

**PREVENTION OF SIGNIFICANT DETERIORATION
PRECONSTRUCTION REVIEW AND PRELIMINARY DETERMINATION
FOR HOLSTON ARMY AMMUNITION PLANT
BAE ORDNANCE SYSTEMS, INC.
IN HAWKINS COUNTY, TENNESSEE**

**This review was performed by the Tennessee
Air Pollution Control Division in accordance
with the Rules for Prevention of Significant
Deterioration.**

August 16, 2018

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I. Rule Background

On June 3, 1981, the State of Tennessee adopted Tennessee Comprehensive Rules and Regulations (Tenn. Comp. R. & Regs.) Rule 1200-03-09-.01(4), Prevention of Significant Air Quality Deterioration. This Rule has been subsequently amended, with the latest amendments effective April 24, 2013. Under these regulations, a source that is included in one of 28 source categories and has the potential or increased potential to emit 100 tons per year or more of any air pollutant regulated in the Clean Air Act must be reviewed with regard to significant deterioration prior to construction. In addition, any source having the potential or increased potential to emit 250 tons per year or more of any of these air pollutants must be reviewed with the same regard.

To comply with the amended PSD regulations, a source with potential emissions greater than significant amounts of a regulated pollutant must meet several criteria. The first criterion is that Best Available Control Technology (BACT) must be applied to all emission points for the applicable PSD pollutant. The second criterion is that the proposed source or modification must not cause or contribute to any violation of the National Ambient Air Quality Standards (NAAQS – see **Table 1**). Finally, increases in ambient concentrations of sulfur dioxide, nitrogen dioxide and particulate matter resulting from emissions discharged by the proposed source must not exceed the increments specified by the PSD regulations (**Table 2**).

Table 1: National Ambient Air Quality Standards			
Pollutant		Averaging Period	Standard
Particulate Matter	(PM ₁₀)	24-hour	150 µg/m ³
	(PM _{2.5})	Annual	12.0 µg/m ³ (primary)
			15.0 µg/m ³ (secondary)
		24-hour	35 µg/m ³
Nitrogen Dioxide (NO ₂)		Annual (primary and secondary)	53 ppb
		1-hour (primary)	100 ppb
Carbon Monoxide (CO)		8-hour	9 ppm
		1-hour	35 ppm
Sulfur Dioxide (SO ₂)		1-hour (primary)	75 ppb
		3-hour (secondary)	0.5 ppm
Lead		3-month (primary and secondary)	0.15 µg/m ³
Ozone		8-hour (primary and secondary)	0.070 ppm

Table 2: Maximum Allowable Increases ($\mu\text{g}/\text{m}^3$) for Class II Areas	
Pollutant	$\mu\text{g}/\text{m}^3$
PM ₁₀ , annual arithmetic mean	17
PM ₁₀ , 24-hour maximum	30
PM _{2.5} , annual arithmetic mean	4
PM _{2.5} , 24-hour maximum	9
Sulfur dioxide: Annual arithmetic mean	20
Sulfur dioxide: 24-hour maximum	91
Sulfur dioxide: 3-hour maximum	512
Nitrogen dioxide: Annual arithmetic mean	25

II. Project Background and Description

On May 31, 2018, BAE SYSTEMS Ordnance Systems, Inc. (BAE) submitted an application for a permit to construct and operate an expansion of an existing explosives manufacturing operation at the Holston Army Ammunition Plant Area B facility located in Hawkins County. The proposed expansion is a multi-phase project, and the current application covers the first phase only. Phase I will include four new natural gas and oil-fired boilers and operations for recrystallization, coating, and milling of explosives. Phase I will also include the retirement of four existing coal-fired boilers upon startup of the new boilers.

The proposed expansion is projected to result in an increase in the amount of potentially contaminated explosive material requiring thermal treatment at the permitted open burning site at Holston Army Ammunition Plant¹. The increase would not constitute a physical change or change in the method of operation at the existing source, but the change in emissions of each pollutant must be considered to determine if emissions exceed the significance thresholds established by Tennessee's PSD regulations. The change

¹ For PSD applicability, Tenn. Comp. R. & Regs. 1200-03-09-.01(4)(b)2 defines a major modification as any physical change in or change in the method of operation of a major stationary source that would result in a significant emissions increase and significant net emissions increase of a regulated NSR pollutant from the major stationary source. A physical change or change in the method of operation does not include an increase in the production rate, unless the increase would be prohibited under a legally enforceable permit condition established after January 6, 1975 or otherwise prohibited under Tennessee's air regulations.

Tenn. Comp. R. & Regs. 1200-03-09-.01(4)(b)4 states that a net emissions increase is calculated as the emissions increase from a particular physical change or change in the method of operation at a stationary source, plus any other increases and decreases in actual emissions that are contemporaneous with the particular change and are otherwise creditable.

BAE's application includes the contemporaneous increase in open burning emissions associated with this project. However, because open burning will not exceed the limit established in Title V Operating Permit 568188, the change is not a modification.

in open burning emissions was established as described in Section 2.1.7.1 of the application².

The proposed modification will result in significant net emissions increases for volatile organic compounds (VOC) and greenhouse gases (CO₂e). The project is therefore subject to review under the regulations governing the Prevention of Significant Air Quality Deterioration (PSD). Although the net emissions increase for carbon monoxide (CO) is currently below the PSD significance level, CO emissions are being treated as significant given the multi-phase nature of the project and the associated uncertainty in current emissions estimates.

III. Information Used in Analysis

The applicant provided the following information in their May 31, 2018, permit application (Appendix B). The proposed modification will affect the emission sources listed in **Tables 3a and 3b**.

² The increase in open burning will result in emission increases of 9.4 tons/year of PM_{2.5}, 0.4 tons/year of SO₂, 5.1 tons/year of NO_x, 38.2 tons/year of CO, and 10.2 tons/year of VOC. The increases in PM_{2.5}, SO₂, and NO_x emissions will be offset by emissions decreases resulting from the retirement of the coal-fired boilers. The increases in CO and VOC emissions due to open burning were considered in determining that a significant net emissions increase occurred for each pollutant.

Table 3a: Source Description (Process Vents)						
Emission Source	Stack ID	Description	Stack Height (ft)	Stack Diameter (ft)	Stack Exit Velocity (ft/s)	Stack Exit Temperature (° F)
37-0028-120, 121, 122, 123	A, B, C, D	Four 327 MMBtu/hr natural gas and oil-fired boilers. Stack parameters are identical for Stacks A, B, C, and D.	75	5.0	60	300
37-0028-125	A	Recrystallization	52	0.172	2.16	85
	E	Coating	52	0.172	12.7	122
37-0028-126	A	Milling (insignificant)	11	2.0	33.4	175
	B	Milling (insignificant)	11	2.0	34.0	70
	C, D	Milling (insignificant)	18	0.33	100	80

Table 3b: Source Description (Storage Vessels and Emergency Engines)			
Emission Source	Stack ID	Description	Stack/Emission Point Information
37-0028-124	N/A	Two fuel oil storage tanks	0.2 tons/year VOC - insignificant
37-0028-125	B	Saturated water tank	97% water, 3% VOC
	C	Decant tank	50% water, 50% VOC
	D	Solvent tank	100% VOC
	F	Solvent tank	100% VOC
37-0028-127	N/A	Three compression ignition emergency generators, 1,490 hp each	NSPS IIII

IV. Emissions Analysis

Projected emissions increases from the proposed modification (**Table 4**) were obtained from the information and assumptions given in the May 31, 2018, permit application.

Table 4: Projected Emissions Increases			
Pollutant	Project Emissions Increase (tons/year)	PSD Significance Threshold (tons/year)	Subject to PSD Review?
CO	71.4	100	Yes
NO _x	(49.2)	40	No
SO ₂	(1,717)	40	No
PM ₁₀	(7.3)	15	No
PM _{2.5}	(9.7)	10	No
VOC	106.5	40	Yes
CO ₂ e	509,908	75,000	Yes

V. Control Technology Review

V.1. New Source Performance Standards (NSPS)

The New Source Performance Standards (NSPS) are national emission standards that apply to specific categories of new sources. As stated in the Clean Air Act Amendments of 1977, these standards “shall reflect the degree of emission limitation and the percentage reduction achievable through application of the best technological system of continuous emission reduction the Administrator determines has been adequately demonstrated.”

Dual-Fuel (Natural Gas and Oil) Boilers

The four natural gas and oil-fired boilers are subject to 40 CFR 60 Subpart Db (Standards of Performance for Industrial-Commercial-Institutional Steam Generating Units). Subpart Db applies to each steam generating unit that commences construction, modification, or reconstruction after June 19, 1984, and that has a heat input capacity greater than 29 MW (100 MMBtu/hr). Subpart Db limits emissions from these boilers as follows:

- §60.42b(k) limits SO₂ emissions from an affected facility that commences construction, reconstruction, or modification after February 28, 2005, and that combusts oil, natural gas, or a mixture of these fuels to 0.20 lb/MMBtu or to 8% of the potential SO₂ emission rate (92% reduction) and 1.2 lb/MMBtu. Units firing only very low sulfur oil (no more than 0.5% sulfur by weight) or gaseous fuel are exempt from the SO₂ emission limit.

- §60.43b(h) limits PM emissions from an affected facility that commences construction, reconstruction, or modification after February 28, 2005, and that combusts oil or a mixture of oil and natural gas to 0.030 lb/MMBtu. An affected facility not located in a noncontinental area that commences construction, reconstruction, or modification after February 28, 2005 and combusts only oil that contains no more than 0.30% sulfur by weight (alone or in combination with other fuels not subject to a PM standard in §60.43b) and not using a post-combustion technology (except a wet scrubber) to reduce SO₂ or PM emissions is not subject to the PM standard.
- For boilers with a high heat release rate³, §60.43b(l) limits NO_x emissions from an affected facility that commences construction after July 9, 1997 to 0.20 lb/MMBtu (as NO₂) if the affected facility combusts coal, oil, or natural gas (or any combination of the three), alone or with any other fuels.

Storage Vessels

40 CFR 60 Subpart Kb (Standards of Performance for Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced After July 23, 1984) applies to each storage vessel with a capacity greater than or equal to 75 m³ (19,813 gallons) that is used to store volatile organic liquids for which construction, reconstruction, or modification is commenced after July 23, 1984.

Subpart Kb does not apply to storage vessels with a capacity greater than or equal to 151 m³ (39,890 gallons) storing a liquid with a maximum true vapor pressure less than 3.5 kPa or with a capacity greater than or equal to 75 m³ but less than 151 m³ storing a liquid with a maximum true vapor pressure less than 15.0 kPa.

The proposed modification includes two fuel oil storage tanks (1,024,000 gallons each) storing a liquid with a maximum true vapor pressure less than 3.5 kPa. The modification also includes four additional storage tanks with a capacity of less than 75 m³ each. Because the storage vessels do not meet the volume or vapor pressure requirements, Subpart Kb does not apply.

Distillation Columns

³ Subpart Db defines “heat release rate” as the steam generating unit design heat input capacity (in Btu/hr) divided by the furnace volume (in cubic feet). The furnace volume is that volume bounded by the front furnace wall where the burner is located, the furnace side waterwall, and extending to the level just below or in front of the first row of convection pass tubes. A “high heat release rate” is a heat release rate greater than 70,000 Btu/hr-ft³. The heat release rate for these boilers is 75,614 70,000 Btu/hr-ft³ (6/20/2018 e-mail from Jimmy Ogle to Travis Blake).

40 CFR 60 Subpart NNN (Standards of Performance for Volatile Organic Compound (VOC) Emissions from Synthetic Organic Chemical Manufacturing Industry (SOCMI) Distillation Operations) applies to each distillation unit identified in §60.660(b) that is part of a process unit that produces any of the chemicals listed in §60.667 as a product, co-product, by-product, or intermediate, except as exempted in §60.660(c). The application states that the new emission sources included in Phase I do not produce the specific chemicals listed in §60.667 and are therefore not subject to Subpart NNN. Pursuant to §60.660(c)(3), any distillation unit that is designed and operated as a batch operation is not an NSPS NNN affected facility.

Equipment Leaks

40 CFR 60 Subpart VVa applies to affected facilities in the synthetic organic chemicals manufacturing industry, including each pump, compressor, pressure relief device, sampling connection system, open-ended valve or line, valve, and flange or other connector in VOC service within a process unit, as defined in §60.481a. A new or modified process unit is subject to Subpart VVa if it produces, as intermediate or final products, one or more of the chemicals listed in §60.489.

The application includes processes that use three chemicals listed in §60.489 (acetic acid, acetic anhydride, and cyclohexanone). 40 CFR 60 does not define “intermediate or final products,” but EPA’s applicability determination index states that “EPA considers either of the following downstream uses as indicative of the production of a listed chemical as a “product”: 1) production for sale as that listed chemical; or 2) use in another process where that listed chemical is needed⁴.” However, raw materials that are used as solvents and do not participate in chemical reactions are not “intermediates or final products” for the purpose of Subpart VVa.

Cyclohexanone is used as a solvent in the process but does not participate in any reactions. Thus, the processes that use cyclohexanone are not subject to Subpart VVa⁵. Similarly, Subpart VVa would not apply to a feedstock material such as acetic acid⁶. Acetic anhydride is produced on site for use in a downstream process and would be considered an intermediate product. Subpart VVa would apply to new or modified sources that produce or use acetic anhydride.

None of the proposed new emission units in Phase I use acetic anhydride. §§60.14(a) and (b) define a modification as any physical or operational change to an existing facility which results in an increase in the emission rate (in kg/hr) of any pollutant to which a standard applies.

⁴ U. S. EPA Applicability Determination #9700142, April 6, 1994.

⁵ U. S. EPA Applicability Determination #9600057, February 16, 1995.

⁶ U. S. EPA Applicability Determination #9700121, August 2, 1994.

However, §60.14(e) states that an increase in production rate of an existing facility *is not* a modification, if that increase can be accomplished without a capital expenditure on that facility. The application indicates that the production increases at existing facilities are not associated with a capital expenditure on those facilities, so the existing facilities using acetic anhydride are not “modified” as defined by Part 60. Thus, Subpart VVa does not apply to Phase I.

Stationary Internal Combustion Engines

The proposed new emergency engines are subject to 40 CFR 60 Subpart IIII (Standards of Performance for Stationary Compression Ignition Internal Combustion Engines). The new units will be subject to emission standards, fuel, monitoring, compliance, notification, recordkeeping, and reporting requirements under Subpart IIII.

V.2. National Emission Standards for Hazardous Air Pollutants (NESHAP)

EPA has promulgated National Emission Standards for Hazardous Air Pollutants (NESHAPs) for Hazardous Air Pollutants (HAPs) for various industrial categories. Sources in these categories that emit more than 10 tons per year of a single HAP or 25 tons per year of total HAPs are subject to major source NESHAPs. The Holston Army Ammunition Plant is a major source of organic HAP emissions.

Dual-Fuel (Natural Gas and Oil) Boilers

The four natural gas and oil-fired boilers are subject to 40 CFR 63 Subpart DDDDD (National Emission Standards for Hazardous Air Pollutants for Major Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters). Subpart DDDDD establishes emission limits and work practice standards for HAP emitted from industrial, commercial, and institutional boilers and process heaters located at major sources of HAP emissions. §63.7500(a)(1) requires the boilers to comply with the emission limits, operating limits, and work practice standards listed in Subpart DDDDD, as follows:

- HCl and mercury limits (Table 1 to Subpart DDDDD, units designed to burn liquid fuel)
- CO and filterable PM (or TSM) limits (Table 1 to Subpart DDDDD, units designed to burn liquid fuel)
- Periodic boiler tune-ups (annually, or every 5 years for boilers equipped with a continuous oxygen trim system, Table 3 to Subpart DDDDD).
- Comply with work practice requirements during startup and shutdown (Table 3 to Subpart DDDDD)

- Comply with applicable performance testing and periodic monitoring requirements (Tables 4 through 8 to Subpart DDDDD)
- Submit periodic reports (Table 9 to Subpart DDDDD)

Fuel Oil Storage Vessels

There are no NESHAP standards applicable to the fuel oil storage vessels.

Chemical Manufacturing Processes

The application was evaluated to determine the applicability of 40 CFR 63 Subparts F, G, and H (National Emission Standards for Organic Hazardous Air Pollutants from the Synthetic Organic Chemical Manufacturing Industry) and 40 CFR 63 Subpart FFFF (National Emission Standards for Hazardous Air Pollutants: Miscellaneous Organic Chemical Manufacturing).

Subparts F, G, and H apply to chemical manufacturing process units that manufacture a chemical listed in Table 1 to Subpart F as a primary product; manufacture tetrahydrobenzaldehyde or crotonaldehyde as a primary product; use as a reactant or manufacture, as a product or co-product, one or more of the organic hazardous air pollutants listed in Table 2 of Subpart F; and are located at a major source of HAP emissions. The process units included in this application do not manufacture as a primary product one or more of the chemicals listed in Table 1 to Subpart F and do not use as a reactant or manufacture, as a product or co-product, one or more of the organic hazardous air pollutants listed in Table 2 of Subpart F. Thus, these process units are not subject to Subparts F, G, and H.

40 CFR 63 Subpart FFFF applies to miscellaneous organic chemical manufacturing process units (MCPUs) at a major source of HAP emissions. An MCU is subject to Subpart FFFF if it satisfies all of the following requirements:

1. The MCU produces any of the materials listed in §63.2435(b)(1);
2. The MCU processes, uses, or generates any of the organic HAP listed in CAA §112(b) or hydrogen halide and halogen HAP, as defined in §63.2550; and
3. The MCU is not an affected source or part of an affected source under another subpart of 40 CFR 63.

The application indicates that the MCPUs included in Phase I do not process, use, or generate any of the organic HAP listed in CAA §112(b) or hydrogen halide and halogen HAP. Therefore, these emission sources are not subject to Subpart FFFF.

Stationary Internal Combustion Engines

The proposed new emergency engines are subject to 40 CFR 63 Subpart ZZZZ (National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines). Subpart ZZZZ establishes emission limits and operating requirements for HAPs emitted from stationary reciprocating internal combustion engines (RICE) located at major and area sources of HAP emissions.

§63.6590(b) establishes requirements for stationary RICE subject to limited requirements. A new or reconstructed emergency stationary RICE with a site rating of more than 500 brake hp located at a major source of HAP emissions does not have to meet the requirements of Subparts A and ZZZZ except for the initial notification requirements of §63.6645(f), if the engines does not operate or is not contractually obligated to be available for more than 15 hours per calendar year for the purposes specified in §63.6640(f)(2)(ii) and (iii).

