DEPARTMENT OF THE NAVY
NAVAL SUPPORT ACTIVITY SOUTH POTOMAC
6509 SAMPSON ROAD, BLDG 101
DAHLGREN, VIRGINIA 22448

5090
Ser PRSI41ZM/099
October 30, 2025

Maryland Department of the Environment
Air and Radiation Management Administration
P.O. Box 2037
Baltimore, Maryland 21230-2037

To Whom it May Concern,

Naval Support Facility Indian Head (NSFIH) is submitting a Permit to Construct application to the Maryland Department of the Environment (MDE) for the installation of two new 41.8 MMBtu/hr, 1,000 HP boilers. The Building 712 facility (Steam B) will be demolished and renovated. All existing equipment will be decommissioned and removed, and the two new air emissions units will replace them. The following equipment will be removed:

- FBE-712-E1 MDE-ARA Registration Number 4-0081.
- FBE-712-ER, MDE-ARA Registration Number 5-0049 recently failed and was replaced. The final Permit to Construct was received on 10/1/2025. The new equipment will be relocated to the Strauss Avenue Primary Nodal Plant, Building 3163.
- FBE-712-E4 MDE-ARA Registration Number 5-0021. This boiler will be relocated to a different site; NSFIH will notify MDE separately when the new location is identified.
- FBE-712-E5 MDE-ARA Registration Number 5-0022. This equipment was never installed.

The boilers will be an addition to the decentralized nodal plant system and will maintain the synthetic minor limit of 25 tons per year for Volatile Organic Compounds. The attached documents include Form 11, calculations for stack emissions estimates, potential to emit calculations, and manufacturer specifications.

5090
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October 30, 2025

Please mail all correspondence to:

ATTN: Director, Environmental Division
Department of the Navy, PWD South Potomac
3972 Ward Road, Suite 101
Indian Head, Maryland 20640-5157

If you have any questions or comments concerning this letter, please contact Zenovia Mitchell at (540) 840-9242 or by email at zenovia.a.mitchell.civ@us.navy.mil.

Sincerely,

ROBITAILLE.KENNETH.R.1550817531 Digitally signed by ROBITAILLE.KENNETH.R.1550817531 Date: 2025.10.30 08:36:54 -04'00'

K. R. ROBITAILLE
Environmental Program Director
By direction

Enclosures: 1. Form 11
2. Stack Emissions Estimates
3. Potential to Emit Calculations
4. Boiler Specifications

AIR QUALITY PERMIT TO CONSTRUCT APPLICATION CHECKLIST

OWNER OF EQUIPMENT/PROCESS	
COMPANY NAME:	Naval Support Activity South Potomac
COMPANY ADDRESS:	3972 Ward Road, Suite 101, Indian Head, MD 20640
LOCATION OF EQUIPMENT/PROCESS	
PREMISES NAME:	Naval Support Facility Indian Head
PREMISES ADDRESS:	Building 712, South Greenslade Road, Indian Head, MD 20640
CONTACT INFORMATION FOR THIS PERMIT APPLICATION	
CONTACT NAME:	Kenneth Robitaille
JOB TITLE:	Installation Environmental Program Director
PHONE NUMBER:	202-718-0682
EMAIL ADDRESS:	kenneth.r.robitaille.civ@us.navy.mil
DESCRIPTION OF EQUIPMENT OR PROCESS	
Superior Boiler Power Flame, Model: MS7-5-5000-S300-PF-GA2	

Application is hereby made to the Department of the Environment for a Permit to Construct for the following equipment or process as required by the State of Maryland Air Quality Regulation, COMAR 26.11.02.09.

Check each item that you have submitted as part of your application package.

- ☑ Application package cover letter describing the proposed project
- ☑ Complete application forms (Note the number of forms included or NA if not applicable.)

  No. _____ Form 5
  No. _____ Form 5T
  No. _____ Form 5EP
  No. _____ Form 6
  No. _____ Form 10
  No. 1 Form 11
  No. _____ Form 41
  No. _____ Form 42
  No. _____ Form 44

- ☑ Vendor/manufacturer specifications/guarantees
- ☐ Evidence of Workman's Compensation Insurance
- ☐ Process flow diagrams with emission points
- ☐ Site plan including the location of the proposed source and property boundary
- ☑ Material balance data and all emissions calculations
- ☐ Material Safety Data Sheets (MSDS) or equivalent information for materials processed and manufactured.
- ☐ Certificate of Public Convenience and Necessity (CPCN) waiver documentation from the Public Service Commission (1)
- ☐ Documentation that the proposed installation complies with local zoning and land use requirements (2)

(1) Required for emergency and non-emergency generators installed on or after October 1, 2001 and rated at 2001 kW or more.

(2) Required for applications subject to Expanded Public Participation Requirements.

Enclosure (1)

MARYLAND DEPARTMENT OF THE ENVIRONMENT

1800 Washington Blvd ▪ Baltimore, Maryland 21230
(410) 537-3230 ▪ 1-800-633-6101 ▪ www.mde.state.md.us

Air and Radiation Management Administration ▪ Air Quality Permits Program

APPLICATION FOR FUEL BURNING EQUIPMENT

Permit to Construct ☑ Registration Update ☐ Initial Registration ☐

1A. Owner of Equipment/Company Name
Naval Support Activity South Potomac

Mailing Address/Street
3972 Ward Road, Suite 101

City Indian Head | State MD | Zip Code 20640

Telephone Number 202-718-0682

Print Name/Title
J. C. NADDER

Signature: J. C. Nadder Date: 20 OCT 2025

DO NOT WRITE IN THIS BOX

2. Registration Number
County No. (1-2) | Premises No. (3-6)
Registration Class (7) | Equipment No. (6-11)
Data Year (12-13) | Application Date

1B. Equipment Location (if different from above give Street Number and Name, City, State, Zip and Telephone Number):
Building 712 South Greenslade Road, Indian Head, MD 20640

Premises Name (if different from above):

3. Status

A= New Equipment B= Modification to Existing Equipment C= Existing Equipment	Status (15)	New Construction Began (MM/YY) (16-19)	New Construction Completed (MM/YY) (20-23)	Existing Initial Operation (MM/YY) (20-23)
	A	0226	TBD	

4. Describe this Equipment (Make, Model, Features, Manufacturer, etc.):
Two new Power Flame boilers will be installed. Model: MS7-5-5000-S300-PF-GA2, 4-Pass

5. Workmen's Compensation Coverage: Binder/Policy Number: _____

Company Name: NA Expiration Date _____

NOTE: Before a Permit to Construct may be issued by the Department, the applicant must provide the Department with proof of worker's compensation coverage as required under Section 1-202 of the Worker's Compensation Act.

6. Number of Pieces of Identical Equipment to be Registered/Permitted at this Time: 2

7. Person Installing this Equipment (if different from above give Name/Title, Company Name, Mailing Address and Telephone Number):

8. Major Activity, Product or Service of Company at this Location:
Provide steam support and redundancy to buildings at NSFIH.

