E-05	2.51E-08
Fluoranthene	4.84E-06	1 45E-04	7 26E-08
Fluorene	4.47E-06	1 34E-04	6.71E-08
Indeno(1,2,3-cd)pyrene	2.14E-06	6.42E-05	3.21E-08
Phenanthrene	1.05E-05	3.15E-04	1.58E-07
Pyrene	4 25E-06	1 28E-04	6 38E-08
OCDD	3.10E-09	9.30E-08	4.65E-11
Total		**1.23**	**6.15E-04**

4.1 Calculation of Annual Emissions

Emission Factor (lb/1000 gal) x Fuel Usage (gal/yr) = Actual Emissions (lb/yr)
Actual Emissions (ton/yr) = Actual Emissions (lb/yr) / 2000 (lb/ton)

4.2 Calculation of Hourly PTE

Emission Factor (lb/1000 gal) x Total Heat Input (MMBtu/hr) x 10^6 / (Heating Content (Btu/gal) x 1000)
= Emissions (lb/hr)

4.3 Calculation of Annual PTE

Hourly PTE (lb/hr) x 8760 hr/yr = Potential Emissions (lb/yr)
Potential Emissions (ton/yr) = Potential Emissions (lb/yr) / 2000 (lb/ton)

5.0 Emission rate calculations for inorganic HAPs

Emission factors were obtained from AP-42, Section 1 3, Table 1 3-10 (9/98).
(Emission factors in $lb/10^{12}$ Btu were converted to $lb/10^3$ gal by multiplying
$lb/10^{12}$ Btu by 140 $MMBtu/10^3$ gal for distillate fuel oil).

Constituent	Emission Factor ($lb/10^3$ gal)	Actual Annual (lb/yr)	Actual Annual (ton/yr)
Arsenic	5 60E-04	0.02	8.40E-06
Beryllium	4.20E-04	0.01	6.30E-06
Cadmium	4 20E-04	0.01	6.30E-06
Chromium	4.20E-04	0.01	6.30E-06
Copper	8.40E-04	0.03	1.26E-05
Lead	0.001	0 04	1 95E-05
Manganese	8.40E-04	0 03	1 26E-05
Mercury	4 20E-04	0.01	6 30E-06
Nickel	4.20E-04	0.01	6.30E-06
Selenium	0.002	0 06	3.15E-05
Zinc	5 60E-04	0.02	8 40E-06
Total		**0.25**	**1.25E-04**

5.1 Calculation of Annual Emissions

Emission Factor (lb/1000 gal) x Fuel Usage (gal/yr) = Actual Emissions (lb/yr)

Actual Emissions (ton/yr) = Actual Emissions (lb/yr) / 2000 (lb/ton)

5.2 Calculation of Hourly PTE

Emission Factor (lb/1000 gal) x Total Heat Input (MMBtu/hr) x 10^6 / (Heating Content (Btu/gal) x 1000)

= Emissions (lb/hr)

5.3 Calculation of Annual PTE

Hourly PTE (lb/hr) x 8760 hr/yr = Potential Emissions (lb/yr)

Potential Emissions (ton/yr) = Potential Emissions (lb/yr) / 2000 (lb/ton)