V.3 Best Available Control Technology (BACT) Analysis

Pursuant to Tenn. Comp. R. & Regs. 1200-03-09-.01(4)(j), this proposed source is required to apply best available control technology (BACT) for CO, VOC, and CO₂e, since significant net emission increases are expected.

Best Available Control Technology (BACT) means an emission limitation (including a visible emission standard) based on the maximum degree of reduction for each regulated NSR pollutant which would be emitted from any proposed major stationary source or major modification which the Technical Secretary, on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs, determines is achievable for such source or modification through application of production processes or available methods, systems and techniques, including fuel cleaning or treatment or innovative fuel combustion techniques for control of such pollutant.

In no event shall application of Best Available Control Technology result in emissions of any pollutant which would exceed the emissions allowed by any applicable standard under 40 CFR part 60 or 61. If the Technical Secretary determines that technological or economic limitations on the application of measurement methodology to a particular emissions unit would make the imposition of an emission standard infeasible, a design, equipment, work practice, operational standard or combination thereof, may be prescribed instead to require the application of Best Available Control Technology. Such standard shall, to the degree possible, set forth the emissions reduction achievable by implementation of such design, equipment, work practice or operation, and shall provide for compliance by means which achieve equivalent results.

The EPA policy memorandum dated December 1, 1987, directs applicants and permit reviewers to consider all technically feasible alternatives, including those more stringent than the BACT selection. This is referred to as the "top-down BACT analysis approach". EPA's 1990 New Source Review manual summarizes the top-down BACT analysis in the following steps:

1. Identify all control technologies.
2. Eliminate technically infeasible options.
3. Rank remaining control technologies by control effectiveness.
4. Evaluate most effective controls and document results.
5. Select BACT.

The results of the BACT analysis are summarized in **Table 5**. Top-down BACT analysis provides that all available control technologies be ranked in descending order of control effectiveness. The most effective control technology is established as BACT unless the applicant demonstrates, and the permitting authority agrees, that technical considerations, or energy, environmental, or economic impacts indicate that the most effective technology is not achievable. If the most stringent technology is eliminated in this fashion, then the next most stringent alternative is considered, and so on.

Table 5: Summary of BACT Analysis			
Emission Source	Pollutant	Emission Limit	Control Technology
Dual-Fuel Boilers	VOC	0.0015 lb/MMBtu (average of three 1-hour test runs)	Oxidation catalyst and good combustion practices
	CO	0.035 lb/MMBtu when burning natural gas and 0.04 lb/MMBtu when burning oil	Oxidation catalyst and good combustion practices
	CO ₂ e	678,139 tons CO ₂ e per 12 consecutive months	Natural gas combustion and fuel efficiency
Fuel Oil Storage Tanks	VOC	0.2 tons/year	White color, submerged fill, routine maintenance
Recrystallization Tanks (Vents B, C, D, and F)	VOC	0.19 tons/year from recrystallization tanks	Submerged fill, routine maintenance
Recrystallization Process Vent (Vent A)	VOC	0.42 lb/hr (average emission rate for each batch) and 4.2 tons/year	Primary condensers in series with vent condenser
Coating Process Vent (Vent E)	VOC	0.42 lb/hr (average emission rate for each batch) and 1.8 tons/year	Vent condenser
Emergency Generators	VOC	6.4 g/kWh (NO _x + NMHC)	Engine design, NSPS III
Emergency Generators	CO	3.5 g/kWh	Engine design, NSPS III

Volatile Organic Compounds (VOC) Emissions – Dual-Fuel Boilers

BAE reviewed the following options to control VOC emissions from the natural gas and oil-fired boilers (**Table 6**). The top-down analysis for each option is presented below.

Table 6: Ranked BACT Options for VOC			
Rank	Control Option	VOC Control Efficiency	VOC Emissions (tons/year)
1	Thermal oxidation (regenerative or recuperative thermal oxidizer)	98%	0.6
2	Oxidation catalyst	20%	22.9
3	Clean fuel and good combustion practice	0%	28.6

Thermal Oxidation – Technical Feasibility: The application states that a thermal oxidizer is typically applied to exhaust streams with high VOC concentrations, and that dual-fuel boilers are designed for high combustion efficiency and low VOC emissions. The application states that a thermal oxidizer was rejected as technically infeasible based on the boiler size.

The Division of Air Pollution Control reviewed BAE's assessment using EPA's *Air Pollution Control Cost Manual*⁷ and information available from one vendor⁸. The vendor information states that thermal oxidation is feasible for VOC concentrations as low as 3% of the lower explosive limit (LEL), but EPA's manual indicates that a higher concentration (around 25% of the LEL) is more typical. The application provides VOC emission rates and stack information for each boiler (6.54 lb/hr VOC when burning natural gas, stack flow of 70,650 ACFM at 300° F). The VOC concentration in the flue gas (calculated as ethane⁹) would be about 47 ppmv at stack conditions, which is about 0.1% of the LEL for ethane. Thermal incineration of VOC is technically infeasible.

Oxidation Catalyst – Technical Feasibility: The application states that catalytic oxidation is widely used with natural gas-fired combined cycle turbines. The products of combustion in the exhaust are introduced into a catalyst bed where the VOC and CO are oxidized to CO₂ and H₂O.

The catalyst reduces the oxidation temperature to around 800° F, which reduces or eliminates the need for supplemental fuel. Typical catalytic oxidation efficiencies may be

⁷ EPA Air Pollution Control Cost Manual, 6th Edition, January 2002, Section 3.2, Chapter 2 (Incinerators).

⁸ <https://www.anguil.com/oxidizers/regenerative-thermal-oxidizer-rto/>

⁹ Natural gas is approximately 94% methane, 4% ethane, 1% nitrogen, and 0.5% carbon dioxide. The remaining 0.5% consists of various organic and inorganic constituents. See <https://www.uniongas.com/about-us/about-natural-gas/Chemical-Composition-of-Natural-Gas> for a typical assay.

as high as 90% to 99%, depending on system requirements and characteristics of the contaminated stream.

BAE proposed a BACT limit of 0.004 lb/MMBtu when burning natural gas or #2 oil using good combustion practices and an oxidation catalyst. **Table 8** shows other BACT determinations found in U. S. EPA's RACT/BACT/LAER Clearinghouse (RBLC). The search was limited to natural gas or #2 oil fired boilers with heat input capacities ranging from 250-450 MMBtu/hr and permit issuance dates of January 1, 2013, through June 25, 2018. No BACT determinations were found for #2 oil combustion. For natural gas combustion, the RBLC indicated one determination (IN-0234) with a more stringent VOC limit of 0.0015 lb/MMBtu. The PSD permit associated with IN-0234 indicated that the limit was based on good combustion practices but no add-on controls.

Pursuant to Tenn. Comp. R. & Regs. 1200-03-09-.01(4), the following limits are established as BACT for VOC: 0.0015 lb/MMBtu when burning natural gas and 0.004 lb/MMBtu when burning oil (average of three one-hour test runs). Compliance will be based upon good combustion practice and use of an oxidation catalyst.

Carbon Monoxide (CO) Emissions – Dual-Fuel Boilers

BAE reviewed the following options to control CO emissions from the natural gas and oil-fired boilers (**Table 7**). The top-down analysis for each option is presented below.

Table 7: Ranked BACT Options for CO			
Rank	Control Option	CO Control Efficiency	CO Emissions (tons/year)
1	Oxidation catalyst	50% ¹⁰	100.6
2	Clean fuel and good combustion practice	0%	201.2

Oxidation Catalyst – Technical Feasibility: The application rejects the use of an oxidation catalyst as rejected as technically infeasible because an oxidation catalyst was not used in comparable sources. The Division's review of this control technology indicates that an oxidation catalyst is technically feasible¹¹.

¹⁰ CO control efficiencies exceeding 90% have been submitted in other applications (e. g., see final determination for PSD permit 966859F, issued June 5, 2013). However, at least one PSD determination for a comparable boiler (Indiana Department of Environmental Management PSD permit 027-35177-00046, issued December 8, 2015) indicates a comparable control efficiency (50-95%) and notes that oxidation catalysts "have limited demonstration in reducing CO emissions from natural gas-fired boilers).

¹¹ An oxidation catalyst was determined to be technically feasible for two auxiliary boilers at TVA's Johnsonville cogeneration facility but was rejected for economic reasons.

BAE proposed a BACT limit of 0.035 lb/MMBtu when burning natural gas and 0.04 lb/MMBtu when burning No. 2 fuel oil based on clean fuel and good combustion practice.

Table 9 shows other BACT determinations found in the RBLC. The search was limited to natural gas or #2 oil fired boilers with heat input capacities ranging from 250-450 MMBtu/hr and permit issuance dates of January 1, 2013, through June 25, 2018. No BACT determinations were found for #2 oil combustion. For natural gas combustion, the RBLC indicated one determination (TX-0704) with a CO limit of 50 ppmvd corrected to 3% oxygen (3-hour rolling average). TX-0704 indicates that the limit is based on good combustion practices but no add-on controls.

When BAE's proposed limit (0.035 lb/MMBtu when burning natural gas) was converted to a volumetric dry basis at 3% oxygen, the CO limits for natural gas and oil combustion were about 50 ppmvd at 3% oxygen. Thus, the CO limits requested by BAE are as stringent as TX-0704

Pursuant to Tenn. Comp. R. & Regs. 1200-03-09-.01(4), the following limit is established as BACT for CO: 0.035 lb/MMBtu when burning natural gas and 0.04 lb/MMBtu when burning No. 2 fuel oil (average of three one-hour test runs). Compliance will be based upon good combustion practice and use of an oxidation catalyst.

Table 8: RBLC Search Results for VOC, Natural Gas-Fired Boilers 250-450 MMBtu/hr								
RBLC ID	Facility Name	Permit Issue Date	Process Name	Primary Fuel	Throughput (MMBtu/hr)	Pollutant	Control Method Description	Emission Limit
TX-0704	UTILITY PLANT	12/2/2014	(2) boilers	Natural Gas	450	VOC	Good Combustion Practices	0.004 lb/MMBtu
AL-0271	GEORGIA PACIFIC BRETON LLC	6/11/2014	No.4 Power Boiler	Natural Gas	425	VOC	Good Combustion Practices	0.0053 lb/MMBtu
LA-0277	COMONIMER-1 UNIT	9/1/2016	Utility Steam Boilers (3 units)		418.5	VOC	Good Operating Practices	3.23 lb/hr (hourly maximum)
*LA-0312	ST. JAMES METHANOL PLANT	6/30/2017	B1-13 - Boiler 1 (EQT0003)	Natural Gas	350	VOC	Good Combustion Practices	1.89 lb/hr
*LA-0312	ST. JAMES METHANOL PLANT	6/30/2017	B2-13 - Boiler 2 (EQT0004)	Natural Gas	350	VOC	Good Combustion Practices	1.89 lb/hr
ID-0021	MAGNIDA	4/21/2014	Package Boiler	Natural Gas	275	VOC	None listed	0.0054 lb/MMBtu (3 test run avg.)
IN-0234	GRAIN PROCESSING CORPORATION	12/8/2015	Boiler 1	Natural Gas	271	VOC	Good Combustion Practices	0.0015 lb/MMBtu (natural gas only)
IN-0234	GRAIN PROCESSING CORPORATION	12/8/2015	Boiler 2	Natural Gas	271	VOC	Good Combustion Practices	0.0015 lb/MMBtu
WY-0074	GREEN RIVER SODA ASH PLANT	11/18/2013	Natural Gas Package Boiler	Natural Gas	254	VOC	Good Combustion Practices	0.0054 lb/MMBtu (3-hr avg.)
TX-0704	UTILITY PLANT	12/2/2014	Boiler	Natural Gas	250	VOC	Good Combustion Practices	0.004 lb/MMBtu

Table 9: RBL Search Results for CO, Natural Gas-Fired Boilers 250-450 MMBtu/hr								
RBLC ID	Facility Name	Permit Issue Date	Process Name	Primary Fuel	Throughput	Pollutant	Control Method Description	Emission Limit
TX-0704	UTILITY PLANT	12/2/2014	(2) boilers	natural gas	450 MMBtu/hr	CO	Good Combustion Practices	50 ppmvd at 3% O ₂ , 3-hr rolling avg.
*LA-0312	ST. JAMES METHANOL PLANT	6/30/2017	B1-13 - Boiler 1 (EQT0003)	Natural Gas	350 MMBtu/hr	CO	Good Combustion Practices	13.3 lb/hr and 0.038 lb/MMBtu
*LA-0312	ST. JAMES METHANOL PLANT	6/30/2017	B2-13 - Boiler 2 (EQT0004)	Natural Gas	350 MMBtu/hr	CO	Good Combustion Practices	3.3 lb/hr and 0.038 lb/MMBtu
ID-0021	MAGNIDA	4/21/2014	PACKAGE BOILER	Natural Gas	275 MMBtu/hr	CO		0.015 lb/MMBtu (3 test run avg.)
IN-0234	GRAIN PROCESSING CORPORATION	12/8/2015	BOILER 1	NATURAL GAS	271 MMBtu/hr	CO	Good Combustion Practices	0.0365 lb/MMBtu and 9.89 lb/hr
IN-0234	GRAIN PROCESSING CORPORATION	12/8/2015	BOILER 2	NATURAL GAS	271 MMBtu/hr	CO	Good Combustion Practices	0.0365 lb/MMBtu and 9.89 lb/hr
WY-0074	GREEN RIVER SODA ASH PLANT	11/18/2013	Natural Gas Package Boiler	Natural Gas	254 MMBtu/hr	CO	Good Combustion Practices	0.037 lb/MMBtu and 9.4 lb/hr (30-day rolling averages)
TX-0704	UTILITY PLANT	12/2/2014	boiler	natural gas	250 MMBtu/hr	CO	Good Combustion Practices	50 ppmvd at 3% O ₂ , 3-hr rolling avg.

Greenhouse Gas Emissions (as CO₂e) – Dual-Fuel Boilers

BAE reviewed the following options to control CO₂e emissions from the natural gas and oil-fired boilers:

- Carbon Capture and Storage (CCS)
- Combustion of Clean Fuels
- Combined Heat and Power (CHP)
- Design and Operational Energy Efficiency Measures

Combined Heat and Power (production of useful heat and electricity from a single thermal source) was eliminated from consideration because it would require a “fundamental redesign” of the boilers. Other options are discussed below.

Carbon Capture and Storage (CCS) – Technical Feasibility: Carbon capture and storage technologies are utilized to concentrate CO₂ in the combustion exhaust gases. Concentrated CO₂ is then compressed for transport via a pipeline to an appropriate location for underground injection into a suitable geological storage reservoir or for use in crude oil production.

Tables 4-4 and 4-5 of the application state that there have been no CCS controls deployed or permitted in the U.S. on industrial boilers similar in size to the proposed steam generating boilers. The application states that BAE applied, in accordance with U.S. EPA guidance, an examination of the physical and chemical characteristics of the pollutant-bearing gas stream and a comparison to the gas stream characteristics of the source types to which CCS technology has been applied, as follows¹²:

In the Report of the Interagency Task Force on Carbon Capture and Storage, August 2010, the task force, when speaking of controlling CO₂ emissions from power plants, which are typically much larger than the steam generating boilers (a typical coal-fired power plant has a heat input capacity of 3,700–5,200 MMBtu/hr versus the 327 MMBtu/hr for the steam generating boilers), states that separating CO₂ from a flue gas is challenging because “a high volume of gas must be treated because the CO₂ is dilute (13–15% by volume in coal systems, 3–4% in natural gas systems); the flue gas is at low pressure (near atmospheric); trace impurities (PM, SO₂, NO_x, etc.) can degrade the CO₂ capture materials; and compressing captured CO₂ from near atmospheric pressure to pipeline pressure (about 2,000 psia) requires a large auxiliary power load.”

¹² PSD permit application 974192, page 40.

Since the steam generating boilers are much smaller than the typical power plant, the GHG emissions from the steam generating boilers will be very dilute (3-4%), and the gas stream will be at, or near, atmospheric pressure, it can be concluded that CCS is not “applicable” to control of the GHG emissions from the steam generating boilers.

BAE’s analysis is consistent with previous technical analyses for greenhouse gases¹³. The exhaust gases consist of nitrogen (N₂), CO₂, and trace impurities (e.g., CO, SO₂, PM, etc.). Separating CO₂ from the flue gas stream is challenging based on the dilute concentration and low pressure. CCS technology is rejected as technically infeasible¹⁴.

¹³ For a related review, see the final determination for PSD permit 970816F (TVA Johnsonville cogeneration plant), issued April 19, 2016.

¹⁴ EPA’s 1990 *New Source Review Workshop Manual – Prevention of Significant Deterioration and Nonattainment Area Permitting* discusses technical feasibility analysis as follows:

This step should be should be straightforward for control technologies that are demonstrated – if the control technology has been installed and operated successfully on the type of source under review, it is demonstrated and it is technically feasible. For control technologies that are not demonstrated in the sense indicated above, the analysis is somewhat more involved.

Two key concepts are important in determining whether an undemonstrated technology is feasible: “availability” and “applicability.” As explained in more detail below, a technology is considered “available” if it can be obtained by the applicant through commercial channels or is otherwise available within the common sense meaning of the term. An available technology is “applicable” if it can reasonably be installed and operated on the source type under consideration. A technology that is available and applicable is technically feasible.

A control technique is considered available, within the context presented above, if it has reached the licensing and commercial sales stage of development. A source would not be required to experience extended time delays or resource penalties to allow research to be conducted on a new technique. Neither is it expected that an applicant would be required to experience extended trials to learn how to apply a technology on a totally new and dissimilar source type. Consequently, technologies in the pilot scale testing stages of development would not be considered available for BACT review. An exception would be if the technology were proposed and permitted under the qualifications of an innovative control device consistent with the provisions of 40 CFR 52.21(v) or, where appropriate, the applicable SIP.

In 2016, the Division of Air Pollution Control reviewed information available from the DOE to determine whether CCS technology has been installed and operated successfully on a similar source. The only U. S. source that we were able to find is Southern Company’s Kemper County Energy Facility, which had not commenced operation. In 2016, the Kemper County facility abandoned CCS technology in favor of natural gas combustion (<https://www.energy.gov/fe/southern-company-kemper-county-mississippi>). SaskPower’s Boundary Dam project in Canada began operation in October 2014 but appeared to be offline in 2016. The project appears to be operating as of April 2018, but operational problems appear to be ongoing. The Boundary Dam project does not meet the “extended time delays or resource penalties” or “extended trials” criteria noted above for availability of a control technique.