9. Control Devices Associated with this Equipment

None ☐ (24-0) | Simple/Multiple Cyclones ☐ (24-1) | Spray/Adsorb Tower ☐ (24-2) | Venturi Scrubber ☐ (24-3) | Carbon Adsorber ☐ (24-4) | Electrostatic Precipitator ☐ (24-5) | Bag-house ☐ (24-6)

Thermal/Catalytic Afterburner ☐ (24-7) | Dry Scrubber ☐ (24-8) | Other ☒ (24-9) Describe Low NOx Burners, and Flue Gas Recirculation

10. Annual Fuel Consumption for this Equipment Only

OIL-1000 GALLONS	SULFUR %	GRADE	NATURAL GAS-1000 FT^3	LP GAS-100 GALLONS	GRADE
8	.015	2	662256	0	
26-31	32-33	34	35-41	42-45	

COAL- TONS	SULFUR %	ASH%	WOOD-TONS	MOISTURE %
0			0	
46-52	53-55	56-58	59-63	64-65

OTHER FUELS NA (Specify Type) ☐ 66-1 ANNUAL AMOUNT CONSUMED (Specify Units of Measure)

OTHER FUEL NA (Specify Type) ☐ 66-2 ANNUAL AMOUNT CONSUMED (Specify Units of Measure)

1= Coke 2= COG 3=BFG 4=Other

11. Operating Schedule (for this equipment)

Comfort/Space Heating Only ☑ 67-1 | Process Heat Only ☐ 67-2 | Percent Process Heat ☐☐ 68-69 | Oil Burner Type 2 70 (1=Pressure Gun 2=Air Atomizer 3=Steam Atomizer 4=Rotary Cup) | Coal Burner Type ☐ 71 (1=Cyclone 2=Stoker 3=Pulverized 4=Hand Fired)

Days Per Week 7 72 | Days Per Year 365 73-75

SEASONAL VARIATION IN OPERATION (PERCENT):

None X 76 | Winter ☐☐ 77-78 | Spring ☐☐ 79-80 | Summer ☐☐ 81-82 | Fall ☐☐ 83-84

12. Exhaust Stack Information

Height Above Ground (ft)	Inside Diameter at Top (inches)	Exit Temperature (°F)	Exit Velocity (ft/sec)
25	32	416	49
86-88	89-91	92-95	96-98

13. Total Stack Emissions (for this equipment only) in Pounds Per Operating Day

Particulate Matter	Oxides of Sulfur	Oxides of Nitrogen
7.52	0.7	37
99-104	105-110	111-116

Carbon Monoxide	Volatile Organic Compounds	PM-10
40.13	5.4	7.52
117-122	123-128	129-134

14. Method Used to Determine Emissions (1=Estimate, 2=AP42, 3=Stack Test, 4=Other Emission Factor)

TSP	SOx	NOx	CO	VOC	PM10
4	2	1	1	1	1
165	166	167	168	169	170

15. What is the Maximum Rated Heat Input of this Unit (Million Btu/hr)?

Air and Radiation Management Administration Use Only

16. Date Rec'd Local _____ Date Rec'd State _____

Return to Local Jurisdiction Date _____ By _____

Rev'd by Local Jurisdiction: Date _____ By _____ Rev'd by State: Date _____ By _____

Acknowledgement Sent by State: Date _____ By _____

17. Inventory Date (MM/YY)	SCC Code	18. Annual Operating Rate	Maximum Design Hourly Rate
171-174	178-185	186-192	193-199

Permit to Operate Month	Transaction Date	Staff Code	VOC	SIP Code
200-201	202-207	208-210	211 212	213 214

Regulation Code ☐☐☐☐ 215-218 Confidentiality ☐ 219

Point Description ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐ 220-238 Action ☐ 239 (A: Add C: Change)

Total Stack Emissions in Pounds per Operating Day

Particulate Matter

PM (lbs/day) = Emissions Factor (lbs/MMBtu) x Heat Input (MMBtu/hr) x Operating Hours

Where:

- Fuel: Natural Gas
- Boiler size: 41.8 MMBtu/hr
- Emissions Factor (from manufacturer): 0.0075 lbs PM-10/MMBtu
- Operating hours: 24

Calculation:
Multiply the emissions factor by the heat input rate

1. (0.0075 lbs/MMBtu) (41.8 MMBtu/hr) = 0.31 lbs/hr

Multiply the hourly emissions rate by the operating hours

2. (0.31 lbs/hr) (24 hr/day) = **7.52 lbs/day**

Nitrogen Oxides

NO_x (lbs/day) = Fuel Consumption x Emissions Factor x (1 – Control Efficiency) x Daily Operating Hours

Where:

- Fuel consumption rate: Boiler manufacturer data given in lb/MMBtu will be converted to lb/MMscf

Given:
Emissions factor: 0.037 lb/MMBtu (manufacturer data)
Heating value: 1,000 Btu/scf (manufacturer data)
Calculation: convert lb/MMBtu to lb/MMscf: [lb/MMscf] = [lb/MMBtu] x [Btu/scf] x (1 MMBtu / 1,000,000 Btu)
lb/MMscf = (0.037 lb/MMBtu) (1,000 Btu/scf) = 37 lb/MMscf

- Boiler heat input (from manufacturer): 41.8 MMBtu/hr
- Natural gas heating value (from manufacturer): 1,000 MMscf
- NO_x emission factor (from manufacturer): 37 lb/MMscf
- Control efficiency: boiler manufacturer data states there is flue gas recirculation but does not mention the percentage of NO_x removed, therefore the assumption will be 0% uncontrolled

Calculation:
Determine daily fuel consumption
Daily fuel consumption (MMscf/day) = (Boiler Heat Input (MMBtu/hr) / Fuel Heat Value (MMBtu/MMscf)) x Daily Operating Hours (hr/day)

1. (41.8 MMBtu/hr / 1,000 MMBtu/MMscf) x 24 hr/day = 1.00 MMscf/day

Calculate daily NO_x emissions
NO_x (lbs/day) = Daily Fuel Consumption (MMscf/day) x Emission Factor (lb/MMscf)

2. (1.00 MMscf/day) (37 lb/MMscf) = **37 lbs/day**

Carbon Monoxide

CO Emissions (lb/hr) = Heat Input (MMBtu/hr) x CO Emission Factor (lb CO/MMBtu) x Operating Hours

Where:

- Heat input: 41.8 MMBtu/hr
- CO Emission Factor (from AP-42): 0.04 lb CO/MMBtu
- Operating hours: 24

Calculation:
Hourly emissions = (41.8 MMBtu/hr) (0.04 lb CO/MMBtu) = 1.672 lb CO/hr
Daily emissions = (1.672 lb CO/hr) (24 hrs/day) = **40.13 lbs/day**