Potential Emission Summary

Constituent	Annual Actual (lb/yr)	Annual Actual (ton/yr)
CO	150.00	0.08
NOx	600.00	0.30
Filterable Particulate	60.00	0.03
Condensable PM	39.00	0.02
SO_2	2,130.00	1.07
NMTOC, non-methane	10.20	0.01
HAPs		
Benzene	6.42E-03	3.21E-06
Ethyl Benzene	1.91E-03	9.54E-07
Formaldehyde	9.90E-01	4.95E-04
Naphthalene	3.39E-02	1.70E-05
1,1,1-Trichloroethene	7.08E-03	3.54E-06
Toluene	1.86E-01	9.30E-05
o-Xylene	3.27E-03	1.64E-06
Acenaphthene	6.33E-04	3.17E-07
Anthracene	3.66E-05	1.83E-08
Benz(a)anthracene	1.20E-04	6.02E-08
Benzo(b)fluoranthene	4.44E-05	2.22E-08
Benzo(k)fluoranthene	4.44E-05	2.22E-08
Benzo(g,h,i)perylene	6.78E-05	3.39E-08
Chrysene	7.14E-05	3.57E-08
Dibenzo(a,h)anthracene	5.01E-05	2.51E-08
Fluoranthene	1.45E-04	7.26E-08
Fluorene	1.34E-04	6.71E-08
Indeno(1,2,3-cd)pyrene	6.42E-05	3.21E-08
Phenanthrene	3.15E-04	1.58E-07
Pyrene	1.28E-04	6.38E-08
OCDD	9.30E-08	4.65E-11
Arsenic	1.68E-02	8.40E-06
Beryllium	1.26E-02	6.30E-06
Cadmium	1.26E-02	6.30E-06
Chromium	1.26E-02	6.30E-06
Copper	2.52E-02	1.26E-05
Lead	3.90E-02	1.95E-05
Manganese	2.52E-02	1.26E-05
Mercury	1.26E-02	6.30E-06
Nickel	1.26E-02	6.30E-06
Selenium	6.30E-02	3.15E-05
Zinc	1.68E-02	8.40E-06
Total HAPs	**1.48**	**7.40E-04**

Supporting Calculations for EPA SEP
Expected Boiler Emissions Reduction for Building 8028

Emissions Reduction Summary

Constituent	Current Boilers Annual Actual (lbs/yr)	New Boilers Annual Actual (lbs/yr)	Expected Reductions Annual Actual (lbs/yr)
CO	503	150	353
NOx	2,013	600	1,413
Filterable Particulate	201	60	141
Condensable PM	131	39	92
SO_2	7,147	2,130	5,017
NMTOC, non-methane	34	10	24
HAPs			
Benzene	2 15E-02	6.42E-03	1 51E-02
Ethyl Benzene	6.40E-03	1 91E-03	4 49E-03
Formaldehyde	3 32E+00	9.90E-01	2.33E+00
Naphthalene	1 14E-01	3.39E-02	7 99E-02
1,1,1-Trichloroethane	2.38E-02	7 08E-03	1.67E-02
Toluene	6.24E-01	1 86E-01	4 38E-01
o-Xylene	1 10E-02	3.27E-03	7.70E-03
Acenaphthene	2.12E-03	6 33E-04	1.49E-03
Anthracene	1.23E-04	3.66E-05	8.62E-05
Benz(a)anthracene	4.04E-04	1.20E-04	2.83E-04
Benzo(b)fluoranthene	1.49E-04	4 44E-05	1 05E-04
Benzo(k)fluoranthene	1.49E-04	4.44E-05	1.05E-04
Benzo(g,h,i)perylene	2 28E-04	6.78E-05	1 60E-04
Chrysene	2.40E-04	7.14E-05	1.68E-04
Dibenzo(a,h)anthracene	1.68E-04	5.01E-05	1.18E-04
Fluoranthene	4.87E-04	1.45E-04	3.42E-04
Fluorene	4.50E-04	1.34E-04	3.16E-04
Indeno(1,2,3-cd)pyrene	2.15E-04	6.42E-05	1 51E-04
Phenanthrene	1 06E-03	3.15E-04	7.42E-04
Pyrene	4.28E-04	1.28E-04	3 00E-04
OCDD	3.12E-07	9 30E-08	2.19E-07
Arsenic	5 64E-02	1 68E-02	3.96E-02
Beryllium	4.23E-02	1 26E-02	2.97E-02
Cadmium	4.23E-02	1 26E-02	2.97E-02
Chromium	4.23E-02	1.26E-02	2.97E-02
Copper	8.46E-02	2.52E-02	5.94E-02
Lead	1.31E-01	3.90E-02	9.19E-02
Manganese	8.46E-02	2.52E-02	5.94E-02
Mercury	4 23E-02	1 26E-02	2.97E-02
Nickel	4.23E-02	1 26E-02	2.97E-02
Selenium	2.11E-01	6.30E-02	1 48E-01
Zinc	5.64E-02	1.68E-02	3.96E-02
Total HAPs	4 96	1 48	3.48

PERMIT APPLICATION
FOR
INDIRECT HEATING EQUIPMENT
(FUEL BURNING EQUIPMENT)

			-					-			

Do not write in this space

1. Name of firm or organization: US Army Garrison – Redstone Arsenal

2. Unit Description (i.e. No. 1 Power Boiler): 8028

Equipment manufacturer's information

Name of manufacturer: Cleaver Brooks

Model number: CB-200-80-150ST

Rated capacity-input: 3,360,000 (Btu/hr.)