Based on the criteria enumerated in EPA’s 1990 workshop manual, the Division believes that CCS would not meet either of the criteria outlined above (successful installation and operation or licensing and commercial sales) and could not be considered as technically feasible for the proposed source.

The remaining options are ranked as shown in **Table 10**. The top-down analysis for each option is presented below.

Table 10: BACT Options for CO₂e			
	Control Option	CO₂e Control Efficiency	CO₂e Emissions (tons/year)
1	Combustion of clean fuels	N/A	669,725
2	Energy efficiency	N/A	678,139

Combustion of Clean Fuels – Technical Feasibility: Combustion of natural gas is technically feasible. However, the application states that BAE will maintain fuel oil at the site if natural gas is not readily available.

Energy Efficiency – Technical Feasibility: The application states that several energy efficient design elements are available to reduce the fuel requirements for the boilers.

Proposed BACT: BAE proposed a BACT limit of 678,139 tons of CO₂e on a 12-month rolling total basis. The proposed limit is based on the global warming potential (GWP) values from Table A-1 of 40 CFR Part 98.

Table 11 shows other BACT determinations found in the RBLC. The search was limited to natural gas or #2 oil fired boilers with heat input capacities ranging from 250-450 MMBtu/hr and permit issuance dates of January 1, 2013, through June 25, 2018. No BACT determinations were found for #2 oil combustion. For natural gas combustion, the RBLC indicated CO₂e limits equivalent to 117.1 lb/MMBtu and 117.8 lb/MMBtu. The overall CO₂e emission rate for this source would be 119.9 lb/MMBtu, which is slightly higher due to the combustion of Number 2 oil as an alternate fuel.

Pursuant to Tenn. Comp. R. & Regs. 1200-03-09-.01(4), the following limits are established as BACT for CO₂e: 678,139 tons during any period of twelve consecutive months. Compliance will be based on fuel selection and energy efficiency.

Table 11: RBLC Search Results for CO₂e, Natural Gas-Fired Boilers 250-450 MMBtu/hr

RBLC ID	Facility Name	Permit issue Date	Process Name	Primary Fuel	Throughput (MMBtu/hr)	Pollutant	Control Method	Emission Limit
AL-0271	GEORGIA PACIFIC BRETON LLC	6/11/2014	No.4 Power Boiler	Natural Gas	425	CO ₂ e	None listed	117.1 lb/MMBtu, 219,214 tons/year
*LA- 0312	ST. JAMES METHANOL PLANT	6/30/2017	B1-13 - Boiler 1 (EQT0003)	Natural Gas	350	CO ₂ e	Energy efficiency	179,511 tons/year 1.05 tons CO ₂ e/ton methanol
*LA- 0312	ST. JAMES METHANOL PLANT	6/30/2017	B2-13 - Boiler 2 (EQT0004)	Natural Gas	350	CO ₂ e	Energy efficiency	179,511 tons/year 1.05 tons CO ₂ e/ton methanol year

VOC Emissions – Fuel Oil Storage Tanks

To provide fuel oil storage for the boilers, BAE proposes to install two fixed-roof 1,024,000-gallon fuel oil storage tanks. The fuel oil storage tanks qualify as insignificant emission units (potential VOC emissions of 0.2 tons/year). BAE reviewed the following options to control VOC emissions from the fuel oil storage tanks:

- Flare
- Thermal oxidation
- Condenser
- Catalytic oxidation
- Carbon adsorption
- Scrubber
- Internal floating roof
- External floating roof
- Submerged fill
- White colored tank
- Good maintenance

Technical Feasibility: The application states that all of the options listed above are technically feasible. The options are ranked as shown in **Table 10**. The top-down analysis for each option is presented below.

Table 10: BACT Options for VOC Emissions from Fuel Oil Storage			
	Control Option	VOC Control Efficiency	VOC Emissions (tons/year)
1	Flare	≥ 98%	0.004
2	Thermal oxidizer	98-99%	0.004
3	Condenser	99%	0.002
4	Catalytic oxidation	95%	0.01
5	Carbon adsorption	95%	0.01
6	Scrubber	95%	0.01
7	Internal floating roof	75-80%	0.04
8	External floating roof	75-80%	0.04
9	Submerged fill, light-colored tank, good tank maintenance	10-25%	0.2

Energy and Environmental Impact of Add-on Controls or Floating Roof: The application did not include specific information regarding energy and environmental impacts for add-on controls or floating roofs, but the Division considered these factors during review of the application (**Table 11**). The energy and environmental impacts

associated with each control technology would likely be minor but would be weighed against the small VOC reductions resulting from add-on control.

Table 11: Energy and Environmental Impacts of Add-on Controls for VOC Emissions from Fuel Oil Storage		
Control Option	Energy Impact	Environmental Impact
Flare	These controls require natural gas combustion to reduce VOC emissions.	NO _x emissions would be generated by natural gas combustion.
Thermal oxidizer		
Catalytic oxidizer		
Scrubber	Electricity required to power fans, blowers, etc.	Scrubber blowdown would require treatment or discharge.
Condenser		Environmental impacts are likely to be minimal. Some air emissions could occur if a cooling tower is used.
Carbon adsorption		Some environmental impact would result from recovery or disposal of the adsorbent and captured VOC.

Economic Impact of Add-on Controls or Floating Roof: The application states that the two tanks will have combined VOC emissions of less than 0.2 tons/year in the absence of add-on controls. Consequently, the application states that it is not economically feasible to apply any add-on controls to the tanks or to require the use of either an internal or external floating roof. BAE submitted emission calculations to demonstrate that the maximum reduction in VOC emissions due to the use of a floating roof is about 150 pounds per year¹⁵. The application did not quantify cost information for the individual BACT options, but VOC emissions from the storage tanks would be minimal, and the Division agrees that none of the add-on controls are likely to be cost-effective. Therefore, a flare, thermal oxidation, a condenser, catalytic oxidation, carbon adsorption, a scrubber, internal floating roof, and external floating roof are eliminated from further consideration.

Proposed BACT: BAE proposed a BACT limit of 0.2 tons/year VOC. The proposed limit is based on the use of a light-color tank, submerged fill, and good maintenance practices. Submerged fill (use of a fill pipe that extends to the bottom of the tank) will be used to control turbulence during filling, use of light-colored tanks will minimize heating of the fuel oil due to absorption of solar energy, and good tank maintenance will reduce emissions from both working and breathing losses.

¹⁵ BAE provided emission calculations using EPA Tanks 4.0.9d for the two tanks as fixed roof, external floating roof, and internal floating roof (Appendix B of the application).

Table 12 shows other BACT determinations found in the RBLC. The search was limited to #2 oil storage tanks and permit issuance dates of January 1, 2013, through June 28, 2018.

Table 12: RBLC Search Results for VOC, #2 Oil Storage Tanks					
RBLC ID	Facility Name	Permit Issue Date	Process Name	Control Method Description	Emission Limit
AR-0124	EL DORADO SAWMILL	8/3/2015	Three diesel storage tanks (capacity not listed)	Light color tanks	0.4 lb/hr
AR-0124	EL DORADO SAWMILL	8/3/2015	Eleven oil storage tanks (capacity not listed)	Enclosed light color tanks	0.3 lb/hr
IN-0273	ST. JOSEPH ENERGY CENTER	6/22/2017	Diesel storage tank (650 gal)	Fixed roof, good design and operating practices	None listed
IN-0273	ST. JOSEPH ENERGY CENTER	6/22/2017	Diesel storage tank (5,000 gal)	Fixed roof, good design and operating practices	None listed
FL-0346	LAUDERDALE PLANT	4/22/2014	Three ULSD fuel oil storage tanks: 80,000 bbl (3,360,000 gal), 150,000 bbl (6,300,000 gal), 75,000 bbl (3,150,000 gal)	Use of pressure relief valves & vapor condensers or use tanks with internal floating roofs or the equivalent.	None listed
MD-0042	WILDCAT POINT GENERATION FACILITY	4/8/2014	Fuel oil storage tanks: 600 gal and 3,400 gal	Periodic maintenance	0.001 tons/12 months
MD-0046	KEYS ENERGY CENTER	10/31/2014	Fuel oil storage tanks (capacity not listed)	Periodic maintenance	0.1 tons/12 months

Pursuant to Tenn. Comp. R. & Regs. 1200-03-09-.01(4), the following emission rate constitutes BACT for VOC: 0.2 tons per year. Compliance with BACT shall be assured by constructing and operating the source in accordance with the approved permit application and by routine maintenance of the tanks.

VOC Emissions – Recrystallization Process Tanks

The recrystallization process includes four fixed roof process tanks containing solvent or solvent/water mixtures (**Table 13**). The application indicates that total VOC emissions from these tanks are 0.19 tons/year (0.18 tons/year of working losses and 0.01 tons/year of breathing losses).

Table 13: Process Tanks				
Vent ID	Contents	Capacity (gallons)	Breathing Losses (tons/year)	Working Losses (tons/year)
B	97.6% water, 2.4% VOC	7,340	0	0.0063
C	50% water, 50% VOC	7,340	0.000085	0.033
D	100% VOC	7,340	0.0047	0.11
F	100% VOC	3,008	0.0073	0.027

BAE listed the following options to control VOC emissions from the tanks associated with this process as follows:

- Flare
- Thermal oxidation
- Condenser
- Catalytic oxidation
- Carbon adsorption
- Scrubber
- Internal floating roof
- External floating roof
- Submerged fill
- White colored tank
- Good maintenance

Technical Feasibility: The application states that all of the control technologies involving a flame are considered technically infeasible due to the hazards associated with the manufacture of explosives. Floating roofs were also rejected as technically infeasible because trace amounts of explosive may be present in the tanks, and a floating roof cannot be use due to explosive design standard 11507¹⁶. Use of a white or light-color tank was rejected as technically infeasible because of potential issues with leak detection and paint compatibility with explosive materials. The remaining options are ranked as shown in **Table 11**.

Table 11: BACT Options for VOC Emissions from Recrystallization Process Tanks			
	Control Option	VOC Control Efficiency	VOC Emissions (tons/year)
1	Condenser	99%	0.002
2	Carbon adsorption	95%	0.01
3	Scrubber	95%	0.01
4	Submerged fill, good tank maintenance	10-25%	0.2

Economic Impact of Add-on Controls: The application states that the four tanks will have combined VOC emissions of less than 0.2 tons/year in the absence of add-on controls. Consequently, the application states that it is not economically feasible to apply any add-on

¹⁶ Review of explosive design standards is outside of the Division's expertise. However, it is generally accepted that explosive material may ignite when subjected to frictional heat. Thus, it is in BAE's interest to minimize possible sources of friction (i. e., moving metal components) in the design of the manufacturing process. We also noted that the process tanks identified in the application are of a size (approximately 3,000 – 7,000 gallons) not generally associated with internal or external floating roofs.

controls to the tanks or to require the use of either an internal or external floating roof. The application did not quantify cost information for the individual BACT options. Because VOC emissions from the process tanks would be minimal, the Division agrees that none of the add-on controls are likely to be cost-effective. Therefore, a flare, thermal oxidation, a condenser, catalytic oxidation, carbon adsorption, a scrubber, internal floating roof, and external floating roof are eliminated from further consideration.

Proposed BACT: BAE proposes a BACT limit of 0.2 tons/year VOC. The proposed limit is based on the use of submerged fill and good maintenance practices.

Table 12 shows other BACT determinations found in the RBLC. The search was limited to storage tanks with capacities of 26,000 gallons or less¹⁷ and permit issuance dates of January 1, 2013, through June 28, 2018. The RBLC search was further narrowed by excluding determinations that were determined to be technically infeasible (internal or external floating roof and control technologies involving a flame). The VOC BACT emission limits in the RBLC ranged from 0.001 tons/year to 1.21 tons/year. Although the RBLC's limits were lower than BAE's proposed BACT for five of the seven determinations, the Division rejected the lower limit in favor of BAE's proposed limits. The Division's assessment was based on the following factors:

- The tanks identified in the RBLC are listed as storage tanks rather than process tanks. The process tanks identified in BAE's application are used to collect material discharged from the process equipment on a semi-continuous basis, so that filling of the tanks occurs more frequently.
- Vapor pressures of the stored materials ("wax", amines, PEG, TEG, and a methanol/water mix) are difficult to assess relative to BAE's tanks.
- Although the RBLC indicated lower emission limits for the storage tanks, none of the RBLC determinations indicated that add-on controls were required.

Pursuant to Tenn. Comp. R. & Regs. 1200-03-09-.01(4), the following emission rate constitutes BACT for VOC: 0.2 tons per year. Compliance with BACT shall be assured by constructing and operating the source in accordance with the approved permit application and by routine maintenance of the tanks.

¹⁷ The RBLC search indicated minimal results for tanks with less than 10,000 gallon capacity, and the search was expanded accordingly.

Table 12: RBLC Search Results for VOC, Recrystallization Process Tanks						
RBLC ID	Facility Name	Permit Issue Date	Process Name	Tank Capacity (gal)	Control Method	Emission Limit
LA-0291	LAKE CHARLES CHEMICAL COMPLEX GTL UNIT	5/23/2014	Wax Storage Tank	24,000	Fixed roof; best maintenance practices consistent with written plan	0.23 tons/year
LA-0291	LAKE CHARLES CHEMICAL COMPLEX GTL UNIT	5/23/2014	Fresh Amine Storage Tank	16,000	Fixed roof; best maintenance practices consistent with written plan	0.004 tons/year
LA-0302	LAKE CHARLES CHEMICAL COMPLEX EO/MEG UNIT	5/23/2014	Two TEG Storage Tanks	24,000 each tank	None listed	0.001 tons/year
LA-0302	LAKE CHARLES CHEMICAL COMPLEX EO/MEG UNIT	5/23/2014	PEG Storage Tank	24,000	None listed	0.001 tons/year
LA-0302	LAKE CHARLES CHEMICAL COMPLEX EO/MEG UNIT	5/23/2014	Two TEG Rundown Storage Tanks	25,569 and 26,000	None listed	0.001 tons/year
TX-0656	GAS TO GASOLINE PLANT	5/16/2014	Methanol and water storage tank	3,087	Horizontal fixed roof with submerged fill, white exterior	0.12 tons/year
TX-0722	ORGANIC CHEMICAL MANUFACTURING	3/14/2014	Storage Tanks (Fixed Roof)	Not specified	Storage tanks that are unheated and/or uninsulated will be painted white or aluminum. All tanks will utilize submerged fill.	17.3 lb/hr & 1.21 tons/year (LAER)

VOC Emissions – Recrystallization and Coating Process Vents

The recrystallization and coating processes include two process vents (Vents A and E). BAE listed the following options to control VOC emissions from these process vents as follows:

- Flare
- Thermal oxidation
- Condenser
- Catalytic oxidation
- Carbon adsorption
- Scrubber

Technical Feasibility: The application states that all of the control technologies involving a flame are considered technically infeasible due to the hazards associated with the manufacture of explosives. The remaining options are ranked as shown in **Table 12**.

Table 12: BACT Options for VOC Emissions from Recrystallization Process Vent			
	Control Option	VOC Control Efficiency	VOC Emissions (tons/year)
1	Condenser	98%	6.2
2	Carbon adsorption	95%	30
3	Scrubber	95%	30

The application states that the use of a condenser represents the most stringent technology available for control of VOC emissions from the process vents. Because the most stringent control technology is selected, an evaluation of a condenser's technical feasibility, environmental impacts, energy impacts, and economic impacts is not necessary.

Proposed BACT: BAE proposes VOC BACT limits of 0.42 lb/hr (average emission rate for each batch), 4.2 tons per year for Vent A, and 1.8 tons/year for Vent E. During the first 25% of the batch process inert materials used to fill process equipment between batches for safety purposes will be purged from the system. During that time condenser control efficiencies will be slightly reduced. Consequently, BACT for Vent A is proposed as the use of two condensers in series with a control efficiency during 25% of the batch process of 95% and a control efficiency during 75% of the batch process of 98%. These proposed efficiencies will result in an average hourly VOC emission rate for the batch of 0.42 lb/hr and an annual emission rate of 4.2 tons/year. BACT for Vent E is proposed as the use of one condenser with a control efficiency during 25% of the batch process of 95% and a control efficiency during 75% of the batch process of 98%. These proposed efficiencies will result in an average hourly VOC emission rate for the batch of 0.42 lb/hr and an annual emission rate of 1.8 tons/year.

Tables 13 and 14 show other BACT determinations found in the RBLC. The search was limited to process vents (**Table 13**) and distillation units (**Table 14**) and permit issuance dates of January 1, 2013, through June 28, 2018. This RBLC search was not narrowed by excluding determinations that were determined to be technically infeasible because all of the listed technologies used combustion to control VOC emissions.

Two RBLC determinations (TX-0823 and TX-0835) indicated higher overall control efficiencies (99.8% and 99%, respectively) than the efficiency proposed by BAE. For TX-0823, a substantial fraction of the overall control efficiency is based upon absorption of isobutylene (94% recovery efficiency) for recycle into the process. The efficiency of the final control device (flare) is listed as 98%. TX-0835 indicates that the control efficiency must be 98% for VOC compounds containing four or more carbon atoms¹⁸ and 99% for VOC

¹⁸ The solvents used by BAE in the recrystallization and coating processes contain more than four carbon atoms.

compounds containing three or fewer carbon atoms. When the site-specific factors for TX-0823 and TX-0835 are excluded from consideration, the control efficiency is equivalent to that proposed by BAE.

Pursuant to Tenn. Comp. R. & Regs. 1200-03-09-.01(4), the following limit is established as BACT for VOC: 0.42 lb/hr (average emission rate for each batch), 4.2 tons per year for Vent A, and 1.8 tons/year for Vent E.