Volatile Organic Chemicals

VOC (lb/day) = EF x FR x HR x (1 – CE/100)

Where:

- EF: manufacturer boiler emissions factor data given in lb/MMBtu will be converted to lb/MMscf

Given:
Emissions factor: 0.0054 lb/MMBtu (manufacturer data)
Heating value: 1,000 Btu/scf (manufacturer data)
Calculation: convert lb/MMBtu to lb/MMscf: [lb/MMscf] = [lb/MMBtu] x [Btu/scf] x (1 MMBtu / 1,000,000 Btu)
lb/MMscf = (0.0054 lb/MMBtu) (1,000 Btu/scf) = 5.4 lb/MMscf

- FR: to calculate fuel usage rate convert the heat input to MMscf/hr using the boilers heating value

FR = (41.8 MMBtu/hr) (1 MMscf/1,000 MMbtu) = 0.0418 MMscf/hr

- HR: operating hours will be 24 hours
- Control efficiency CE: boiler manufacturer data states there is flue gas recirculation but does not mention the percentage of NO_x removed, therefore the assumption will be 0% uncontrolled

Calculation:
Calculate the hourly VOC emissions:

1. (5.4 lb/MMscf) (0.0418 MMscf/hr) (1 – 0/100) = 0.226 lb/hr

Convert to daily VOC emissions:

2. (0.226 lbs/hr) (24 hr/day) = **5.4 lbs/day**

Permit To Construct Application

Building 712 Renovation
Emissions Calculations

Two new identical units will be installed for the Building 712 renovation

Location	Unit IDs	Rating (HP)	NG - Heat Input Capacity (MMBtu/hr)	#2 Fuel - Heat Input Capacity (MMBtu/hr)
Building 712	TBD	1,000	41.8	41.8

Primary Fuel: Natural Gas

1020 MMBtu/mmscf of natural gas (HHV, source: 40 CFR 98, Subpart C, Table C-1)

Backup Fuel: #2 Fuel Oil (emergency backup)

140 MMBtu/Kgal of Fuel Oil (HHV, source: 40 CFR 98, Subpart C, Table C-1)

Maximum Emissions Operating Scenario - Potential to Emit

New boilers will combust fuel oil only during periods of natural gas curtailment or supply emergencies. For the purposes of this PTE, fuel oil is estimated to be burned 1% of the time.

PTE Operating Schedule (hr/yr) - NG 8,672
PTE Operating Schedule (hr/yr) - #2 fuel oil 88

Pollutant	Natural Gas Emission Factor (lb/MMBtu)	Natural Gas Emissions (lb/hr)	Natural Gas Emissions (ton/yr)	Note
CO	0.037	1.5	6.71	A
CO_2	117.6	4917.6	21322.92	B
NO_X	0.037	1.5	6.71	A
Pb	4.9E-07	2.0E-05	8.9E-05	B
PM	0.008	0.3	1.36	A/D
PM_{10}	0.008	0.3	1.36	A/D
$PM_{2.5}$	0.008	0.3	1.36	A/D
SO_2	0.001	2.5E-02	0.11	B
VOC	0.005	0.2	0.98	A

Pollutant	#2 Fuel Oil Emission Factor (lb/MMBtu)	#2 Fuel Oil Emissions (lb/hr)	#2 Fuel Oil Emissions (ton/yr)	Total Potential to Emit (ton/yr)	Note
CO	0.037	1.5	0.07	**6.77**	A
CO_2	163.0	6,814	299.80	**21,622.72**	C
NO_X	0.115	4.81	0.21	**6.92**	A
Pb	9.0E-06	0.0	0.00	**0.00**	B
PM	0.024	0.99	0.04	**1.40**	A/D
PM_{10}	0.024	0.99	0.04	**1.40**	A/D
$PM_{2.5}$	0.024	0.99	0.04	**1.40**	A/D
SO_2	1.014	42.4	1.87	**1.97**	B
VOC	0.200	8.4	0.37	**1.35**	B

A - Emission factor from Boiler Spec Sheet
B - Emission factor from AP-42, Ch. 1.3(Fuel Oil)/1.4 (NG)
C - Emission factor from 40 CFR 98, Subpart C, Table C-1
D - PM_{10} and $PM_{2.5}$ assumed equal to total PM as a conservative estimate

HAPs: **from Natural Gas combustion**

Pollutant (HAPs)	Emission Factor (lb/MMBtu)	Potential to Emit (lb/hr)	Potential to Emit (ton/yr)	Note
1,3-Butadiene	NA	-	-	
Acetaldehyde	NA	-	-	
Acrolein	NA	-	-	
Benzene	2.1E-06	8.61E-05	3.73E-04	*
Ethylbenzene	NA	-	-	
Formaldehyde	7.4E-05	3.07E-03	1.33E-02	*
Naphthalene	6.0E-07	2.50E-05	1.08E-04	*
PAH	NA	-	-	
Propylene Oxide	NA	-	-	
Toluene	3.3E-06	1.39E-04	6.04E-04	*
Xylene	NA	-	-	
Arsenic	2.0E-07	8.20E-06	3.55E-05	*
Beryllium	1.2E-08	4.92E-07	2.13E-06	*
Cadmium	1.1E-06	4.51E-05	1.95E-04	*
Chromium	1.4E-06	5.74E-05	2.49E-04	*
Copper	8.3E-07	3.48E-05	1.51E-04	*
Lead	4.9E-07	2.05E-05	8.88E-05	*
Mercury	2.5E-07	1.07E-05	4.62E-05	*
Manganese	3.7E-07	1.56E-05	6.75E-05	*
Nickel	2.1E-06	8.61E-05	3.73E-04	*
Selenium	2.4E-08	9.84E-07	4.26E-06	*
HCl	NA	-	-	

from Fuel Oil combustion

Emission Factor (lb/MMBtu)	Potential to Emit (lb/hr)	Potential to Emit (ton/yr)	Note
NA	-	-	
NA	-	-	
NA	-	-	
1.5E-06	6.4E-05	2.8E-06	**
4.5E-06	-	-	
NA	-	-	**
8.1E-06	3.4E-04	1.5E-05	**
NA	-	-	
NA	-	-	
4.4E-05	1.9E-03	8.1E-05	**
7.8E-07	3.3E-05	1.4E-06	**
4.0E-06	1.7E-04	7.4E-06	**
3.0E-06	1.3E-04	5.5E-06	**
3.0E-06	1.3E-04	5.5E-06	**
3.0E-06	1.3E-04	5.5E-06	**
6.0E-06	2.5E-04	1.1E-05	**
9.0E-06	3.8E-04	1.7E-05	**
3.0E-06	1.3E-04	5.5E-06	**
6.0E-06	2.5E-04	1.1E-05	**
3.0E-06	1.3E-04	5.5E-06	**
1.5E-05	6.3E-04	2.8E-05	**
4.40E-04	1.8E-02	8.1E-04	#