Boiler type: ☒ Fire tube ☐ Water tube ☐ other(specify): _____

Manufactured date: Dec 2009

Proposed installation date: July 2010

Original installation date (if existing): _____

Reconstruction or Modification date (if applicable): _____

3. Type of fuel used:

Primary: #2 Fuel Oil

Fuel	Heat Content	Units	Max. % Sulfur	Max. % Ash	Grade No. [fuel oil only]	Supplier [used oil only]
Coal		Btu/lb				
Fuel Oil	139,600	Btu/gal				
Natural Gas		Btu/ft^3				
L. P. Gas		Btu/ft^3				
Wood		Btu/lb				
Other (specify)						

Standby: None

Fuel	Heat Content	Units	Max. % Sulfur	Max. % Ash	Grade No. [fuel oil only]	Supplier [used oil only]
Coal		Btu/lb				
Fuel Oil		Btu/gal				
Natural Gas		Btu/ft^3				
L. P. Gas		Btu/ft^3				
Wood		Btu/lb				
Other (specify)						

Encl 2

4. Purpose (if multipurpose, note percent in each use category):

☒Space heat 100 % ☐Power generation _____ % ☐Process heat _____ %

Other (specify): _____

5. Normal schedule of operation:

Hours per day: 24 Days per week: 7 Weeks per year: 26

6. For each regulated pollutant, describe any limitations on source operation which affects emissions or any work practice standard (attach additional page if necessary): _____

7. Fugitive Emissions (attach calculation worksheets):

POLLUTANT	POTENTIAL EMISSIONS		BASIS OF CALCULATION	REGULATORY EMISSION LIMIT	REGULATORY EMISSION LIMIT
	lb/hr	t/yr		(lb/hr)	(in units of standard)
Particulate					
Sulfur dioxide					
Nitrogen oxides					
Carbon monoxide					
VOC's					
Other					

8. Is there any emission control equipment on this emission source?

☐Yes ☒No (If "yes", complete form ADEM-110)

9. Point Emissions (attach calculation worksheets):

POLLUTANT	POTENTIAL EMISSIONS lb/hr	POTENTIAL EMISSIONS t/yr	BASIS OF CALCULATION	REGULATORY EMISSION LIMIT (lb/hr)	REGULATORY EMISSION LIMIT (in units of standard)
Particulate	0.057	0.25	AP-42	1.68	0.5 lb/MMBtu
Sulfur dioxide	1.70	7.46	AP-42	13.44	4 lb/MMBtu
Nitrogen oxides	0.48	2.10	AP-42		
Carbon monoxide	0.12	0.53	AP-42		
VOC's	0.008	0.04	AP-42		
HAPs	See Attached Spreadsheet		AP-42		

10. Stack data:

Height above grade 28 (feet) Gas temperature at exit 375 (°F)

Inside diameter at exit 1.667 (feet) Volume of gas discharged 55.83 (ACFM)

Base Elevation 582 (feet)

Are sampling ports available? ☐Yes ☒No (If "yes", describe. Draw on separate sheet if necessary):

11. Is this item in compliance with all applicable air pollution rules and regulations?

☒ Yes ☐ No (if "no", a compliance schedule, form ADEM-114, must be attached.)