Table 13: RBLC Search Results for VOC Emissions from Process Vents

RBLC ID	Facility Name	Permit Number	Permit Issue Date	Process Name	Throughput	Control Method Description	Emission Limit
LA-0290	LAKE CHARLES CHEMICAL COMPLEX GTL LAB-2 UNIT	PSD-LA-778	5/23/2014	Process Vents	none listed	Flare	None listed
LA-0291	LAKE CHARLES CHEMICAL COMPLEX GTL UNIT	PSD-LA-778	5/23/2014	Process Vents	none listed	Flare	None listed
LA-0297	LAKE CHARLES CHEMICAL COMPLEX LLDPE UNIT	PSD-LA-779	5/23/2014	LLDPE Unit Process Vents	none listed	Thermal Oxidizer	None listed
LA-0298	LAKE CHARLES CHEMICAL COMPLEX GUERBET ALCOHOLS UNIT	PSD-LA-779	5/23/2014	Process Vents	none listed	Flare	None listed
LA-0301	LAKE CHARLES CHEMICAL COMPLEX ETHYLENE 2 UNIT	PSD-LA-779	5/23/2014	Process Vents	none listed	Flare	None listed
LA-0302	LAKE CHARLES CHEMICAL COMPLEX EO/MEG UNIT	PSD-LA-779	5/23/2014	Process Vents	none listed	Combustion (Process Heat Boiler)	None listed
				Process Vents	none listed	Flare	None listed
LA-0303	LAKE CHARLES CHEMICAL COMPLEX ZIEGLER ALCOHOL UNIT	PSD-LA-779	5/23/2014	Reactor and Tower Process Vents	none listed	Flare	None listed

Table 13: RBLC Search Results for VOC Emissions from Process Vents

RBLC ID	Facility Name	Permit Number	Permit Issue Date	Process Name	Throughput	Control Method Description	Emission Limit
TX-0811	LINEAR ALPHA OLEFINS PLANT	136130 AND N250	11/3/2016	Process Vents	none listed	All process vents and pressure relief devices must vent to a flare or thermal oxidizer. No pressure relief device may emit directly to the atmosphere under any circumstance. The capture system must be inspected regularly to verify integrity.	0.53 tons/year (LAER)
TX-0813	ODESSA PETROCHEMICAL PLANT	16963, PSDTX1478, GHGPSDTX148	11/22/2016	Polypropylene Process Vents	437.5 MM lb/year	Emissions minimized by limited venting, and waste stream controlled by flare. The flare must conform to 40 CFR §60.18. Vent stream composition and flow must be continuously monitored to demonstrate compliance.	None listed
TX-0815	PORT ARTHUR ETHANE SIDE CRACKER	122353, PSDTX1426, GHGPSDTX114	1/17/2017	High Pressure Process Vents	none listed	Multi-Point Ground Flare. Applicant will obtain an AMOC and AMEL prior to startup of the MPGF	None listed
				Low Pressure Process Vents	none listed	Thermal Oxidizer	None listed
TX-0823	LYONDELL CHEMICAL BAYPORT CHOATE PLANT	137789 AND N244	6/7/2017	Process Vents	4,131 MM lb/year	Isobutylene absorber 94% DRE VOC for recycle to the process. The VOC-stripped absorber effluent is then routed to the flare, additional 98 % VOC DRE. The estimated combined effect approximately 99.8 % DRE.	None listed
*TX-0835	CHANNELVIEW TERMINAL	N262	4/13/2018	Process Vents to Flare	10,410,100 SCF/year	Flare designed to meet 40 CFR §60.18 with a DRE of 98% for compounds with four carbons and more and 99% for compounds with three or less. The flare has installed a continuous flow monitor and composition analyzer. Operating conditions and flaring of off-gas shall be re-evaluated every 2 years.	None listed

Table 14: RBLC Search Results for VOC Emissions from Distillation Units							
RBLC ID	Facility Name	Permit Number	Permit Issue Date	Process Name	Throughput	Control Method Description	Emission Limit
IN-0215	TRADEBE TREATMENT AND RECYCLING, LLC	089-34432-00345	02/25/2015	Solids Distillation System II	5 tons/hr	Flare	95.6 tons/hr** and 98% control efficiency (non-PSD case-by-case)
				Solids Distillation System	4 tons/hr	Flare	23.4 tons/hr** and 98% control efficiency (non-PSD case-by-case)
IN-0241	CENTRAL INDIANA ETHANOL, LLC	053-35637-00062	10/26/2015	Distillation and DDGS drying	7,266 gal/hr	RTO	98% control efficiency
LA-0298	LAKE CHARLES CHEMICAL COMPLEX GUERBET ALCOHOLS UNIT	PSD-LA-779	05/23/2014	Distillation Towers	None listed	Flare	None listed
LA-0301	LAKE CHARLES CHEMICAL COMPLEX ETHYLENE 2 UNIT	PSD-LA-779	05/23/2014	Distillation Units	None listed	Route emissions to the fuel gas system	None listed
** Limit as shown in the RBLC, should possibly be tons/year instead of tons/hr.							

VOC, CO, and CO₂e Emissions – Emergency Generators

The application states that three diesel-fired emergency generators will be used to provide backup power to the site. BAE listed the following options to control VOC, CO, and CO₂e emissions from the generators:

- Good engine design
- Good combustion practices

Technical Feasibility: The application states that both of the listed options are technically feasible. The application states that the engines will be certified to meet the required U. S. EPA emission standards based on their model year and size. In order to achieve this certification, the engines will be optimized to perform at their design capacities. Good combustion practices, including fuel-air ratios, proper operating temperatures, and proper fuel-air residence times, will be used to reduce VOC, CO, and CO₂e emissions by optimizing conditions in the combustion zone.

A top-down analysis of the listed options was not performed because federal NSPS requirements for stationary compression-ignition internal combustion engines (40 CFR 60 Subpart IIII) address both proper design and operation of emergency engines.

Proposed BACT: BAE proposes the BACT limits indicated in **Table 15**. The proposed BACT limits are based on good engine design and operation, as required by 40 CFR 60 Subpart IIII.

Table 15: BACT Limits for Emergency Engines		
Pollutant	BACT Emission Limit	Annual Emissions (tons/year)¹⁹
VOC	6.4 g/kWh NO _x +NMHC ²⁰	0.7 ²¹
CO	3.5 g/kWh	5.8
CO ₂ e	644 tons/year per engine	1,932

Tables 16, 17, and 18 show other BACT determinations found in the RBLC for VOC, CO, and CO₂e. The search was limited to emergency engines larger than 1,000 hp and permit issuance dates of January 1, 2013, through June 28, 2018. The RBLC search indicated that

¹⁹ Annual emissions are calculated for comparison purposes and do not constitute BACT. Annual emissions were calculated using emission factors from AP-42, Table 3.4-1 (VOC and CO₂e), 40 CFR 98 (CO₂e), and 40 CFR §89.112(a) (CO) using a power rating of 1,000 kW, 3 engines, and 500 operating hours per year.

²⁰ Nonmethane hydrocarbon.

²¹ Because the NSPS IIII emission limit applies to both NMHC and NO_x, the AP-42 emission factor of 0.4 g/kWh was used to calculate emissions.

“good combustion practices” and/or compliance with 40 CFR 60 Subpart IIII were the only reported control methods. No other technologies were identified for control of VOC, CO, or CO₂e emissions from the diesel-fired emergency engines.

Table 16: RBLC Search Results for VOC Emissions from Diesel-Fired Emergency Engines							
RBLC ID	Facility Name	Permit Number	Permit Issue Date	Process Name	Throughput	Control Method Description	Emission Limit
AK-0082	POINT THOMSON PRODUCTION FACILITY	AQ1201CPT03	01/23/2015	Emergency Camp Generators	2,695 hp	None listed	0.0007 lb/hp-hr
FL-0347	ANADARKO PETROLEUM CORPORATION - EGOM	OCS-EPA-R4015	09/16/2014	Main Propulsion Generator Diesel Engines	9,910 hp	Use of good combustion practices based on the most recent manufacturer's specifications issued for engines and with turbocharger, aftercooler, and high injection pressure	0.35 g/kWh (24-hr rolling avg.)
FL-0347	ANADARKO PETROLEUM CORPORATION - EGOM	OCS-EPA-R4015	09/16/2014	Emergency Diesel Engine	3,300 hp	Use of good combustion practices based on the most recent manufacturer's specifications issued for engines and with turbocharger, aftercooler, and high injection pressure	
IL-0114	CRONUS CHEMICALS, LLC	13060007	09/05/2014	Emergency Generator	3,755 hp	Tier IV standards for non-road engines at 40 CFR 1039.102, Table 7.	0.4 g/kWh
IN-0173	MIDWEST FERTILIZER CORPORATION	129-33576-00059	06/04/2014	Diesel-fired emergency generator	3,600 bhp	Good combustion practices	0.31 g/bhp-hr (3-hr avg.)
IN-0179	OHIO VALLEY RESOURCES, LLC	147-32322-00062	09/25/2013	Diesel-fired emergency generator	4,690 bhp	Good combustion practices	0.31 g/bhp-hr (3-hr avg.)
IN-0180	MIDWEST FERTILIZER CORPORATION	129-33576-00059	06/04/2014	Diesel-fired emergency generator	3,600 bhp	Good combustion practices	0.31 g/bhp-hr (3-hr avg.)
IN-0263	MIDWEST FERTILIZER COMPANY LLC	129-36943-00059	03/23/2017	Emergency generators (EU014A AND EU-014B)	3,600 hp each	Good combustion practices	0.35 g/bhp-hr each (3-hr avg.), 500 hr/year each
LA-0272	AMMONIA PRODUCTION FACILITY	PSD-LA-768	03/27/2013	Emergency diesel generators (2205-B)	1,200 hp	Compliance with 40 CFR 60 Subpart IIII; good combustion practices.	6.4 g/kWh (NOX + NMHC)

Table 16: RBLC Search Results for VOC Emissions from Diesel-Fired Emergency Engines							
RBLC ID	Facility Name	Permit Number	Permit Issue Date	Process Name	Throughput	Control Method Description	Emission Limit
LA-0288	LAKE CHARLES CHEMICAL COMPLEX	PSD-LA-778	05/23/2014	Emergency Diesel Generators (EQT 629, 639, 838, 966, & 1264)	2,682 hp	Comply with 40 CFR 60 Subpart IIII; operate the engine in accordance with the engine manufacturer's instructions and/or written procedures designed to maximize combustion efficiency and minimize fuel usage.	0.85 lb/hr (hourly maximum), 0.04 tons/year (annual maximum)
LA-0292	HOLBROOK COMPRESSOR STATION	PSD-LA-769(M-1)	01/22/2016	Emergency Generators No. 1 & No. 2	1,341 hp	Good combustion practices consistent with the manufacturer's recommendations to maximize fuel efficiency and minimize emissions	0.83 lb/hr (hourly maximum), 0.04 tons/year (annual maximum), 0.28 g/bhp-hr
LA-0296	LAKE CHARLES CHEMICAL COMPLEX LDPE UNIT	PSD-LA-779	05/23/2014	Emergency Diesel Generators (EQTs 622, 671, 773, 850, 994, 995, 996, 1033, 1077, 1105, & 1202)	2,682 hp	Compliance with 40 CFR 60 Subpart IIII; operating the engine in accordance with the engine manufacturer's instructions and/or written procedures (consistent with safe operation) designed to maximize combustion efficiency and minimize fuel usage.	0.85 lb/hr (hourly maximum), 0.04 tons/year (annual maximum)
LA-0309	BENTELER STEEL TUBE FACILITY	PSD-LA-774(M1)	06/04/2015	Emergency Generator Engines	2,922 hp each	Complying with 40 CFR 60 Subpart IIII	
*LA-0312	ST. JAMES METHANOL PLANT	PSD-LA-780(M-1)	06/30/2017	DEG1-13 - Diesel Fired Emergency Generator Engine (EQT0012)	1,474 hp	Compliance with NSPS Subpart IIII	0.04 lb/hr
LA-0313	ST. CHARLES POWER STATION	PSD-LA-804	08/31/2016	SCPS Emergency Diesel Generator 1	2,584 hp	Good combustion practices	27.34 lb/hr (hourly maximum), 6.84 tons/year (annual maximum)

Table 16: RBLC Search Results for VOC Emissions from Diesel-Fired Emergency Engines							
RBLC ID	Facility Name	Permit Number	Permit Issue Date	Process Name	Throughput	Control Method Description	Emission Limit
*LA-0315	G2G PLANT	PSD-LA-781	05/23/2014	Emergency Diesel Generator 1	5,364 hp	Compliance with 40 CFR 60 Subpart IIII and 40 CFR 63 Subpart ZZZZ	3.86 lb/hr (hourly maximum), 0.19 tons/year (annual maximum), 4.8 g/bhp-hr
*LA-0315	G2G PLANT	PSD-LA-781	05/23/2014	Emergency Diesel Generator 2	5,364 hp	Compliance with 40 CFR 60 Subpart IIII and 40 CFR 63 Subpart ZZZZ	3.86 lb/hr (hourly maximum), 0.19 tons/year (annual maximum), 4.8 g/bhp-hr
LA-0316	CAMERON LNG FACILITY	PSD-LA-766(M3)	02/17/2017	emergency generator engines (6 units)	3,353 hp	Complying with 40 CFR 60 Subpart IIII	
MD-0044	COVE POINT LNG TERMINAL	PSC CASE NO. 9318	06/09/2014	Emergency generator	1,550 hp	Use only ULSD, good combustion practices, and designed to achieve emission limit	4.8 g/bhp-hr (combined NOX + NMHC), 6.4 g/kWh (combined NOX + NMHC)
NY-0103	CRICKET VALLEY ENERGY CENTER	3-1326-00275/00009	02/03/2016	Black start generator	3,000 kW	Compliance demonstrated with vendor emission certification and adherence to vendor-specified maintenance recommendations.	0.11 g/bhp-hr
OH-0352	OREGON CLEAN ENERGY CENTER	P0110840	06/18/2013	Emergency generator	2,250 kW	Purchased certified to the standards in NSPS Subpart IIII	3.93 lb/hr.98 tons/year (12-month rolling total) 500 hours of operation per rolling 12-months.
OK-0154	MOORELAND GENERATING STA	2008-302-C(M-1)PSD	07/02/2013	Diesel-fired emergency generator	1,341 hp	Combustion control	0.0007 lb/hp-hr
TX-0728	PEONY CHEMICAL MANUFACTURING FACILITY	118239, N200	04/01/2015	Emergency Diesel Generator	1,500 hp	Minimized hours of operations Tier II engine	0.7 lb/hr.02 tons/year

Table 16: RBLC Search Results for VOC Emissions from Diesel-Fired Emergency Engines							
RBLC ID	Facility Name	Permit Number	Permit Issue Date	Process Name	Throughput	Control Method Description	Emission Limit
WV-0025	MOUNDSVILLE COMBINED CYCLE POWER PLANT	R14-0030	11/21/2014	Emergency Generator	2,015.7 hp	None listed	1.24 lb/hr

Table 17: RBLC Search Results for CO Emissions from Diesel-Fired Emergency Engines							
RBLC ID	Facility Name	Permit Number	Permit Issue Date	Process Name	Throughput	Control Method Description	Emission Limit
AK-0082	POINT THOMSON PRODUCTION FACILITY	AQ1201CPT03	1/23/2015	Emergency Camp Generators	2,695 hp	None listed	2.6 g/hp-hr
FL-0347	ANADARKO PETROLEUM CORPORATION - EGOM	OCS-EPA-R4015	9/16/2014	Main Propulsion Generator Diesel Engines	9,910 hp	Use of good combustion practices based on the most recent manufacturer's specifications issued for engines and with turbocharger, aftercooler, and high injection pressure	0.8 g/kWh (24-hr rolling average)
FL-0347	ANADARKO PETROLEUM CORPORATION - EGOM	OCS-EPA-R4015	9/16/2014	Emergency Diesel Engine	3,300 hp	Use of good combustion practices based on the most recent manufacturer's specifications issued for engines and with turbocharger, aftercooler, and high injection pressure	None listed
IL-0114	CRONUS CHEMICALS, LLC	13060007	9/5/2014	Emergency Generator	3,755 hp	Tier IV standards for non-road engines at 40 CFR 1039.102, Table 7.	3.5 g/kWh
IN-0173	MIDWEST FERTILIZER CORPORATION	129-33576-00059	6/4/2014	Diesel-fired emergency generator	3,600 bhp	Good combustion practices	2.61 g/bhp-hr (3-hr avg.)
IN-0179	OHIO VALLEY RESOURCES, LLC	147-32322-00062	9/25/2013	Diesel-fired emergency generator	4,690 bhp	Good combustion practices	2.61 g/bhp-hr (3-hr avg.)
IN-0180	MIDWEST FERTILIZER CORPORATION	129-33576-00059	6/4/2014	Diesel-fired emergency generator	3,600 bhp	Good combustion practices	2.61 g/bhp-hr (3-hr avg.)