Total HAP PTE (ton/yr) **0.016**

NA - Not available
* Emission factor from AP-42, Ch. 1.4 (Natural Gas Combustion)
** Emission factor from AP-42, Ch. 1.3 (Fuel Oil Combustion)
# - Emission factor equal to HCl emission limit listed in Table 1 of 40 CFR 63, Subpart DDDDD for new liquid fuel subcategory unit

Methodology

Emission Factor (lb SO_2/MMBtu) = AP-42 Emission Factor (lb/MMcf) x NG Higher Heating Value (MMcf/MMBtu)
Emission Factor (lb HAP/MMBtu NG) = AP-42 Emission Factor (lb/MMcf) x NG Higher Heating Value (MMcf/MMBtu)
Emission Factor (lb SO_2/MMBtu fuel oil) = 142 (AP-42 Factor, lb/kgal) x fuel oil Higher Heating Value (kgal/MMBtu) x S, where S = fuel oil % sulfur
Emission Factor (lb HAP/MMBtu fuel oil) = AP-42 Emission Factor (lb/kgal) x Fuel Oil Higher Heating Value (kgal/MMBtu)
Potential to Emit (lb/hr) = Emission Factor (lb/MMBtu) x Heat Input Capacity (MMBtu/hr)
Potential to Emit (ton/yr) = Potential to Emit (lb/hr) x Maximum Operating Schedule (hr/yr) x 1/2000 (ton/lb)

Enclosure (3)

Power Flame Inc.
AN ASTEC COMPANY

9/28/2006
Rev. 04/16/2024
Revision 13

Typical Flue Product Emissions Data for Power Flame Burners

Most analyzers today will provide a dry analysis of the Products of Combustion, PFI can guarantee NOx & CO performance, by burner design; using premix, flue gas recirculation, staged combustion or a combination of the above. PFI cannot guarantee SO_X, PM_T, Hydrocarbons, VOC's or CO_2 values as these values are dependent on the actual fuel sample being consumed.

Per EPA AP-42 unless Noted	Natural Gas - Section 1.4	L.P. Gas - Section 1.5	# 2 Fuel Oil - Section 1.3 [1]
Carbon Monoxide - CO[6] **Per PFI Burner Testing**	0.037 lb/MMBTU input (50 PPM)	0.037 lb/MMBTU input (50 PPM)	0.037 lb/MMBTU input (50 PPM)
Sulfur Dioxide - SO_X[7] (SO_2 & SO_3)	0.0006 lb/MMBTU input (0.4 PPM)	0.0006 lb/MMBTU input (0.4 PPM)	(1.0550) x $\%S_w$ = lb/MMBTU input
Particulate Matter (Total)[8] $PM_T = PM_C + PM_F$	0.0075 lb/MMBTU input	0.0075 lb/MMBTU input	0.0236 lb/MMBTU input
Hydrocarbons[9]	0.025 lb/MMBTU input	0.025 lb/MMBTU input	0.038 lb/MMBTU input
VOC's[10]	≈ 0.0054 lb/MMBTU input	≈ 0.0054 lb/MMBTU input	Based on actual #2 Oil sample
CO_2[11]	9 % to 12%	10% to 12%	10% to 13%
Nitrogen Oxides - NO_x			
Standard JA, FDM & X4 Burners	0.091 lb/MM BTU input (75 PPM)	0.095 lb/MM BTU input (79 PPM)	N/A N/A
Standard C(R) Burners	0.091 lb/MM BTU input (75 PPM)	0.095 lb/MM BTU input (79 PPM)	0.115 lb/MM BTU Input (90) PPM[2]
LNIC(R) Burners **Fire box/Cast Iron boilers**	0.037 lb/MM BTU input (30 PPM)	0.037 lb/MM BTU input (30 PPM)	0.115 lb/MM BTU Input (90) PPM[2]
LNIC(R) Burners **Water tube boilers**	0.037 lb/MM BTU input (30 PPM)	0.037 lb/MM BTU input (30 PPM)	0.115 lb/MM BTU Input (90) PPM[2]
LNIAC Burners	0.037 lb/MM BTU input (30 PPM)	0.037 lb/MM BTU input (30 PPM)	0.115 lb/MM BTU Input (90) PPM
CMAX Burners	0.085 lb/MM BTU input (70 PPM)[4]	0.085 lb/MM BTU input (70 PPM)[4]	0.141 lb/MM BTU Input (110) PPM
LNICM Burners **Scotch Boiler**	0.037 lb/MM BTU input (30) PPM	0.037 lb/MM BTU input (30) PPM	0.115 lb/MM BTU Input (90) PPM
LNICM Burners **Fire box/Cast Iron boilers**	0.030 lb/MM BTU input (25) PPM	0.030 lb/MM BTU input (25) PPM	0.115 lb/MM BTU Input (90) PPM
LNICM Burners **Water tube boilers**	0.024 lb/MM BTU input (20) PPM	0.030 lb/MM BTU input (25) PPM	0.115 lb/MM BTU Input (90) PPM
UCM Burners	0.010 lb/MM BTU input (9) PPM[5]	0.015 lb/MM BTU input (12) PPM	0.077 lb/MM BTU Input (60) PPM
NPM Premix Burners	0.030 lb/MM BTU input (25) PPM	0.030 lb/MM BTU input (25) PPM	N/A N/A
NVC and NP2 Burners	0.010 lb/MM BTU input (9) PPM	0.015 lb/MM BTU input (12) PPM	N/A N/A
EVO™ Burners	0.037 lb/MM BTU input (30) PPM	N/A N/A	N/A N/A

(1) NOx emissions will vary based on the percent of fuel bound nitrogen (these are based on 0.02%) and boiler or heat exchanger configurations.
(2) 90 PPM NOx on cast iron sectional, fire box and water tube boiler, 120 PPM on fire tube boilers. (0.159 lb/MM BTU Input)
(3) Not used
(4) In some applications the CMAX will achieve less than 60 PPM without flue gas recirculation - consult factory.
(5) In some applications the UCM burner will achieve less than 9 PPM with modifications - consult factory.
(6) Based upon PFI Burner testing in lab and field. Consult factory if lower values needed, based on Burner & Boiler combination.
(7) SO_x value shown has a value of 2,000 grains/10^6 scf for Natural Gas and Propane. Oil is by weight, based on sample analysis.
(8) Particulate Matter Total (PM_T) is the total is the Filterable (PM_F) and the Condensable (PM_C), this will vary based upon fuel analysis.
(9) Hydrocarbon Emission Factors are determined from the (CxHy) Hydrocarbon Chains in natural gas composition, in general from (C_1H_4) Methane to (C_6H_{14}) Hexane. (C_7H_{16}) N-Heptane through ($C_{10}H_{22}$) Decane are often combined in the fuel as C_6+. This value is based upon your actual natural gas composition. #2 oil is based on the actual oil sample.
(10) The VOC's are dependent on the gas or liquid fuel composition. It will vary based on the Hydrocarbon amount and all other constituents which will determine the calculated value.
(11) The CO_2 percentage is dependent on the hydrocarbon value as well as excess air values.