Name of person preparing application: Michael J. Wassell

Signature: Michael J Wassell Date: 02-09-10

Emissions Calculations from Appendix D Large Fuel Oil Boilers
Based on 2008 Air Emissions Inventory for USAG-Redstone

1 Initial data needed for emission calculations for Appendix D Large Fuel Oil Boilers (< 100 MMBtu/hr)

Location (Building)	Actual Rated Heat Input (MMBtu/hr)	Potential Rated Heat Input (MMBtu/hr)	Fuel Oil Usage (gal/yr)	Fuel Oil Sulfur Content (wt %)	Natural Gas Usage (ft^3)
Proposed 8028 #1 Boiler	3.38	3.38		0.50	
Total	3.38	3.38	0	-	0
(1) Heating unit type is either: Central Boiler Plant Boiler - CP, or Heating Plant Boiler - HP The heating unit type needs to be further specified as either tangential or horizontal					

Heat content of fuel oil - 139,600 Btu/gal
Heat Content of Natural Gas - 1,000 Btu/ft^3

Emissions from Combustion of Fuel Oil

2 Emission factors, from AP-42, Section 1.3-Tables 1.3-1, 1.3-2, Commercial/Institutional Residential Heating Units (9/98)

Constituent	Emission Factor
CO	5 lb/1000 gal fuel
NO_x	20 lb/1000 gal fuel
PM-10 (1)	2.38 lb/1000 gal fuel
PM-2.5 (1)	2.13 lb/1000 gal fuel
Ammonia	0.60 lb/1000 gal fuel
SO_2	71 lb/1000 gal fuel
VOC, non-methane	0.34 lb/1000 gal fuel

(1) The particulate matter emission factors were derived by adding together the applicable filterable particulate matter emission factors and the applicable condensable particulate emission factors (Tables 1.3-2 and 1.3-7 of AP-42, 9/98).
(2) If the combustion source is controlled, the uncontrolled emission factors would be multiplied by the efficiency of the control device, or (1-CE).

3 Calculation of Criteria Pollutant Emission Rates.

Constituent	Annual Actual (lb/yr)	Hourly Potential to Emit (lb/hr)	Annual Potential to Emit (lb/yr)
CO	0	0.12	1,051
NO_x	0	0.48	4,204
PM-10	0	0.057	505
PM-2.5	0	0.051	448
Ammonia	0	0.019	168
SO_2	0	1.70	14,925
VOC	0	0.008	71.5

3.1 Calculation of Annual Emissions
Emission Factor (lb/1000 gal) x Fuel Usage (gal/yr) = Actual Emissions (lb/yr)

3.2 Calculation of Hourly PTE
Emission Factor (lb/1000 gal) x Total Heat Input (MMBtu/hr) x 10^3 / (Heating Content (Btu/gal) x 1000)
= Emissions (lb/hr)

3.3 Calculation of Annual PTE
Hourly PTE (lb/hr) x 8760 hr/yr = Potential Emissions (lb/yr)

4 Emission rate calculations for organic HAPs

Emission factors were obtained from AP-42, Section 1.3, Tables 1.3-8, Distillate Fuel Oil Combustion Sources (9/98).

Constituent	Emission Factor ($lb/10^6$ gal)	Annual Actual (lb/yr)	Hourly Potential to Emit (lb/hr)	Annual Potential to Emit (lb/yr)
Formaldehyde	0.048	0	0.001	10.1
Polycyclic Organic Matter	0.009	0	7.92E-06	0.69
Benzene	2.14E-04	0	5.14E-06	0.045
Ethylbenzene	6.36E-06	0	1.53E-06	0.013
Methyl Chloroform	2.36E-04	0	5.66E-06	0.050
Toluene	0.008	0	1.49E-04	1.30
O-Xylene	1.09E-04	0	2.62E-06	0.023
Total		0	0.001	12.2

4.1 Calculation of Annual Emissions
Emission Factor (lb/1000 gal) x Fuel Usage (gal/yr) = Actual Emissions (lb/yr)

4.2 Calculation of Hourly PTE
Emission Factor (lb/1000 gal) x Total Heat Input (MMBtu/hr) x 10^3 / (Heating Content (Btu/gal) x 1000)
= Emissions (lb/hr)

4.3 Calculation of Annual PTE
Hourly PTE (lb/hr) x 8760 hr/yr = Potential Emissions (lb/yr)

5 Emission rate calculations for inorganic HAPs

Emission factors were obtained from AP-42, Section 1.3, Table 1.3-10, Distillate Fuel Oil Combustion Sources (9/98). Emission factors in (lb/10^{12} Btu were converted to lb/10^{3} gal by multiplying (lb/10^{12} Btu by 140 MMBtu/10^{3} gal for distillate fuel oil).