Table 17: RBLC Search Results for CO Emissions from Diesel-Fired Emergency Engines

RBLC ID	Facility Name	Permit Number	Permit Issue Date	Process Name	Throughput	Control Method Description	Emission Limit
IN-0263	MIDWEST FERTILIZER COMPANY LLC	129-36943-00059	3/23/2017	2 emergency generators	3,600 hp each	Good combustion practices	2.61 g/bhp-hr (3-hr avg.), 500 hr/year each
LA-0272	AMMONIA PRODUCTION FACILITY	PSD-LA-768	3/27/2013	Emergency generator	1,200 hp	Compliance with 40 CFR 60 Subpart IIII; good combustion practices.	3.5 g/kWh
LA-0288	LAKE CHARLES CHEMICAL COMPLEX	PSD-LA-778	5/23/2014	Emergency Diesel Generators (EQT 629, 639, 838, 966, & 1264)	2,682 hp	Comply with 40 CFR 60 Subpart IIII; operate the engine in accordance with the engine manufacturer's instructions and/or written procedures designed to maximize combustion efficiency and minimize fuel usage.	15.43 lb/hr (hourly maximum) 0.77 tons/year (annual maximum)
LA-0296	LAKE CHARLES CHEMICAL COMPLEX LDPE UNIT	PSD-LA-779	5/23/2014	Emergency Diesel Generators (EQTs 622, 671, 773, 850, 994, 995, 996, 1033, 1077, 1105, & 1202)	2,682 hp	Compliance with 40 CFR 60 Subpart IIII; operating the engine in accordance with the engine manufacturer's instructions and/or written procedures (consistent with safe operation) designed to maximize combustion efficiency and minimize fuel usage.	15.43 lb/hr (hourly maximum) 0.77 tons/year (annual maximum)
LA-0305	LAKE CHARLES METHANOL FACILITY	PSD-LA-803(M1)	6/30/2016	Diesel Engines (Emergency)	4,023 hp	Complying with 40 CFR 60 Subpart IIII	0
LA-0309	BENTELER STEEL TUBE FACILITY	PSD-LA-774(M1)	6/4/2015	Emergency Generator Engines	2,922 hp each	Complying with 40 CFR 60 Subpart IIII	0
LA-0312	ST. JAMES METHANOL PLANT	PSD-LA-780(M-1)	6/30/2017	DEG1-13 - Diesel Fired Emergency Generator Engine (EQT0012)	1,474 hp	Compliance with NSPS Subpart IIII	0.51 lb/hr

Table 17: RBLC Search Results for CO Emissions from Diesel-Fired Emergency Engines							
RBLC ID	Facility Name	Permit Number	Permit Issue Date	Process Name	Throughput	Control Method Description	Emission Limit
LA-0313	ST. CHARLES POWER STATION	PSD-LA-804	8/31/2016	SCPS Emergency Diesel Generator 1	2,584 HP	Compliance with NESHAP 40 CFR 63 Subpart ZZZZ and NSPS 40 CFR 60 Subpart IIII, and good combustion practices (use of ultra-low sulfur diesel fuel).	14.81 lb/hr (hourly maximum) 3.7 tons/year (annual maximum) 2.6 g/bhp-hr
LA-0315	G2G PLANT	PSD-LA-781	5/23/2014	Emergency Diesel Generator 1	5,364 HP	Compliance with 40 CFR 60 Subpart IIII and 40 CFR 63 Subpart ZZZZ	30.86 lb/hr (hourly maximum) 1.54 tons/year (annual maximum) 2.625 g/bhp-hr
LA-0315	G2G PLANT	PSD-LA-781	5/23/2014	Emergency Diesel Generator 2	5,364 HP	Compliance with 40 CFR 60 Subpart IIII and 40 CFR 63 Subpart ZZZZ	30.86 lb/hr (hourly maximum) 1.54 tons/year (annual maximum) 2.625 g/bhp-hr
LA-0316	CAMERON LNG FACILITY	PSD-LA-766(M3)	2/17/2017	emergency generator engines (6 units)	3,353 hp	Complying with 40 CFR 60 Subpart IIII	
MD-0042	WILDCAT POINT GENERATION FACILITY	CPCN CASE NO. 9327	4/8/2014	Emergency generator 1	2,250 kW	Use of ULSD, good combustion practices, 100 hr/year operating limit	2.6 g/hp-hr 3.49 g/kWh
MD-0044	COVE POINT LNG TERMINAL	PSC CASE NO. 9318	6/9/2014	Emergency generator	1,550 hp	Good combustion practices and designed to meet emission limit	2.6 g/hp-hr 3.49 g/kWh
NY-0103	CRICKET VALLEY ENERGY CENTER	3-1326-00275/00009	2/3/2016	Black start generator	3,000 kW	Compliance demonstrated with vendor emission certification and adherence to vendor-specified maintenance recommendations.	2.6 g/hp-hr 1 H
OH-0352	OREGON CLEAN ENERGY CENTER	P0110840	6/18/2013	Emergency generator	2,250 HP	Purchased certified to the standards in NSPS Subpart IIII	17.35 lb/hr 4.34 tons/year (12-month rolling total) 500 hours of operation (12-month rolling total)

Table 17: RBLC Search Results for CO Emissions from Diesel-Fired Emergency Engines

RBLC ID	Facility Name	Permit Number	Permit Issue Date	Process Name	Throughput	Control Method Description	Emission Limit
OK-0154	MOORELAND GENERATING STA	2008-302-C(M-1)PSD	7/2/2013	Diesel-fired emergency generator engine	1,341 hp	Combustion Control	0.001 lb/hp-hr ²²
TX-0728	PEONY CHEMICAL MANUFACTURING FACILITY	118239, N200	4/1/2015	Emergency Diesel Generator	1,500 hp	Minimized hours of operations Tier II engine	0.2 tons/year
WV-0025	MOUNDSVILLE COMBINED CYCLE POWER PLANT	R14-0030	11/21/2014	Emergency Generator	2,015.7 hp		2.6 g/hp-hr

Table 18: RBLC Search Results for CO₂e Emissions from Diesel-Fired Emergency Engines

RBLC ID	Facility Name	Permit Number	Permit Issue Date	Process Name	Throughput	Control Method Description	Emission Limit
AK-0082	POINT THOMSON PRODUCTION FACILITY	AQ1201CPT03	1/23/2015	Emergency Camp Generators	2,695 hp	None listed	2,332 tons/year combined
IL-0114	CRONUS CHEMICALS, LLC	13060007	9/5/2014	Emergency Generator	3,755 hp	Tier IV standards for non-road engines at 40 CFR 1039.102, Table 7.	432 tons/year
IN-0173	MIDWEST FERTILIZER CORPORATION	129-33576-00059	6/4/2014	Diesel-fired emergency generator	3,600 bhp	Good combustion practices	526.39 g/bhp-hr, 3-hour average
IN-0179	OHIO VALLEY RESOURCES, LLC	147-32322-00062	9/25/2013	Diesel-fired Emergency generator	4,690 bhp	Good combustion practices	526.39 g/bhp-hr, 3-hr average
IN-0180	MIDWEST FERTILIZER CORPORATION	129-33576-00059	6/4/2014	Diesel-fired emergency generator	3,600 bhp	Good combustion practices	526.39 g/bhp-hr, 3-hr average

²² Reported as 0.001 lb/hr, corrected based on review of Oklahoma's preliminary determination.

Table 18: RBLC Search Results for CO ₂ e Emissions from Diesel-Fired Emergency Engines							
RBLC ID	Facility Name	Permit Number	Permit Issue Date	Process Name	Throughput	Control Method Description	Emission Limit
IN-0263	MIDWEST FERTILIZER COMPANY LLC	129-36943-00059	3/23/2017	2 emergency generators	3,600 hp each	Good combustion practices	1,044 tons/12 consecutive months each, 500 hr/year each
LA-0272	AMMONIA PRODUCTION FACILITY	PSD-LA-768	3/27/2013	Emergency generator	1,200 hp	Energy efficiency measures	
LA-0288	LAKE CHARLES CHEMICAL COMPLEX	PSD-LA-778	5/23/2014	Emergency Diesel Generators	2,682 hp	Comply with 40 CFR 60 Subpart IIII	56 tons/year annual maximum
LA-0292	HOLBROOK COMPRESSOR STATION	PSD-LA-769(M-1)	1/22/2016	Emergency Generators No. 1 & 2	1,341 hp		77 tons/year annual maximum
LA-0296	LAKE CHARLES CHEMICAL COMPLEX LDPE UNIT	PSD-LA-779	5/23/2014	Emergency Diesel Generators (EQTs 622, 671, 773, 850, 994, 995, 996, 1033, 1077, 1105, & 1202)	2,682 hp	Comply with 40 CFR 60 Subpart IIII	56 tons/year annual maximum
LA-0305	LAKE CHARLES METHANOL FACILITY	PSD-LA-803(M1)	6/30/2016	Diesel Engines (Emergency)	4,023 hp	Comply with 40 CFR 60 Subpart IIII	
LA-0309	BENTELER STEEL TUBE FACILITY	PSD-LA-774(M1)	6/4/2015	Emergency Generator Engines	2,922 hp each		
*LA-0312	ST. JAMES METHANOL PLANT	PSD-LA-780(M-1)	6/30/2017	DEG1-13 - Diesel Fired Emergency Generator Engine (EQT0012)	1,474 hp	Compliance with NSPS Subpart IIII	84 tons/year
LA-0313	ST. CHARLES POWER STATION	PSD-LA-804	8/31/2016	SCPS Emergency Diesel Generator 1	2584 hp	Good combustion practices	
*LA-0315	G2G PLANT	PSD-LA-781	5/23/2014	Emergency Diesel Generator 1	5364 hp	Proper design and operation; energy efficiency measures	
				Emergency Diesel Generator 2	5364 hp	Proper design and operation; energy efficiency measures	

Table 18: RBLC Search Results for CO ₂ e Emissions from Diesel-Fired Emergency Engines							
RBLC ID	Facility Name	Permit Number	Permit Issue Date	Process Name	Throughput	Control Method Description	Emission Limit
LA-0316	CAMERON LNG FACILITY	PSD-LA-766(M3)	2/17/2017	emergency generator engines (6 units)	3353 hp	good combustion practices	
MI-0406	RENAISSANCE POWER LLC	51-13	11/1/2013	FG-EMGEN7-8; Two (2) 1,000kW diesel-fueled emergency reciprocating internal combustion engines	1000 kW	Good combustion practices.	1731.4 T/YR TEST PROTOCOL; BOTH UNITS combined
OH-0352	OREGON CLEAN ENERGY CENTER	P0110840	6/18/2013	Emergency generator	2250 KW		87 tons/12 months, rolling total
OH-0359	DTE MARIETTA	P0115137	3/31/2014	black start generator w/ 1,141 hp diesel engine (P002)	1,141 hp		None listed (RACT)
OK-0154	MOORELAND GENERATING STA	2008-302-C(M-1)PSD	7/2/2013	Diesel-Fired Emergency generator	1,341 hp	Tier 3 certified engine operated < 100 hr/year	81.2 tons/year
WV-0025	MOUNDSVILLE combined CYCLE POWER PLANT	R14-0030	11/21/2014	Emergency Generator	2015.7 hp		2,416 lb/hr

VI. Ambient Air Quality Impact Analysis

Tenn. Comp. R. & Regs. 1200-03-09-.01(4)(e) requires the owner or operator of a proposed major stationary source or major modification to demonstrate by source impact analysis that allowable emission increases from the proposed source or modification, in conjunction with all other applicable emissions increases or reductions, would not cause or contribute to air pollution in violation of any Tennessee ambient air quality standard in the source impact area or any applicable maximum allowable increase over the baseline concentration in any area. The owner or operator must submit all data necessary to make these analyses and determinations, including an analysis of the projected air quality impact resulting from general commercial, residential, industrial, and other growth associated with the source or modification.

Holston Army Ammunition Plant is located in Hawkins and Sullivan Counties near Kingsport, Tennessee. The facility is located in a rural setting with rolling hills and complex terrain (i.e., terrain above stack height) as shown in **Figures 1 and 2**.

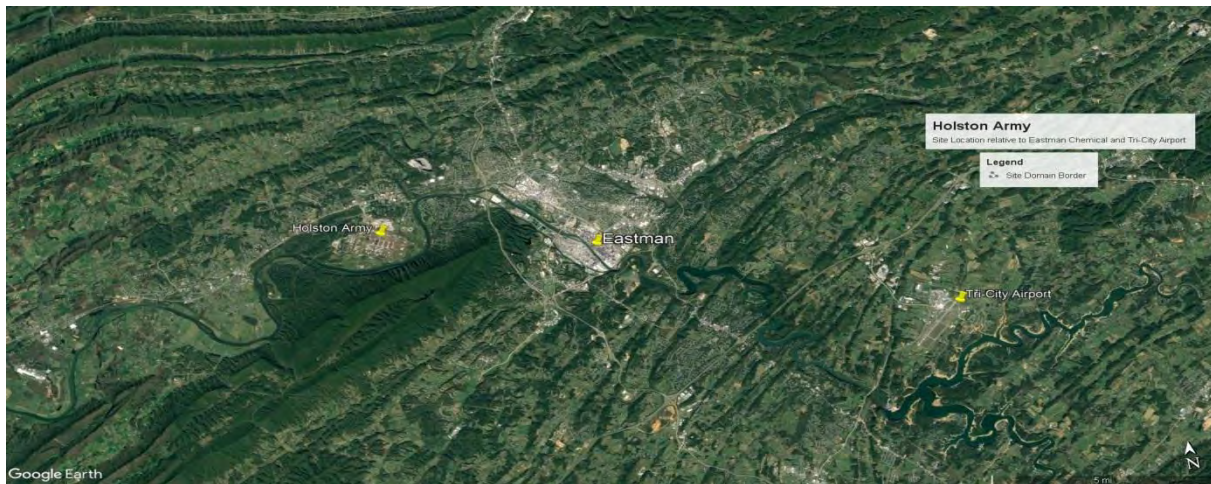


Figure 1: Facility Location

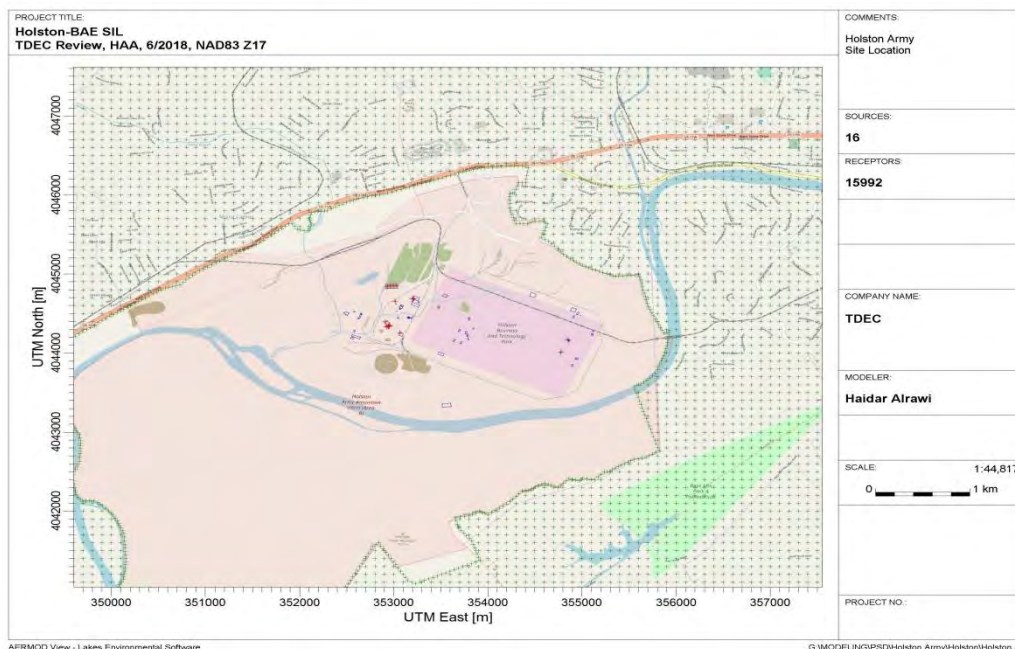


Figure 2: Facility Layout Plot

Air quality dispersion modeling analyses to support the PSD application includes the following assessments:

1. Determination of the facility potential pollutant emission quantities relative to PSD significant emission rates (SER) as defined in PSD rules (40 CFR 52.21).
2. Determination of the significant impact area (SIA) of the facility potential emissions if they exceed the SER.
3. Determination of compliance with the PSD increments for those triggered criteria pollutants that have Class I area and Class II area increments.
4. Determination of compliance with the National Ambient Air Quality Standards (NAAQS) for those triggered criteria pollutants.

Based on the above analysis, **Table 19** below compares the project emissions to the SER as defined in the PSD rules. Carbon monoxide (CO), volatile organic compounds (VOC), and greenhouse gases are the only pollutants that exceed the “significant” emission level. Only CO and VOC emissions as (an ozone precursor) require a source impact modeling assessments. Currently, there are no modeling requirements for GHG emissions. The projected net increase of CO is about 232 tons/year and VOC is about 107 tons/year, exceeding the SER thresholds of 100 and 40 tons/year respectively. An analysis of CO ambient impacts and of

secondary ozone formed by precursor emissions of VOC and NO_x were completed for the project. BAE was not required to conduct air quality modeling analysis for VOC emissions alone as there is currently no EPA modeling requirement for VOC emissions.

Table 19: Summary of Project Emissions and PSD Applicability

Pollutant	PSD Significant Emission Rate (tons/year)	Emissions (tons/year)				PSD Significant Emission Rate Exceeded?
		Phase I	Phase II	Phase III	Project Total	
PM	25					No
PM ₁₀	15	(21.4)	7	7.1	(7.3)	No
PM _{2.5}	10	(19.9)	5.1	5.1	(9.7)	No
SO ₂	40	(877) ²³	4.4	5.4	(877)	No
NO _x	40	(91.8)	5	37.6	(49.2)	No
CO	100	49.6 ²⁴	33.1	45.7	128.4 ²⁵	Yes
Ozone (VOC)	40	36.7	51.0	18.8	106.5	Yes
Lead	0.6	—	—	—	—	No
Fluorides	3	—	—	—	—	No
Sulfuric Acid Mist	7	—	—	—	—	No
Hydrogen Sulfide	10	—	—	—	—	No
Total Reduced Sulfur	10	—	—	—	—	No
Reduced Sulfur Compounds	10	—	—	—	—	No
GHG	75,000	509,908.3	—	—	509,908.3	Yes

Carbon Monoxide Assessment

As noted above, the net emissions increase for CO is above the PSD significance level, and an ambient modeling analysis is included to demonstrate compliance with the applicable NAAQS.

²³ The Phase I total was updated from a decrease of 1,726.3 tons/year to a decrease of 877 tons/year based on review of baseline emission calculations. BAE's most recent fuel analysis (Title V Semiannual Report for July – December 2017) indicates that the average sulfur content of coal burned in the existing boilers is 1.49%. Using this sulfur content, baseline SO₂ emissions were calculated be 877 tons/year at the highest average heat input (period ending April 2018).

²⁴ The Phase I total was updated from a decrease of 7.4 tons/year to an increase of 49.6 tons/year based on review of baseline emission calculations. BAE demonstrated a CO emission rate of 0.116 lb/MMBtu in a performance test on June 18-19, 2005. Using the emission rate from the performance test, baseline CO emissions from the coal boilers were updated from 152 tons/year to 95 tons/year.

²⁵ The project total was updated from 71.4 tons/year to 128.4 tons/year based on review of baseline emission calculations and the performance test dated June 18-19, 2005 (CO emission rate of 0.116 lb/MMBtu).

Significant Impact Analysis: The criteria pollutant air quality analysis for CO was conducted in two phases: an initial or significant impact analysis (SIA), and a refined phase including an increment analysis and a NAAQS analysis. In the SIA, the calculated maximum impacts will be determined for each pollutant with an emissions increase that exceeds the PSD SER. These impacts will determine the net change in air quality resulting from the proposed modification. Five years of meteorological data will be used in the significant impact analysis. Maximum modeled concentrations will be compared to the pollutant-specific significance levels for all pollutants and averaging times. The PSD Class II Significant Impact Levels (SILs) are listed in **Table 20**.

Pollutants with impacts that exceed the ambient air significance levels, as defined in 40 CFR 51.165, were included in both the NAAQS and increment analyses. In these analyses, impacts from the facility were added to concentrations calculated from other nearby sources and a regional background concentration (for the NAAQS analysis only). The resultant total concentration was compared to the NAAQS and increments to determine compliance.

Table 20: PSD Class II Significant Impact Levels (SILs)		
Pollutant	Averaging Time	PSD Class II SIL ($\mu\text{g}/\text{m}^3$)
CO	1-hour	2,000
	8-hour	500

NAAQS Analysis: Following the determination of significant impacts, a refined air quality analysis was conducted to determine NAAQS compliance. This NAAQS analysis was conducted only for pollutants modeled as having significant impacts in the initial analysis, and the modeled receptors modeled were limited to those showing a significant impact for each pollutant. Each source's potential emission rate was used, and five years of meteorological data were used in this analysis.