These emission rates are general estimates and do not constitute guarantees by Power Flame Inc.
In instances where guarantees are required, please consult the factory with the specific application information.
All NOx numbers stated are corrected to 3.0% O_2 (dry).

Enclosure (4)

CONFIDENTIAL, FOR USE AND DISTRIBUTION ONLY BY S.B.W. INC. REPRESENTATIVES

Superior Boiler

3524 E. 4th Ave.
Hutchinson, Ks. 67501

TEL: 800-444-6693
FAX: 620-662-7586

SUPERIOR BOILER PERFORMANCE

Reps:
Project:

Model: MS7-5-5000-S300-PF-GA2
Firing: Nat. Gas **HHV =** 1,000 Btu/Ft3

Boiler Type & Size	4-Pass Wetback		
Radiant Heat'g Surface	362	Ft2	
Tubes Heat'g Surface	4588	Ft2	
Radiant Section Volum-	324.2	Ft3	
Operating Conditions			
Steam Pressure	200	psig	
Feedwater Temp	227	Deg. F	**From DA.**
Combustion Air Temp	80	Deg. F	
Relative Humidity	60	%	
Blowdown	3	%	
Steam Temperature	387.7	Deg. F	
Steam Enthalpy	1,199.2	Btu/Lb	
Boiler Water Enthalpy	361.9	Btu/Lb	
Feedwater Enthalpy	195.3	Btu/Lb	

Firing Rate	100	75	50	25	%
Excess Air	20	20	20	20	%
Flue Gas Reciculation	15	15	15	15	%
CO2 in Dry Flue Gas	9.6	9.6	9.6	9.6	% Vol
O2 in Dry Flue Gas	3.8	3.8	3.8	3.8	% Vol
Fuel Input	41,844	31,383	20,922	10,461	SCFH
	41,844	31,383	20,922	10,461	MBH
Combustion Air	35,939	26,954	17,970	8,985	Lb/hr
	8,054	6,040	4,027	2,013	SCFM
Flue Gas Flow	37,818	28,364	18,909	9,455	Lb/hr
	8,769	6,577	4,384	2,192	SCFM
LOSSES					
Flue Gas	17.56	17.44	17.32	17.22	%
Radiation&Convect.	0.26	0.35	0.53	1.05	%
EFFICIENCY (HHV)					
Thermal	82.44	82.56	82.68	82.78	%
Fuel to Steam	82.17	82.21	82.15	81.73	%
BOILER					
Heat Output	34,384	25,799	17,188	8,550	MBH
Net Steam Flow	33,222	24,927	16,606	8,260	Lb/hr
Stack Temp-	416.0	411.0	406.2	402.2	Deg. F
Furnace Heat Release	129,053	96,790	64,527	32,263	Btu/Ft3-hr
Furnace Heat Flux	115,547	86,660	57,773	28,887	Btu/Ft2-hr

Notes:
1- Boiler performance is based on the heat loss method.
2- Jacket losses (radiation and convection losses) are calculated based on actual losses through boiler insulation and connections.

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3524 E. 4th Ave.
Hutchinson, Ks. 67501

TEL: 800-444-6693
FAX: 620-662-7586

SUPERIOR BOILER PERFORMANCE

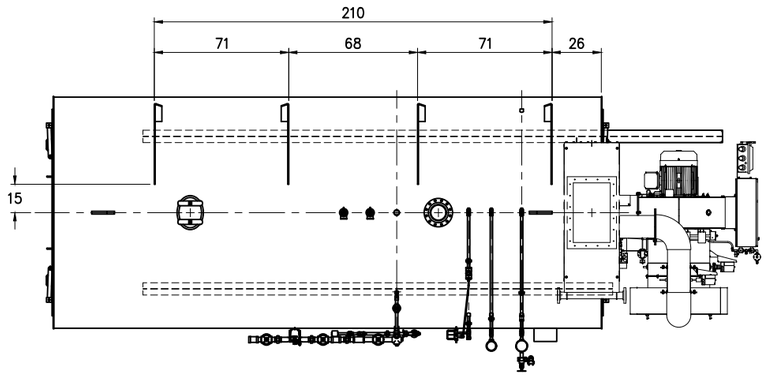
Reps:
Project:

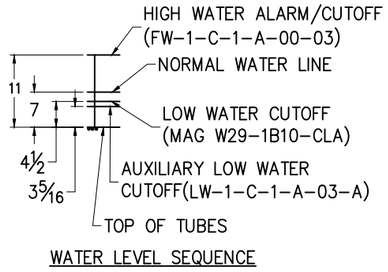
Model: MS7-5-5000-S300-PF-GA2
Firing: #2 OIL **HHV =** 139,856 Btu/Gal

Boiler Type & Size	4-Pass Wetback		
Radiant Heat'g Surface	362	Ft2	
Tubes Heat'g Surface	4588	Ft2	
Radiant Secion Volume	324.2	Ft3	
Operating Conditions			
Steam Pressure	200	psig	
Feedwater Temp	227	Deg. F	**From DA.**
Combustion Air Temp	80	Deg. F	
Relative Humidity	60	%	
Blowdown	3	%	
Steam Temperature	387.7	Deg. F	
Steam Enthalpy	1,199.2	Btu/Lb	
Boiler Water Enthalpy	361.9	Btu/Lb	
Feedwater Enthalpy	195.3	Btu/Lb	

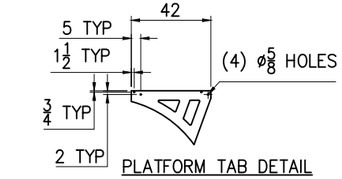
Firing Rate	100	75	50	25	%
Excess Air	20	20	20	20	%
Flue Gas Reciculation	15	15	15	15	%
CO2 in Dry Flue Gas	12.9	12.9	12.9	12.9	% Vol
O2 in Dry Flue Gas	3.7	3.7	3.7	3.7	% Vol
Fuel Input	299.2	224.4	149.6	74.8	GPH
	41,844	31,383	20,922	10,461	MBH
Combustion Air	37,360	28,020	18,680	9,340	Lb/hr
	8,372	6,279	4,186	2,093	SCFM
Flue Gas Flow	39,502	29,626	19,750	9,875	Lb/hr
	8,800	6,600	4,400	2,200	SCFM
LOSSES					
Flue Gas	14.11	13.98	13.86	13.76	%
Radiation&Convect.	0.26	0.35	0.53	1.05	%
EFFICIENCY (HHV)					
Thermal	85.89	86.02	86.14	86.24	%
Fuel to Steam	85.63	85.67	85.61	85.19	%
BOILER					
Heat Output	35,831	26,885	17,912	8,912	MBH
Net Steam Flow	34,620	25,976	17,306	8,611	Lb/hr
Stack Temp-	416.9	411.7	406.8	402.5	Deg. F
Furnace Heat Release	129,053	96,790	64,527	32,263	Btu/Ft3-hr
Furnace Heat Flux	115,547	86,660	57,773	28,887	Btu/Ft2-hr

Notes:
1- Boiler performance is based on the heat loss method.
2- Jacket losses (radiation and convection losses) are calculated based on actual losses through boiler insulation and connections.