Constituent	Emission Factor (lb/10^{3} gal)	Actual Annual (lb/yr)	Hourly Potential to Emit (lb/hr)	Annual Potential to Emit (lb/yr)
Arsenic	5.58E-04	0	1.34E-06	0.12
Beryllium	4.19E-04	0	1.01E-06	0.088
Cadmium	4.19E-04	0	1.01E-06	0.088
Chromium	4.19E-04	0	1.01E-06	0.088
Lead	0.001	0	3.02E-06	0.26
Manganese	8.38E-04	0	2.01E-06	0.18
Mercury	4.19E-04	0	1.01E-06	0.088
Nickel	4.19E-04	0	1.01E-06	0.088
Selenium	0.002	0	5.03E-06	0.44
Total		0	1.84E-04	1.44

5.1 Calculation of Annual Emissions
Emission Factor (lb/1000 gal) x Fuel Usage (gal/yr) = Actual Emissions (lb/yr)

5.2 Calculation of Hourly PTE
Emission Factor (lb/1000 gal) x Total Heat Input (MMBtu/hr) x 10 / (Heating Content (Btu/gal) x 1000)
= Emissions (lb/hr)

5.3 Calculation of Annual PTE
Hourly PTE (lb/hr) x 8760 hr/yr = Potential Emissions (lb/yr)

Emissions from Combustion of Natural Gas

6 Calculation of Fuel Usage for Heating Units 0.3-100 MMBtu/hr

6.1 Annual Fuel Usage

Annual fuel usage based on heating unit size is used to calculate fuel usage by this size class (0.3-100 MMBtu/hr)
Annual fuel usage = Total heat input of this boiler (mmbtu/hr) ÷ Total heat input for all heating units (MMBtu/hr) x Total fuel used (cf/yr)

Annual fuel usage = 0 ft³/yr

6.2 Hourly PTE Fuel Usage
Hourly potential to emit fuel usage is based on all heating units running at the same time

Total heat input= MMBtu/hr
Fuel usage = 0 ft³/hr
Fuel usage = Total heat input, this class (mmbtu/hr) ÷ fuel heat content (Btu/ft³) x 10^{6} Btu/MMBtu

7 Emission factors, from AP-42, Section 1.4 Tables 1.4-1 and 1.4-2 Small Commercial Heating Units

Constituent	Emission Factor (lb pollutant per million ft natural gas)
CO	84
NO_x	100
PM-10 (1)	7.6 lb/1,000,000 ft³, condensible and filterable
PM-2.5 (1)	7.6 lb/1,000,000 ft³, condensible and filterable
Ammonia	3.2
SO_2	0.6
VOC, non-methane	5.5
(1) Combination of both filterable and condensable particulate matter. All particulate matter is assumed to be less than 1.0 micrometer in diameter (i.e., the emission factor applies to Total PM, PM-10, and PM-2.5), see AP-42, Table 1.4-2. (2) If the combustion source is controlled, the uncontrolled emission factors would be multiplied by the efficiency of the control device, or (1-CE).	

8 Calculation of Criteria Pollutant Emission Rates.

Constituent	Annual Actual (lb/yr)	Hourly Potential to Emit (lb/hr) (1)	Annual Potential to Emit (lb/yr) (2)
CO	0	0	0
NO_x	0	0	0
PM-10	0	0	0
PM-2.5	0	0	0
Ammonia	0	0	0
SO_2	0	0	0
VOC	0	0	0
(1) Hourly potential to emit fuel usage is based on all heating units running at the same time. (2) Annual potential to emit is based on 8,760 hr/yr.			