Nearby Source Inventory: Off-site sources were included in the NAAQS and increment analyses. A 50 km radius was initially used to define the screening area. A list of sources that are located within the screening area were obtained from the TN Division of Air Pollution Control (Division) and Virginia Department of Environmental Quality (VDEQ). Section 8.3.3.b of Appendix W to 40 CFR Part 51 states that the number of nearby sources to be explicitly modeled is expected to be few, except in unusual situations. Appendix W further states that the sources to be included will usually be located within the first 10 to 20km from the source under consideration. In addition, it states that identification of nearby sources calls for the exercise of professional judgment by the appropriate reviewing authority. Further, EPA's *Guidance for PM_{2.5} Permit Modeling* reiterates the Appendix W emphasis on a 10 km screening radius for determining which nearby sources to include in the cumulative modeling analysis.

Once all sources in the screening area have been identified, the NC Division of Air Quality's (NCDAQ) 20D screening criterion were applied to eliminate sources outside of the significant impact area that are not likely to influence the analysis. Total facility potential emissions (i.e., all sources at a facility) were used in the 20D evaluation. All major sources located within the significant impact area were included (i.e., no sources were screened out) for this initial screening analysis.

NAAQS Compliance Assessment: Ambient background concentrations were added to assess NAAQS compliance. The modeled and monitored values shown in **Table 21** were used for this assessment.

Table 21: Monitored and Modeled Values for NAAQS Compliance			
Pollutant	Averaging Time	Monitored Value	Modeled Value
CO	1-hour & 8-hour	Maximum over three years	Highest, second high over 5 years

Representative CO monitoring data were obtained from an existing regional monitor located in Memphis, Shelby County, Tennessee (AQS ID #47-163-0007). This monitor has a similar rural/suburban setting as the source location and it meets Part 58 requirements. This data is complete and certified (**Appendix F**). The 3-year (2015-2017) background concentrations design values are shown in **Table 22** according to EPA's AIRS system. Both Hawkins and Sullivan Counties are currently designated attainment for the CO standards.

Table 22: Background CO DV Concentrations 2015-2017				
Pollutant	Averaging Time	Design Value (ppb)	Basis	AQS Site No.
CO	1-hour	5,600.0	Maximum	47-157-0075
	8-hour	1,300	Average	
Note: ppb = parts per billion; DV= Design Value				

BAE used the updated Table 8-2 from the *Guideline* for calculating emissions from the off-site nearby emission sources using actual operating levels and actual operating factors in assessing compliance with the annual NAAQS. As U.S. EPA explains in the *Guideline*, "Table 8-2 allows for the model user to account for actual operations in developing the emissions inputs for dispersion modeling of nearby sources". This brings the modeled impact of nearby sources closer to the actual impact of nearby sources for this analysis.

The NAAQS are shown in **Table 23**. If modeled exceedances are identified, the facility must demonstrate that the project does not significantly contribute to an ambient exceedance.

Table 23: National Ambient Air Quality Standards (NAAQS)			
Pollutant	Averaging Time	NAAQS ($\mu\text{g}/\text{m}^3$)	
		Primary	Secondary
CO	1-hour	40,000	--

PSD Increment Analysis: There is no PSD increment for CO. Therefore, no increment analysis was conducted.

Modeling Methodology: The following modeling methodology was utilized in the CO Significant Impact Area (SIA) analysis for the following three modeling scenarios:

- Air dispersion model AERMOD with latest (version 18081) was used.
- The land use surrounding the facility is mostly undeveloped or cultivated land, hence rural dispersion coefficients were used in the model. **Figure 1** depicts the location of the site on a Google Earth topographical map.
- Downwash was included and calculated with BPIP (version 04274). The BPIP program files are included with the electronic modeling files. **Figure 3** depicts the building and CO emission sources model layout.
- Receptor arrays with elevation assigned by AERMAP (version 18081) from National Elevation Data (NED) files. Approximately 16,000 ambient receptors were used in the modeling analysis. Receptor grid was spaced at 50 m along the fenceline, spaced at 100 m out to 2 km, and spaced at 250 m out to 7.5 km. The receptor grid is designed such that maximum facility impacts fall within the refined 100 m spacing of receptors. If maximum impacts are identified in the 250 m grid, the impacts will be refined to 100m resolution.
- The receptor grid is shown in **Figure 4**, and the modeled concentration impacts are shown in **Figures 5 through 10**.
- Five years (2012-2016) of National Weather Service (NWS) meteorological data (AERMET 18081) were used in the application. Surface data was from the Tri-City regional airport (BRS) located in Bristol, TN. Upper air data was from Roanoke, VA regional airport (RNK).
- North American Datum 1983 was used.

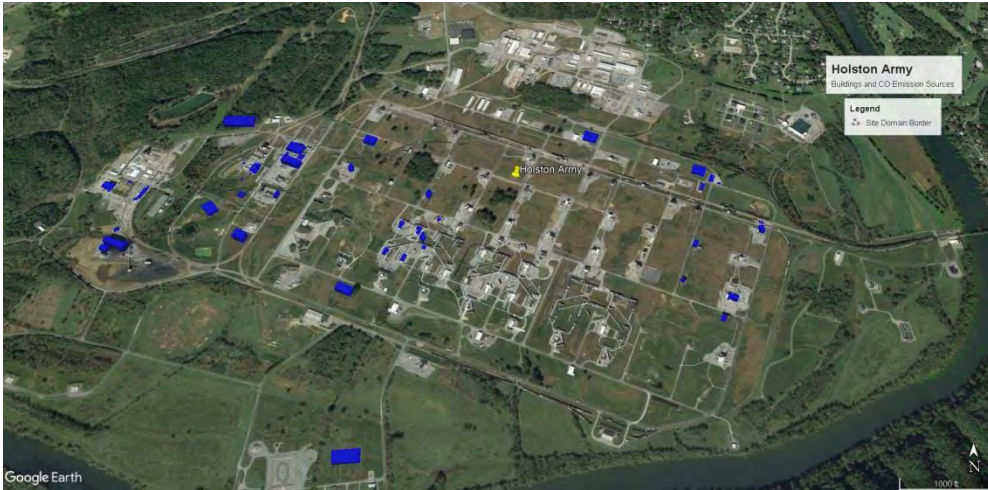


Figure 3: Holston Army Ammunition Plant Buildings and Emission Sources

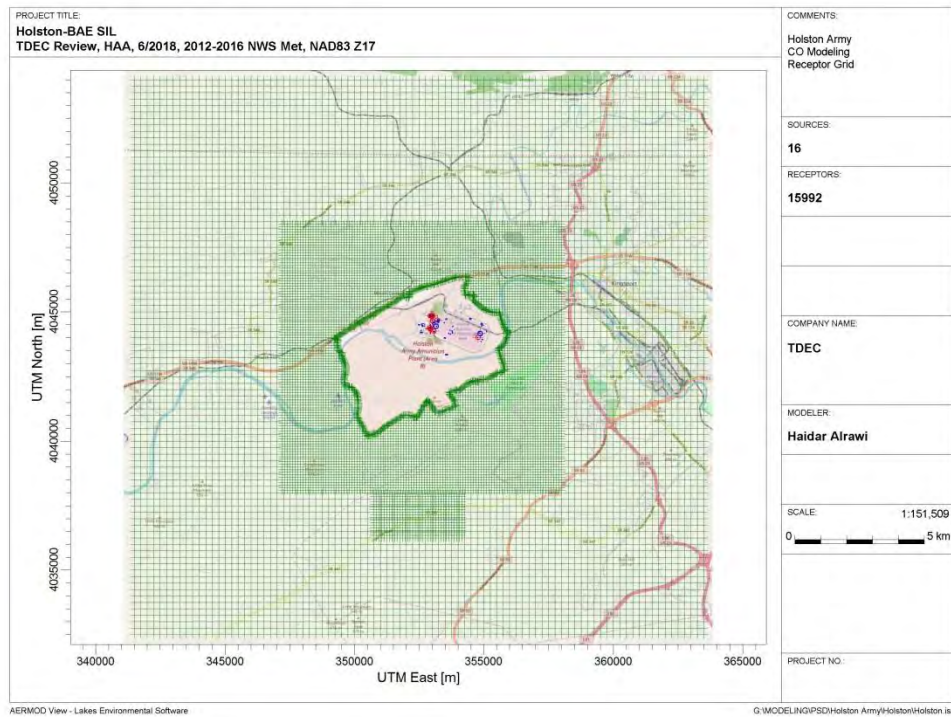


Figure 4: Holston Army Ammunition Plant CO Modeling Receptor Grid

The Holston modeled sources are shown below in **Table 24**.

**Table 24: Holston Army Ammunition Plant
Modeled CO Emissions Sources and Stack Parameters**

Source ID	Base_Elev	Height	Diam	Exit_Vel	Exit_Temp	Emission_	Emission_ X1	Y1
Point	[m]	[m]	[m]	[m/s]	[K]	gm/sec	lb/hour	[m]
7	371.21	22.86	1.524	38.7096	422.0389	0.755987	5.999899	353025.9
8	371.19	22.86	1.524	38.7096	422.0389	0.755987	5.999899	352995.5
9	370.45	22.86	1.524	38.7096	422.0389	0.755987	5.999899	352966.2
10	369.36	22.86	1.524	38.7096	422.0389	0.755987	5.999899	352932.9
13	366.14	12.8016	0.3048	6.4008	377.5944	0.144898	1.149981	352911.9
14	365.47	15.24	0.2987	12.8991	293.15	0.430913	3.419942	352923.2
15	366.87	10.668	0.2652	3.3528	505.3722	0.0252	0.199997	353212.6
16	366.7	10.668	0.2652	3.3528	505.3722	0.0252	0.199997	353203.8
17	365.62	16.764	0.0914	1.31064	727.5944	0.640069	5.079915	353012.6
20	367.5	12.2743	0.2987	12.8991	293.15	0.629989	4.999916	354778.6
21	364.28	34.39973	0.1006	18.0015	308.2	0.308695	2.449959	353069.1
23	365.74	12.192	0.3048	9.7536	449.8167	0.352794	2.799953	352957.7
24	365.69	12.192	0.3048	9.7536	449.8167	0.352794	2.799953	352950
25	365.64	12.192	0.3048	9.7536	449.8167	0.352794	2.799953	352943.9
26	365.6	12.192	0.3048	9.7536	449.8167	0.352794	2.799953	352938.7
27	366.19	7.0104	0.3048	0.00914	-0.18333	0.02898	0.229996	354855
				Total		6.669068	52.92911	
						231.83 TPY		

The SIA modeling demonstration consists of the following three scenarios:

Modeling Analysis – NWS Surface Characteristics MET: The modeling demonstration utilizing surface characteristics (i.e., Surface Roughness, Albedo and Bowen Ratio) at the nearby Bristol airport resulted in the following insignificant 1-hour and 8-hour impacts (**Table 25**).

Table 25: NWS Met Modeling Results				
Pollutant	Averaging Time	Significant Impact Level (SIL) NWS Met Modeling ($\mu\text{g}/\text{m}^3$)		
		Source Impact	SIL	Exceed SIL?
CO	1-hour	224	2,000	No
	8-hour	38.2	500	No

The source highest impacts are shown in **Figures 5 and 6** (1-hour and 8-hour averages).

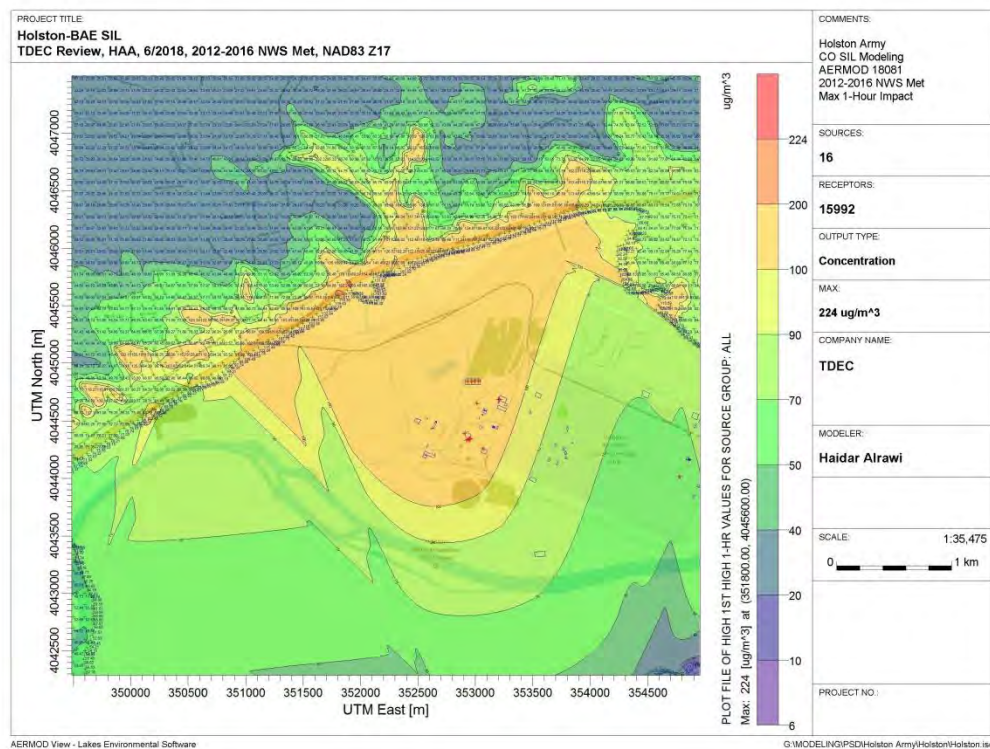


Figure 5: NWS Met Modeling 1-Hour Average Max CO Impact

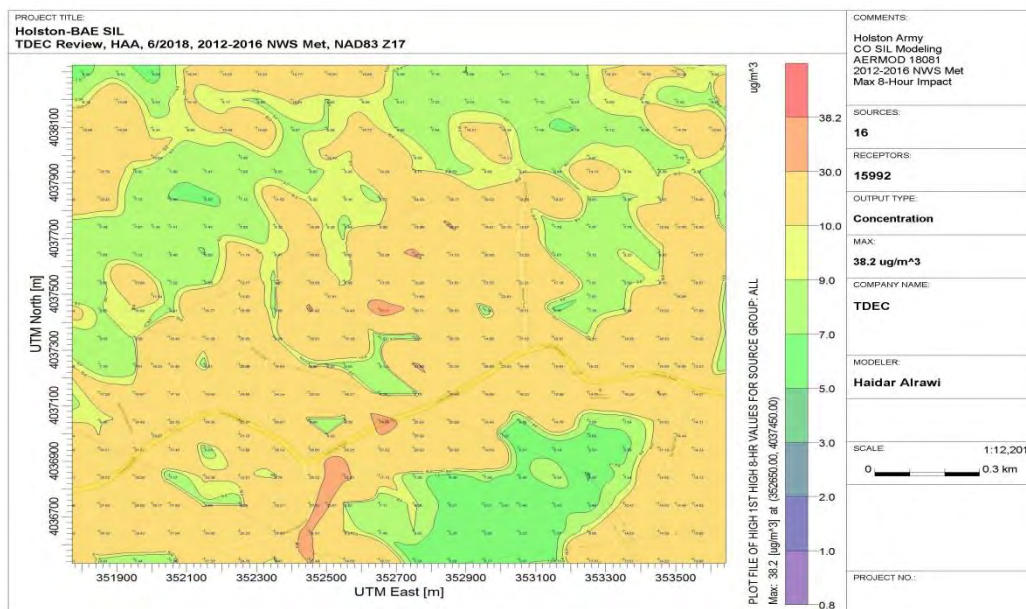


Figure 6: NWS Met Modeling 8-Hour Average Max CO Impact

Modeling Analysis – Site-Specific Surface Characteristics Met: The modeling demonstration utilizing surface characteristics resulted in the following insignificant 1-hour and 8-hour impacts (**Table 26**).

Table 26: Site Specific Met Modeling Results				
Pollutant	Averaging Time	Significant Impact Level (SIL) SS Met Modeling ($\mu\text{g}/\text{m}^3$)		
		Source Impact	SIL	Exceed SIL?
CO	1-hour	247	2,000	No
	8-hour	44.6	500	No

The source highest modeled impacts are shown in **Figures 7 and 8** for the 1-hour and 8-hour averages.