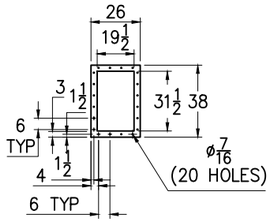




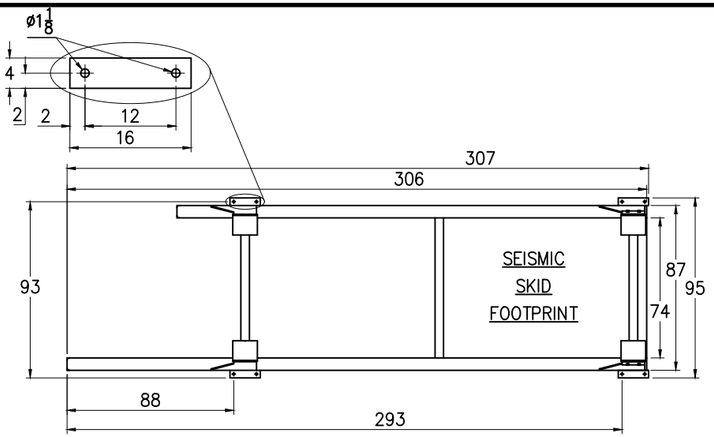
WATER LEVEL SEQUENCE

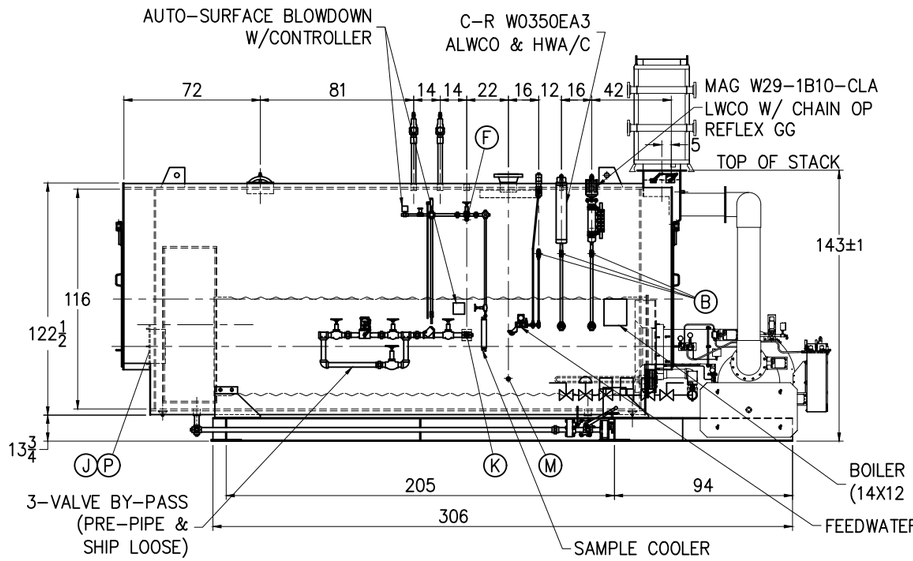


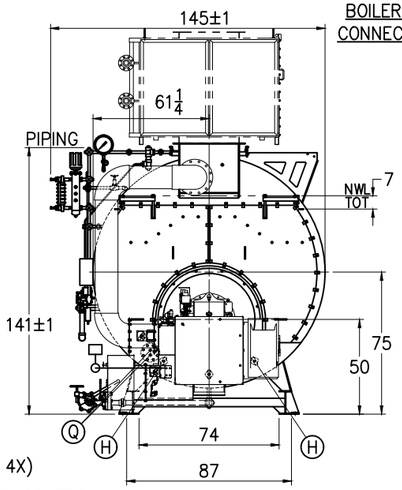
PLATFORM TAB DETAIL

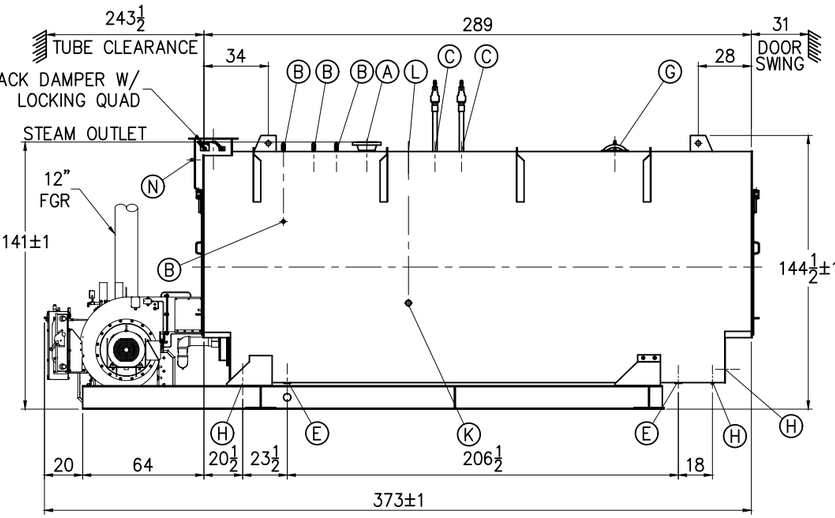


BOILER FLUE GAS CONNECTION DETAIL









BOILER CONNECTIONS	
A.(1) STEAM OUTLET	8" 300# FLANGE
B.(7) LWCO	1" NPT
C.(2) SAFETY VALVE	2" NPT
D.( ) SAFETY VALVE	
E.(2) BOILER BLOWDOWN	2" NPT
F.(1) SURFACE BLOWDOWN	1" NPT
G.(1) MANWAY	12" x 16"
H.(5) HANDHOLE	3" x 4"
J.(1) CLEANOUT	18" PIPE
K.(2) FEEDWATER	2" NPT
L.(1) AUXILIARY/VENT	2" NPT
M.(1) LOW FIRE HOLD	1" NPT
N.(1) STACK TEMP	1/2" NPT
P.(1) SIGHT PORT	1" NPT
Q.(1) STEAM PREHEATER	3/4" NPT
R.( )	
S.( )	