Benzene	0.002	0	0	0
Dichlorobenzene	0.001	0	0	0
Formaldehyde	0.075	0	0	0
Napthalene	6.10E-04	0	0	0
Hexane	1.80	0	0	0
Toluene	0.003	0	0	0
Total		0	0	0

9.1 Calculation of Annual Emissions
Emission Factor (lb/mmcf) x Fuel Usage (cf/yr)/ 10^6 cf/mmcf = Actual Emissions (lb/yr)

9.2 Calculation of Hourly PTE
Emission Factor (lb/mmcf) x Fuel Usage (cf/hr) / 10^6 cf/mmcf = Emissions (lb/hr)

9.3 Calculation of Annual PTE
Hourly PTE (lb/hr) x 8760 (hr/yr) = Potential HAP Emissions (lb/yr)

10 Emission rate calculations for inorganic HAPs.

HAP constituents obtained from AP-42, Section 1.4, Table 1.4-4 (7/98).

Constituent	Emission Factor (lb/10^6ft^3)	Annual Actual (lb/yr)	Hourly Potential to Emit (lb/hr)	Annual Potential to Emit (lb/yr)
Arsenic	2.00E-04	0	0	0
Beryllium	1.20E-06	0	0	0
Cadmium	0.001	0	0	0
Chromium	0.001	0	0	0
Cobalt	8.40E-05	0	0	0
Manganese	3.80E-04	0	0	0
Mercury	2.60E-04	0	0	0
Nickel	0.002	0	0	0
Selenium	2.40E-05	0	0	0
Total		0	0	0

10.1 Calculation of Annual Emissions
Emission Factor (lb/mmcf) x Fuel Usage (cf/yr)/ 10^6 cf/mmcf = Actual Emissions (lb/yr)

10.2 Calculation of Hourly PTE
Emission Factor (lb/mmcf) x Fuel Usage (cf/hr) / 10^6 cf/mmcf = Emissions (lb/hr)

10.3 Calculation of Annual PTE
Hourly PTE (lb/hr) x 8760 (hr/yr) = Potential HAP Emissions (lb/yr)

Comparison of Emissions

11 The potential emissions from combustion of fuel oil and natural gas were compared and the highest potential emissions are shown in the following table. The potential emissions for combustion of fuel oil and natural gas are shown in the preceding tables.

Constituent	Actual Annual Emissions (lb/yr)	Hourly Potential to Emit (lb/hr)	Annual Potential to Emit (lb/yr)	Annual Potential Emissions (t/yr)
CO	0	0.12	1,051	0.53
NO_x	0	0.48	4,204	2.10
PM-10	0	0.057	500	0.25
PM-2.5	0	0.051	448	0.22
Ammonia	0	0.019	168	0.08
SO_2	0	1.70	14,925	7.46
VOC	0	0.008	71.5	0.04
	HAPs			
Benzene	0	5.14E-06	0.045	2.25E-05
Dichlorobenzene	0	0	0	0.00E+00
Ethylbenzene	0	1.53E-06	0.013	6.68E-06
Formaldehyde	0	0.001	10.1	5.05E-03
Napthalene	0	0	0	0.00E+00
Hexane	0	0	0	0.00E+00
Toluene	0	1.49E-04	1.30	6.52E-04
Methyl Chloroform	0	5.66E-06	0.050	2.48E-05
O-Xylene	0	2.62E-06	0.023	1.15E-05
Polycyclic Organic Matter	0	7.92E-06	0.69	3.47E-04
Arsenic	0	1.34E-06	0.12	5.87E-05
Beryllium	0	1.01E-06	0.088	4.40E-05
Cadmium	0	1.01E-06	0.088	4.40E-05
Chromium	0	1.01E-05	0.088	4.40E-05
Cobalt	0	0	0	0.00E+00
Lead	0	3.02E-06	0.26	1.32E-04
Manganese	0	2.01E-05	0.18	8.80E-05
Mercury	0	1.01E-06	0.088	4.40E-05
Nickel	0	1.01E-06	0.088	4.40E-05
Selenium	0	5.03E-06	0.44	2.20E-04
Total HAPs	0	0.002	13.7	6.83E-03