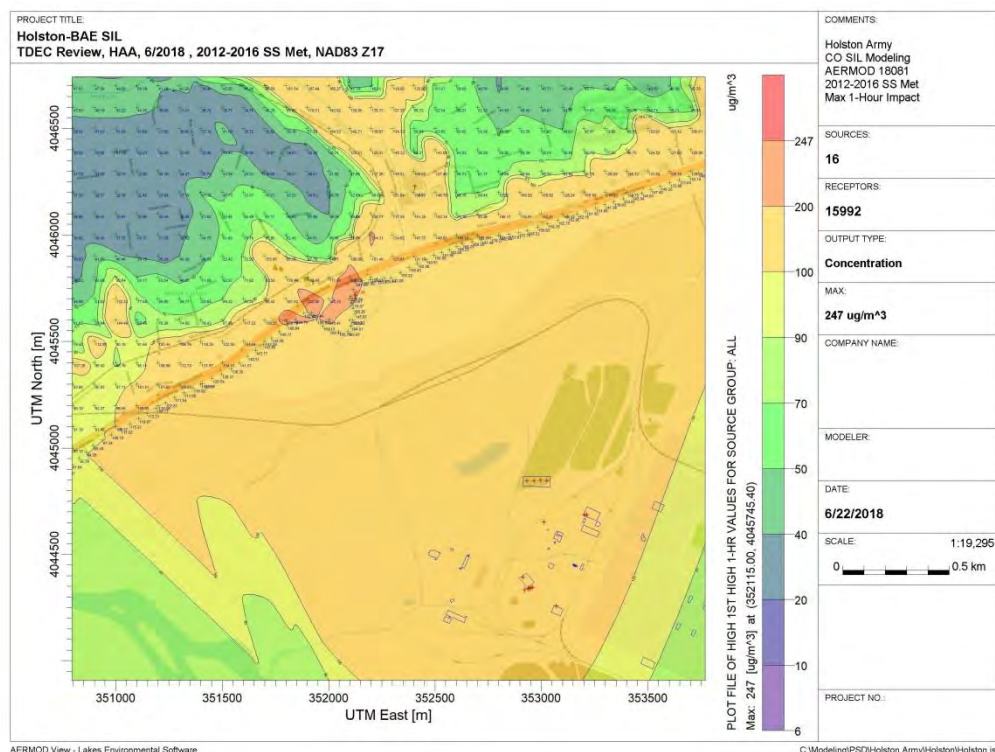


Figure 7: Site Specific Met Modeling 1-Hour Average Max CO Impact

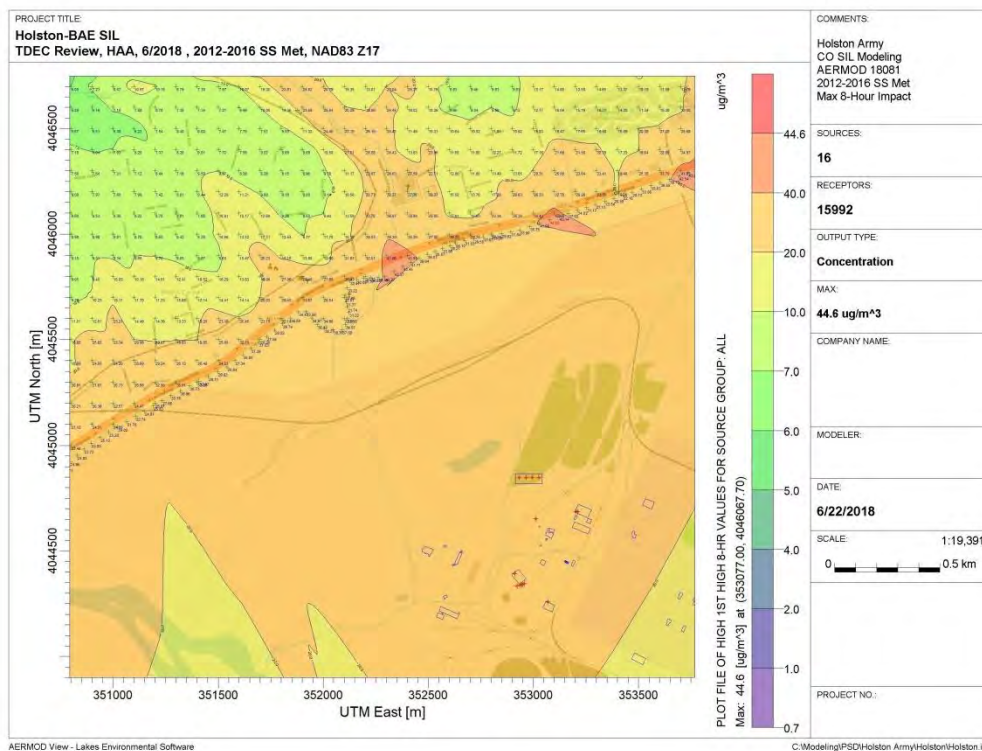


Figure 8: Site Specific Met Modeling 8-Hour Average Max CO Impact

Modeling Analysis – Eastman Onsite Met: The modeling demonstration utilizing one year of onsite meteorology (Eastman Chemical Company data, 4/1/2012 - 3/31/2013)²⁶ resulted in the following insignificant 1-hour and 8-hour average impacts (**Table 27**).

Table 27: Onsite (Eastman) Met Modeling Results				
Pollutant	Averaging Time	Significant Impact Level (SIL) Eastman Onsite Met Modeling (µg/m³)		
		Source Impact	SIL	Exceed SIL?
CO	1-hour	168.4	2,000	No
	8-hour	78.0	500	No

The source highest modeled impacts are shown in **Figures 9 and 10** for the 1-hour and 8-hour averages.

²⁶ No turbulence calculation due to the adjustment of the horizontal friction velocity (adj U*) in AERMET.

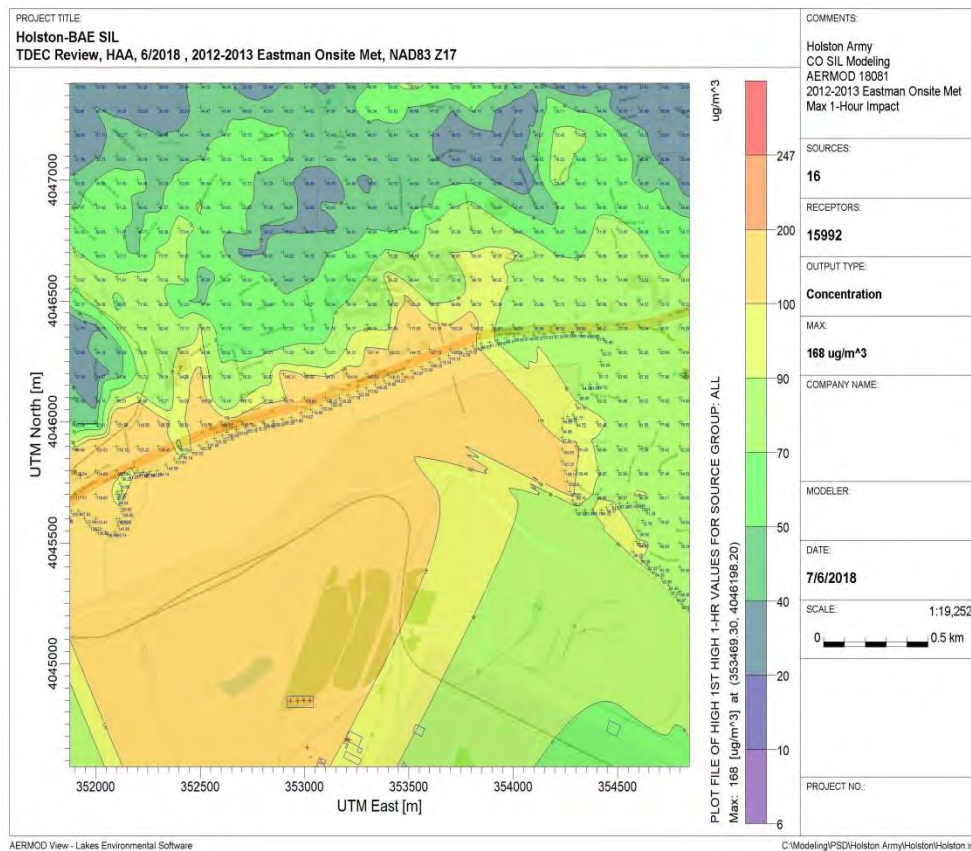


Figure 9: Onsite (Eastman) Met Modeling 1-Hour Average Max CO Impact

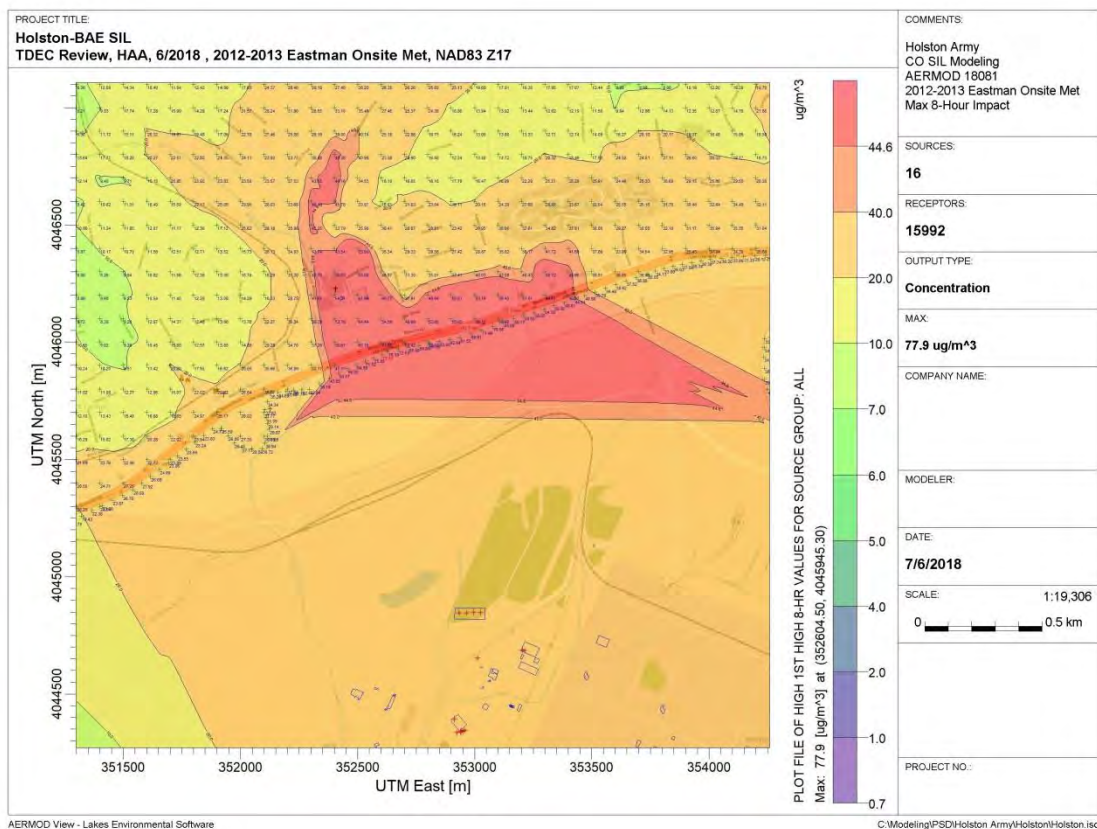


Figure 10: Onsite (Eastman) Met Modeling 8-Hour Average Max CO Impact

Ozone Impact Assessment

Since the net emissions increase for volatile organic compounds (VOC) will exceed 40 tons per year, an analysis of ambient air quality data for ozone, through preconstruction monitoring or existing representative monitoring data is required. An existing regional monitor is located in Bloomingdale, Sullivan County, Tennessee (AQS ID #47-163-2003). This data is complete and certified (see **Appendix F**). The 3-year (2015-2017) design value, 8-hour ozone concentration at this monitor is 66.0 ppb (**Table 28**) according to EPA's AIRS system. This design concentration is lower than the 8-hour revised ozone NAAQS of 70.0 ppb, and both Hawkins and Sullivan Counties are currently designated attainment for the 8-hour ozone standard. The VOC emissions from the modification are relatively small compared to regional emissions of ozone precursors, including NO_x from anthropogenic sources and VOC from anthropogenic and biogenic sources. Single source impacts are generally considered not to play a major role in contributing to ozone levels

Table 28: Background Ozone DV Concentration 2015-2017				
Pollutant	Averaging Time	Design Value (ppb)	Basis	AQS Site No.
Ozone	8-hour	66	Maximum	47-163-2003
Note: ppb = parts per billion; DV= Design Value				

On December 2, 2016, EPA released a draft guidance memorandum (EPA 2016a) *"Guidance on the Development of Modeled Emission Rates for Precursors (MERPs) as a Tier I Demonstration Tool for Ozone and PM_{2.5} under the PSD Permitting Program"* for review and comment that described how Modeled Emission Rates of Precursors (MERPs) could be calculated as part of a Tier I ozone formation analysis to assess a project's emissions of precursor pollutants as they would relate to the ozone "critical air quality threshold". BAE utilized the MERPs guidance for this purpose to assess the projects impacts on ozone formation as described.

Calculation of MERPs (Modeled Emission Rates for Precursors) for Ozone: Table 29 describes the potential emissions of NO_x from the proposed project to be - 49.2 (or zero) tons per year and the potential VOC emissions of 106.5 tons per year. The MERPs guidance provides modeling results representing the maximum downwind ozone concentrations due to NO_x and VOC emissions of hypothetical sources. EPA conducted photochemical modeling of hypothetical sources using emission rates of 500 tons per year, 1,000 tons per year, and 3,000 tons per year and similar stack parameters except for high and low release heights of both NO_x and VOC for various locations throughout the U. S. The MERPs Guidance considers Tennessee to be located in the central U. S.

Figure 11 (or Figure A-2 of the MERPs guidance) presents the locations of the sources modeled in the central U. S. For the central U. S., the most conservative sites were selected to develop the lowest ozone MERP for the region, which is shown in **Table 30** (or Table 7.1 of the guidance). This is the MERP level with which the Project's emissions of precursors will be assessed against the appropriate "critical air quality threshold". The MERPs guidance specifies the following equation to derive a MERP:

Table 29: Summary of facility-wide NO_x Emissions	
Expansion Project	NO_x (tons/year)
Phase I Emissions	-91.8
Phase II Emissions	5.0
Phase III Emissions	37.6
Site-wide Net Emissions	-49.2

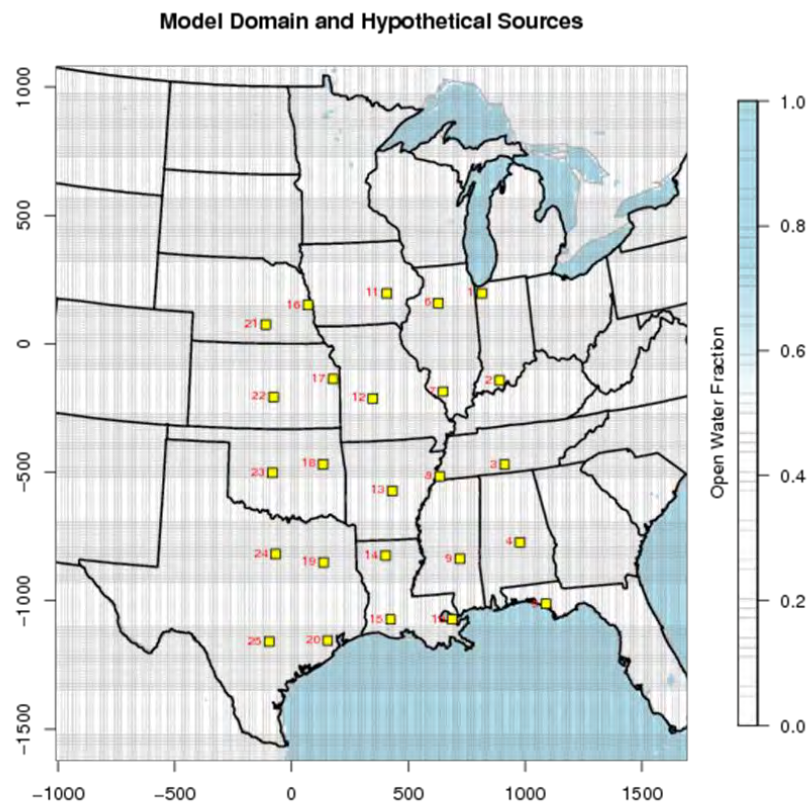


Figure 5-11: Hypothetical Source Locations for the Central U.S. (CUS) Domain

Table 30: Most Conservative (Lowest) Illustrative MERP Values (tons per year) by Precursor, Pollutant, and Region				
Precursor	Area	8-hr O ₃	Daily PM	Annual PM
NO _x	CUS	126	1,693	5,496
	EUS	170	2,295	10,144
	WUS	184	1,075	3,184
SO ₂	CUS		238	839
	EUS		628	4,013
	WUS		210	2,289
VOC	CUS	948		
	EUS	1,159		
	WUS	1,049		
Note: Illustrative MERP values are derived based on EPA modeling (as described in section 4) and critical air quality thresholds (as described in Section 5).				

The proposed ozone significant impact level (SIL) of 1 ppb is chosen to represent the critical air quality threshold. The SIL represents a *de-minimis* impact level, that is, if the maximum concentration of ozone due to a single source is less than the SIL, then it can be concluded that the source has an insignificant contribution to ozone formation. The most conservative (or lowest) hypothetical source's modeled central U. S. region emission rate and impacts along with the ozone SIL were used to calculate the MERPs values below:

$$\text{MERP} = (\text{Critical Air Quality Threshold}) \times (\text{Modeled emission rate from hypothetical source}) \div (\text{Modeled air quality impact from hypothetical source})$$

$$\text{NO}_x \text{ MERP} = 126 \text{ tons/year}$$

$$\text{VOC MERP} = 948 \text{ tons/year}$$

The potential emissions of NO_x (zero tons per year) and VOC (106.5 tons per year) are below the MERP values calculated above. However, since the emissions of the ozone precursor VOC exceeds the individually applicable PSD SER, the MERPs guidance suggests that the total emission rate of precursors should be cumulatively evaluated with respect to the MERP levels. The following equation shows the Project's cumulative MERP consumption. A cumulative MERP consumption of less than 100% (or 1 ppb) indicates that a project would not cause ozone concentrations exceeding the ozone SIL.

$$(\text{Project NO}_x \text{ emissions (zero tons/year)} / \text{NO}_x \text{ MERP (126 tons/year)}) + (\text{Project VOC emissions (106.5 tons/year)} / \text{VOC MERP (948 tons/year)}) = 11\%$$

The calculated cumulative consumption of the MERPs is 11% (or 0.11 ppb). BAE concludes that this analysis utilizing recent EPA guidance demonstrates that the proposed project will result in insignificant ozone impacts below the ozone SIL of 1 ppb. Additionally, most current monitor design values shown in Table 5-10 for the region are all below the ozone national ambient air quality standard (NAAQS) of 70 ppb. This monitor located in Bloomingdale, TN, has a regional measurement scale and is approximately 14km from the Project as shown in **Figure 12**. The highest monitor design value over the last three years was 66 ppb. The project's impacts were demonstrated to be below the SIL of 1 ppb, but for a conservative qualitative assessment, if 1 ppb is added to the three year average 8-hour design value of 66 ppb, the result is 66.11 ppb. This is below the NAAQS of 70 ppb and further supports that the project's secondary ozone impacts would not cause an exceedance of the ozone NAAQS.

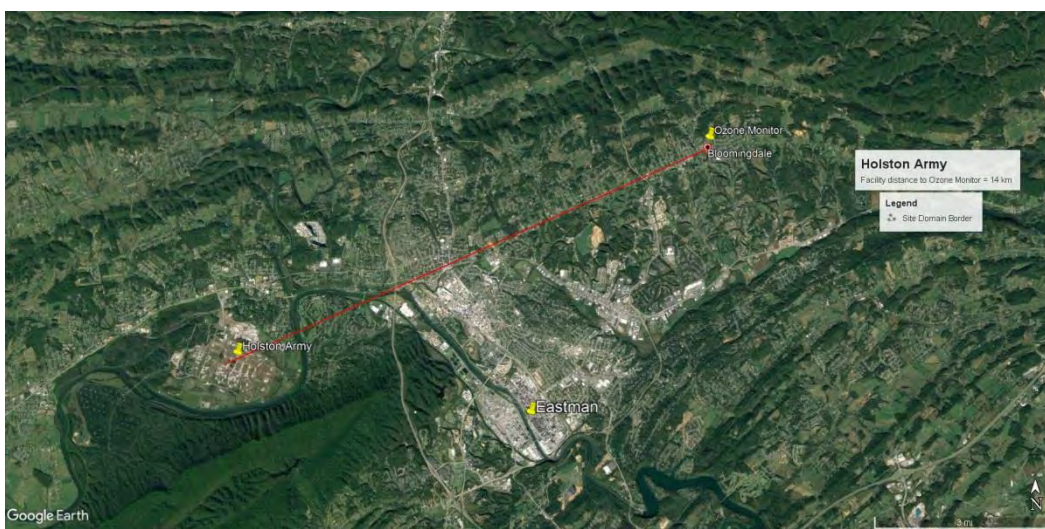


Figure 12: Holston location relative to the nearby Ozone Monitor

Class I Area Impacts

Class I AQRV Analysis: There are five Class I areas located within 300 km of the Holston facility as shown in **Figure 13**²⁷. The closest Class I area is the Linville Gorge Wilderness Area, located 95 km to the southeast. CO and VOC emissions alone do not require evaluation by the FLM's. Therefore, no Class I AQRV analysis will be conducted.