RATINGS & CAPACITIES	
HORSEPOWER	1000*
DESIGN PRESSURE	300 PSIG STEAM
GROSS OUTPUT	33475 MBH*
STEAM (FROM & AT 212°F)	34500 Lbs/Hr*
HEAT RELEASE: (FURNACE ONLY)	172858 BTU/CuFt*
RATED INPUT	41844 MBH*
HEATING SURFACE (ASME)	5038 SqFt
FURNACE HEATING SURFACE	261.65 SqFt
FURNACE VOLUME	242.07 CuFt
TURNAROUND VOLUME	82.98 CuFt
STEAMING VOLUME	151.28 CuFt
STEAM RELEASE AREA	148.19 SqFt
WATER CAPACITY:	
(FULL) 7,077 Gal	@ 58,867 Lbs
(NWL) 5,946 Gal	@ 49,454 Lbs
SHIPPING WEIGHT:	89,400 Lbs

LTR	DATE	REVISION	BY
A	7-24-24	UPDATE SKID, BURNER, FGR, JBOX, & GAS TRAIN. OAL WAS 368 & 9" REF.	MWM BS
B	10-30-24	UPDATE PLATFORM AND TABS. ALWCO & HW WERE 26NMB1A0A/EA101.	JH BD
C	11-1-24	UPDATE ECONOMIZER.	JH BD
D	11-14-24	REMOVE PLATFORM & LADDER, REVISE BOTTOM BLOWDOWN PIPING AND ADD SAFETY VALVE SPOOL PIECES.	BD

REPRESENTATIVE:
GREENLAND ENTERPRISES, INC.

PROJECT:
NAVAL SUPPORT FACILITY-INDIAN HEAD
INDIAN HEAD, MD

NOTES

1. ALL CONTROLS MOUNTED AS PER SPECIFICATION SHEET.
2. SPECIFICATION SHEET TAKES PRIORITY OVER R & D SHEET.
3. BOILER DESIGN CODE ASME SECTION I.
4. BOILER INSULATED WITH 2" – 8# DENSITY MINERAL FIBER INSULATION WITH 22 GAUGE STEEL JACKET.
5. ALL DIMENSIONS ARE ±1/2" UNLESS OTHERWISE NOTED.
*6. HORSEPOWER & RELATED INFO BASED ON 5 SqFt FIRING.

SUPERIOR BOILER

CHECKED BY	DATE
B. SHERRADEN	7-3-24
DRAWN BY	DATE
J. HOLDEN	7-1-24

MOHICAN BOILER MODEL
MS7-5-5000-S300-PF-GA2

SCALE: 1/80

DRAWING No: 249237 & 238

SUPERIOR BOILER

J.O. NO. 9000457
SPEC SHEET - STEAM PAGE 1 OF 3
S.O. NO. 249237 NAT.BOARD NO.
DATE RECEIVED: 3/19/24 QTY 1
STATUS: WA&R [X] RELEASED [ ] DATE

SUBMITTALS REQ'D: 1 SETS PROPOSAL 03380106
R&D SHEET [X] W.D. [X] SUBMITTAL NO.
BURNER [X] GAS PIPING [X] OIL PIPING [X]
DATE REQ'D: MANUALS REQ'D: 2
REP CONTACT:

JOB: NAVAL SUPPORT FACILITY - INDIAN HEAD
LOCATION: INDIAN HEAD, MD 20640
SOLD TO: GREENLAND ENTERPRISES, INC.
11864 FISHING POINT DRIVE
NEWPORT NEWS, VA 23606

MODEL: MS7-5-5000-S300-PF-GA2
NOMINAL HP 1000 OUTPUT 33475 MBH
SECTION I
DESIGN PRESSURE 300 PSI STEAM
OPERATING PRESSURE 200 PSI STEAM
NAMEPLATE: SUPERIOR PAINT BLUE
STACK DAMPER: [X] W/LOCKING QUAD [X] W/BEARINGS [ ]
STACK THERMOMETER 50EI60E120 [L]
DIAL 5.00" STEM 12.00" RANGE 100/800 ºF
BOILER J-BOX [X] 14X12 NEMA 4X w/ SEALTITE LS [X] RS [ ]
GAUGE GLASS [X] TRI-COCKS [N/S] CHAIN OPERATED [X]
REFLEX
PRIMARY L.W.C.O. LS [X] RS [ ] TOP [ ]
MODEL MAG W29-1B10-CLA [M]
WATER COLUMN BLOWDOWN VALVE(S); [M]
[1] POWELL FIG. NO. GA08TA58GB SIZE 1.00"
AUX. L.W.C.O.: LS [ ] RS [ ] TOP [X]
MODEL 26NMB1A0A / EA101 [M]
HIGH WATER LS [X] RS [ ] TOP [ ]
CUTOFF [X] ALARM [X]
MODEL 16MC1A0 / EA101 [M]

			PSI	
[1]	OPERATOR	L404F1094	RANGE 20-300#	[M]
[1]	LIMIT	L4079B 1066	RANGE 20-300	[M]
[1]	FIRING RATE	2051TG3A2B21AS5B4E5Q4	RANGE 0-300	[M]
[ ]			RANGE	[ ]

STEAM GAUGE: W/GAUGE/TEST COCK [X]
ASHCROFT FIG. NO. 1379AS [L]
DIAL 8.5" RANGE 0-600# PSI W/SYPHON [X]
AIR VENT VALVE: N/S SIZE [ ]
TURBULATORS: [ ] N/S TYPE

SAFETY VALVE(S): KUNKLE [L]
[2] 6030JH SIZE 2.00" X 2.50" SET @ 300 PSIG
[ ] SIZE SET @ PSIG
DRIP PAN ELBOW(S): (2) 299-J, 2.5"
FEEDWATER VALVE(S): LS [X] RS [ ] [M]
GATE POWELL FIG. NO. GA08TA58GB SIZE 2.00"
CHECK: POWELL FIG. NO. SW08TA58GB SIZE 2.00"
****
FEEDWATER CONTROL: ON-OFF [ ] ELECT.MOD. X
PNEUMATIC MOD. ATO [ ] ATC [ ]
LEVEL CONTROLLER 3051CD1A02A1AE5S5Q4 [M]

VALVE MAKE 4446PMSE / 7285C SIZE 1.25"

3-VALVE BY-PASS: [P]
[2] GATE POWELL FIG. NO. GA08TA58GB SIZE 2.00"
[1] GLOBE POWELL FIG. NO. GL08TA58GB SIZE 2.00"
****
CHEMICAL FEED VALVES: LS [ ] RS [ ] [ ]
[ ] N/S FIG. NO. SIZE
[ ] N/S FIG. NO. SIZE
CHEMICAL FEED CONNECTION WITH DIFFUSER [ ]

SURFACE BLOWDOWN VALVE(S): LS [X] RS [ ] [M]
METERING AVP-3131 / NANO BO-W SIZE .75"
STOP POWELL FIG. NO. GA08TA58GB SIZE 1.00"
FULL LENGTH SKIMMER [ ] N/S

BOTTOM BLOWOFF VALVE(S): LS [X] RS [ ] [M]
[2] EVERLASTING FIG. NO. 4000-S(57) SIZE 2.00"
[1] EVERLASTING FIG. NO. 4060-S(57) SIZE 2.00"

COMPLETED BY: DATE
SALES: JB 3/19/24
ENG.: MM 7/1/24
ACCOUNT MANAGER:
SCOTT AVERY

BOILER TO MEET THE FOLLOWING CODES:
UL LABEL [ ] [ ]
LOW FIRE/ELECTRIALTEST ONLY [X] FULL FIRETEST [ ]

[M]	SHIPPED MOUNTED	[N/A]	NOT APPLICABLE
[L]	SHIPPED LOOSE	[N/S]	NOT SUPPLIED
[P]	PREPIPED/SHIPPED LOOSE	[CF]	CUSTOMER FURNISHED

REVISIONS

REV.	DATE	BY

SUPERIOR BOILER

J.O. NO. 9000457

SPEC SHEET PAGE 2 OF 3

S.O. NO. 249237 BURNER S/N

BURNER ORDERED ☐ P.O. NO.

BURNER MFG. POWER FLAME MODEL LNICM12-GO-40

FUELS: GAS TYPE NATURAL OIL: # 2 AIR ATOMIZING X PRESSURE ATOMIZING ☐

FIRING RATE: GAS 42000 CFH OF 1000 BTU/CF 300 GPH OF 140000 BTU/GAL

BURNER OPERATION: FULL MODULATION X OTHER

AVAILABLE GAS PRESSURE 25 PSIG VOLTAGE: 480 VOLT 60 HZ 3 PH

CODES: UL CSD-1 X IRI FM NFPA 85 X OTHER

GAS TRAIN: SIZE 4" MOUNTED LS RS X

CONTROL PANEL: MOUNTED LS RS

BOILER SKID BURNER REMOTE X

FGR PIPING 12" LS RS X NOx 30PPM

BLOWER MOTOR 60 HP ODP ☐ TEFC X HI EFF X

FLAME SAFEGUARD FIREYE YB110

OIL SIDE:

CIRCULATING OIL PUMP : LS RS L

PRESSURE ATOMIZING OIL PUMP:
SKID MOUNTED ☐ LS RS

AIR COMPRESSOR: LS RS L

SPECIAL INSTRUCTIONS

BOILER COMBUSTION CONTROL SYSTEM ALLEN BRADLEY COMPACTLOGIX

CONTROL PANEL IS 72" X 36" X 18" NEMA 4X

VFD (SHIPS LOOSE)

DRAFT PRESSURE GAUGE (Ashcroft 60 1189AS02L N10/10IW)

NATURAL GAS FLOW METER WITH BURNER SHIPS LOOSE

OIL FLOW METER WITH BURNER SHIPS LOOSE

Mitchell, Zenovia A CIV USN NAVFAC WASHINGTON DC (USA)

From: Kristen Lentz <klentz@greenlandenterprises.com>
Sent: Friday, August 29, 2025 3:44 PM
To: Matt Steele; Mitchell, Zenovia A CIV USN NAVFAC WASHINGTON DC (USA)
Subject: [Non-DoD Source] RE: Bldg. 712 Steam B - Boiler Submittal

Hi Matt,

Thank you!

@Mitchell, Zenovia A CIV USN NAVFAC WASHINGTON DC (USA) please see response from Superior's Engineer.

Kristen Lentz
Assistant Project Manager
Greenland Enterprises, Inc.
11864 Fishing Point Drive
Newport News, VA 23606
Email: klentz@greenlandenterprises.com
Mobile: 757-660-3398
Web: www.greenlandenterprises.com

From: Matt Steele <msteele@superiorboiler.com>
Sent: Friday, August 29, 2025 3:09 PM
To: Kristen Lentz <klentz@greenlandenterprises.com>
Subject: Fw: Bldg. 712 Steam B - Boiler Submittal

Kristen,

It is our standard to provide stack measurements in SCFM like you provided below. Since it is a standardized flow, flow rate in SCFM does not vary with temperature, elevation, duct size, or barometric pressure.

Using the 283°F out of the economizer, 60% relative humidity, and 105 FASL, actual volumetric flow is 12532 ACFM. The exit of the economizer is 31.5" x 19.5" for a cross sectional area of 4.26 ft². With this area, velocity is 49 ft/s.

If the duct size or operating conditions change, the flow rate will also change.

Thank you

Matt

From: Kristen Lentz <klentz@greenlandenterprises.com>
Sent: Friday, August 29, 2025 1:18 PM

To: Matt Steele <msteele@superiorboiler.com>
Subject: FW: Bldg. 712 Steam B - Boiler Submittal

Matt,

See Zenovia's question I can't answer. Can you shed some light here?

Kristen Lentz

Assistant Project Manager

Greenland Enterprises, Inc.

11864 Fishing Point Drive

Newport News, VA 23606

Email: klentz@greenlandenterprises.com

Mobile: 757-660-3398

Web: www.greenlandenterprises.com

From: Mitchell, Zenovia A CIV USN NAVFAC WASHINGTON DC (USA) <zenovia.a.mitchell.civ@us.navy.mil>
Sent: Friday, August 29, 2025 12:23 PM
To: Kristen Lentz <klentz@greenlandenterprises.com>
Subject: Re: Bldg. 712 Steam B - Boiler Submittal

Hi Kristen,

Thank you, however flue gas flow was already provided. I am looking for the exhaust exit velocity measured in ft/sec. Thank you!

Kristen Lentz
Assistant Project Manager
Greenland Enterprises, Inc.
11864 Fishing Point Drive
Newport News, VA 23606
Email: klentz@greenlandenterprises.com
Mobile: 757-660-3398
Web: www.greenlandenterprises.com

From: Matt Steele <msteele@superiorboiler.com>
Sent: Thursday, August 28, 2025 4:04 PM
To: Kristen Lentz <klentz@greenlandenterprises.com>
Subject: Re: Bldg. 712 Steam B - Boiler Submittal

Kristen,

Stack is 32" ID

Flue gas Flow is 8,769 SCFM@100%, 6577 SCFM @75%, 4,384 SCFM @ 50%, and 2192 SCFM@25% firing rates.

Thank you

Matt Steele
VP of Sales & Marketing
Superior Boiler
3524 E. 4th Ave
Hutchinson, KS 67501
www.superiorboiler.com

From: Kristen Lentz <klentz@greenlandenterprises.com>
Sent: Thursday, August 28, 2025 10:25 AM
To: Matt Steele <msteele@superiorboiler.com>
Subject: RE: Bldg. 712 Steam B - Boiler Submittal

Matt,

Disregard information previously requested. Zenovia located boiler specs but is not looking for Boiler stack diameter and velocity. Can you provide this? Thanks,

Kristen Lentz
Assistant Project Manager
Greenland Enterprises, Inc.
11864 Fishing Point Drive
Newport News, VA 23606
Email: klentz@greenlandenterprises.com
Mobile: 757-660-3398