²⁷ Class I areas are pristine areas (e.g., large National Parks and Wilderness Areas) that have been designated by Congress and are afforded a greater degree of air quality protection than other areas. All other inhabited areas are designated as Class II areas.

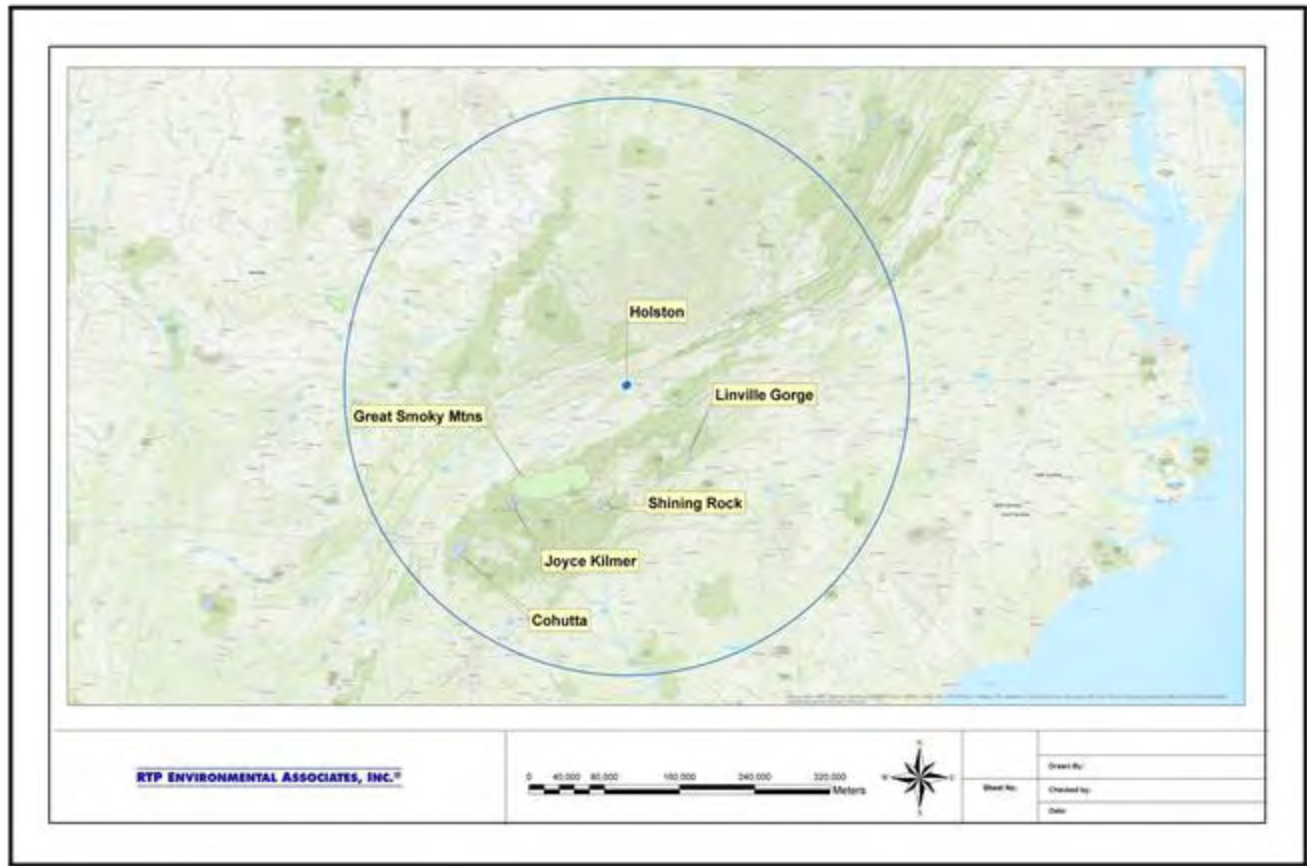


Figure 13: Class I Areas Relative to the Holston Site (300km Radius Shown)

Class I Increment Analysis: There are no PSD increments for CO or VOC/ozone. Therefore, a Class I increment analysis will not be conducted.

VII. Additional Impact Analysis

The PSD regulations require an additional impacts analysis for each pollutant emitted by a source, including the analysis of the effects of emissions on local soils and vegetation. The depth of the analysis performed generally depends on existing air quality, the quantity of air emissions, and the sensitivity of local soils and vegetation. Pursuant to Tenn. Comp. R. & Regs. 1200-03-09-.01(4)(e)2.(IV), the owner or operator of the proposed major stationary source or major modification must submit an additional impact analysis. The owner or operator of the proposed major stationary source or major modification, which addresses the following:

- The impairment to visibility, soils, and vegetation that would occur as a result of the source or modification and the associated general commercial, residential, industrial, and other growth. Vegetation having no significant commercial or recreational value may be excluded from the analysis.

- The air quality impact projected for the area as a result of general commercial, residential, industrial, and other growth associated with the source or modification.
- The Technical Secretary may require monitoring of visibility in any Federal Class I area near the proposed new stationary source or major modification, for such purposes and by such means as the Technical Secretary deems necessary and appropriate.

VII.1 Growth Analysis

Air quality impacts projected for the area as a result of general commercial, residential, industrial, and other growth associated with the project are expected to be insignificant. BAE projects that about 250 new jobs will be added as a result of the expansion project. The application assumes an average household size of 2.64 persons per household for a total population increase of about 660 persons, which is less than 0.5% of the current population of Sullivan and Hawkins Counties.

VII.2 Soils Analysis

Because most air pollutants are ultimately deposited upon the soil, the impact of these pollutants on terrestrial ecosystems is important. Pollutant emissions can impact the soil, ground and surface waters, and plant growth. In many instances, such as metals (e.g., lead, mercury), these pollutants can accumulate in the soil system, or become concentrated via bio magnification through plants and animals. In other instances, these pollutants may cause leaching of soil nutrients (e. g., acid deposition) or contribute to nutritional imbalances in plant communities (i.e., excessive nitrogen deposition).

The Holston Army Ammunition Plant is located in extreme northeastern Hawkins County, near its borders with Sullivan and Hancock Counties. Land use in the immediate vicinity of the plant is primarily commercial and residential to the north and west of the plant, residential to the east, and forested to the south (**Figure 14**). The main production area of Holston Army Ammunition Plant slopes gently downward from the north toward the Holston River. The highest points on the production area are about 1,230 feet above mean sea level and the lowest points near the river are about 1,170 feet above mean sea level.

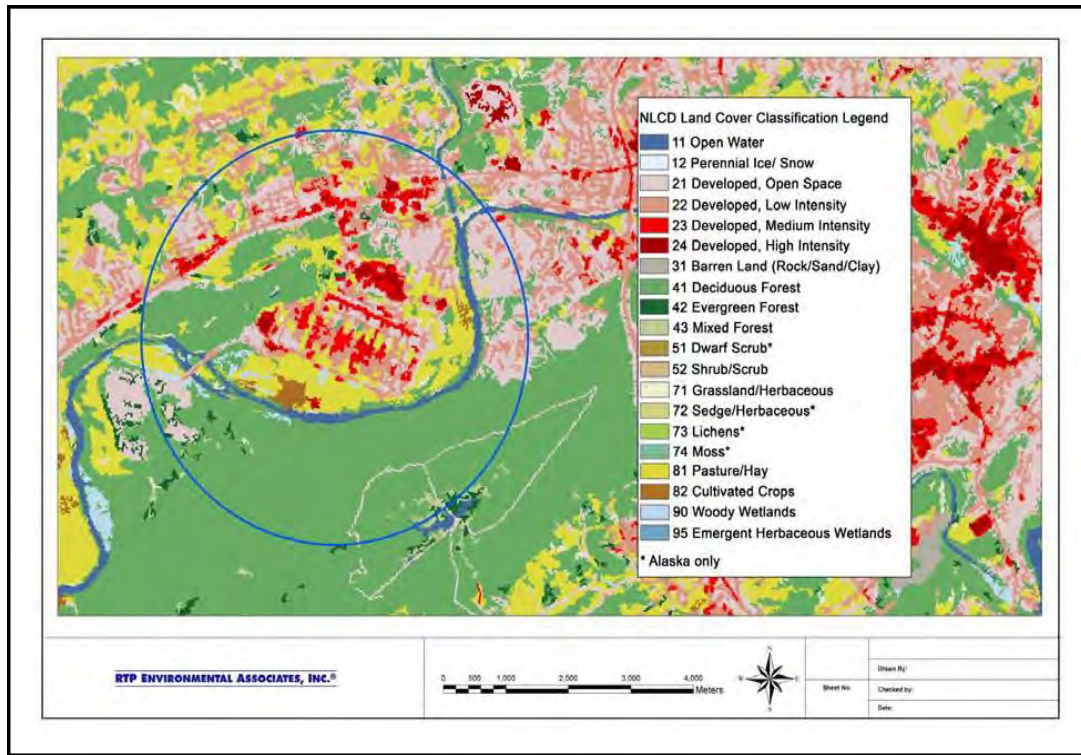


Figure 14: Land Use in the Vicinity of Holston

Soils in the immediate vicinity of the plant site are predominately well to excessively drained Holston and Dandridge loams composed of silts and shaly and cherty clays. Soils along the Holston River floodplain are predominately well drained Staser silty loams. There are some steep slopes to the south (up to 60%), but generally slopes in the area are 12-25%, except for the land along the Holston River, which is generally flat floodplain.

Soils in the area are not expected to be adversely impacted by the VOC and CO emissions increases resulting from the proposed expansion. The project may result in a net benefit to soil quality, due to the reductions of NO_x and SO₂ emissions following shutdown of the coal-fired boilers.

VII.3 Vegetation Impacts

The application states that there is little agricultural vegetation in the vicinity of the facility, and potentially impacted vegetation is primarily residential and forest vegetation. The increases in CO and VOC emissions are not anticipated to cause adverse impacts to vegetation in the vicinity of the plant. CO is rapidly oxidized in the atmosphere to form CO₂, which is used by plants in photosynthesis. The application notes that plants are a significant source of biogenic VOC and that the increase in VOC emissions due to the proposed expansion would not significantly increase ambient VOC concentrations. Chronic pollution effects from ozone are not anticipated because ozone levels in the vicinity of the

facility are likely NO_x-limited. The NO_x reductions resulting from the shutdown of the coal-fired boilers should contribute to a decrease in ozone levels.

VII.4 Class II Area Visibility Impacts

Visibility is impacted by both suspended particles and aerosols. Most of the particles and aerosols that impact visibility have an aerodynamic diameter of 2.5 microns or less (PM_{2.5}). In addition to direct PM_{2.5} emissions, gaseous emissions of SO₂ and NO_x contribute to the formation of secondary particles and aerosols.

The application states that increased open burning will have short-term visibility impacts in the immediate vicinity of Holston Army Ammunition Plant. However, the reduction in PM_{2.5}, SO₂, and NO_x emissions resulting from the proposed expansion should contribute to a longer-term improvement in visibility in the region surrounding the facility.

VII.5 Impacts on Nearby Nonattainment Areas

The modification will take place in both Hawkins and Sullivan Counties, which are classified as being in attainment for all criteria pollutants with the exception of the partial 3-km radius nonattainment area encompassing the Eastman Chemical Company's Kingsport facility in Sullivan County. Given the results of the air quality modeling assessment, it is not expected that emissions from the facility will have a significant impact on any nearby nonattainment areas.

VIII. Post-Construction Monitoring

Tenn. Comp. R. & Regs. 1200-03-09-.01(4)(e)3 states that the owner or operator of the proposed major stationary source or major modification shall conduct such post-construction monitoring as the Technical Secretary determines is necessary to determine the effect emissions from the stationary source or modification may have, or are having on air quality in any area.

Post-construction monitoring may be required when the NAAQS are threatened or when there are uncertainties in the modeling (e. g., emission inventory) databases. Existing monitors can be considered for collecting post-construction ambient data as long as they have been approved for PSD monitoring purposes. However, the location of the monitors should be checked to ascertain their appropriateness if other new sources or modifications have subsequently occurred, because the new emissions from the more recent projects could alter the location of points of maximum ambient concentrations where ambient measurements need to be made.

Post-construction monitoring is not required for this project, since the air quality impact analysis demonstrates that this project will be below the Significant Impact Levels for all pollutants.

IX. Conclusions and Conditions of Approval

Projected emissions of VOC, CO, and CO₂e from the proposed modification exceed the PSD significance levels at maximum operating rate and maximum hours of operation. This major modification is subject to review under the regulations for the Prevention of Significant Deterioration contained in 1200-03-09-.01(4). The proposed control technology satisfies the requirement to install Best Available Control Technology (BACT), as required by the PSD regulations. The BACT requirements are incorporated into the permit to be issued for the proposed modification. The proposed changes will not result in ambient impacts that would exceed any National Ambient Air Quality Standards and will not cause or contribute to adverse impacts on Air Quality Related Values in nearby Class I areas.

After review of the information submitted with the PSD application, it is concluded that the proposed modification qualifies for approval, subject to the terms and conditions of the proposed PSD construction permit (Appendix A).

Appendix A – Proposed Construction Permit 974192

STATE OF TENNESSEE
AIR POLLUTION CONTROL BOARD
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
NASHVILLE, TENNESSEE 37243



Permit to Construct or Modify an Air Contaminant Source Issued Pursuant to Tennessee Air Quality Act

Issue Date:	*****DRAFT*****	Permit Number:	974192
Expiration Date:	*****DRAFT*****	Facility ID:	37-0028
Issued To: Holston Army Ammunition Plant BAE Systems Ordnance Systems Inc. (HSAAP Area B Operations)	Installation Address 4509 West Stone Drive Kingsport		
Installation Description Chemical Processing Operations for Preparation of RDX and HMX Explosives	Emission Source Reference No. See Condition G16 Title V PSD, NSPS, NESHAP		

The holder of this permit shall comply with the conditions contained in this permit as well as all applicable provisions of the Tennessee Comprehensive Rules and Regulations (Tenn. Comp. R. & Regs.).

General Conditions

- G1.** The applications that were utilized in the preparation of this permit are dated May 31, 2018 and August 13, 2018 and are signed by Robert E. Winstead, Director, Environmental Health Safety and Security for the permitted facility. If this person terminates their employment or is assigned different duties and is no longer the responsible person to represent and bind the facility in environmental permitting affairs, the owner or operator of this air contaminant source shall notify the Technical Secretary of the change. Said notification shall be in writing and submitted within thirty (30) days of the change. The notification shall include the name and title of the new person assigned by the source owner or operator to represent and bind the facility in environmental permitting affairs. All representations, agreement to terms and conditions and covenants made by the former responsible person that were used in the establishment of limiting permit conditions on this permit will continue to be binding on the facility until such time that a revision to this permit is obtained that would change said representations, agreements and covenants.

Tenn. Comp. R. & Regs. 1200-03-09-.03(8)

(conditions continued on next page)

TECHNICAL SECRETARY

No Authority is Granted by this Permit to Operate, Construct, or Maintain any Installation in Violation of any Law, Statute, Code, Ordinance, Rule, or Regulation of the State of Tennessee or any of its Political Subdivisions.

POST AT INSTALLATION ADDRESS

G2. Visible and Fugitive Emissions

- A. Visible emissions from the emission sources covered by this permit shall not exhibit greater than twenty percent (20%) opacity, except for one (1) six-minute period in any one (1) hour period, and for no more than four (4) six-minute periods in any twenty-four (24) hour period. Visible emissions from this source shall be determined by EPA Method 9, as published in the current 40 CFR 60, Appendix A (six-minute average).

Tenn. Comp. R. & Regs. 1200-03-05-.01(1) and 1200-03-05-.03(6)

- B. 1) No person shall cause, suffer, allow, or permit any materials to be handled, transported, or stored; or a building, its appurtenances, or a road to be used, constructed, altered, repaired, or demolished without taking reasonable precautions to prevent particulate matter from becoming airborne. Such reasonable precautions shall include, but not be limited to, the following:
- (a) Use, where possible, of water or chemicals for control of dust in demolition of existing buildings or structures, construction operations, grading of roads, or the clearing of land;
 - (b) Application of asphalt, water, or suitable chemicals on dirt roads, material stock piles, and other surfaces which can create airborne dusts;
 - (c) Installation and use of hoods, fans, and fabric filters to enclose and vent the handling of dusty materials. Adequate containment methods shall be employed during sandblasting or other similar operations.

2) No person shall cause, suffer, allow, or permit fugitive dust to be emitted in such manner to exceed five (5) minutes per hour or twenty (20) minutes per day as to produce a visible emission beyond the property line of the property on which the emission originates, excluding malfunction of equipment as provided in Tenn. Comp. R. & Regs. 1200-03-20. Fugitive emissions from this source shall be determined by Tennessee Visible Emissions Evaluation Method 4 as adopted by the Tennessee Air Pollution Control Board on April 16, 1986.

Tenn. Comp. R. & Regs. 1200-03-08-.01(1) and 1200-03-08-.01(2)

- C. Visible emissions from roads and parking areas shall not exhibit greater than ten percent (10%) opacity utilizing Tennessee Visible Emissions Evaluation (TVEE) Method 1, as adopted by the Tennessee Air Pollution Control Board on April 29, 1982, as amended on September 15, 1982 and August 24, 1984.

Tenn. Comp. R. & Regs. 1200-03-08-.03

Compliance Method: Records of visible emissions evaluations and fugitive dust control measures shall be maintained at the source location and kept available for inspection by the Technical Secretary or the authorized representative.

G3. Facility-wide Limitations: Reserved.**G4. Routine Maintenance Requirements**

The permittee shall maintain and repair the emission source, associated air pollution control device(s), and compliance assurance monitoring equipment as required to assure compliance with the specified emission limits.

Tenn. Comp. R. & Regs. 1200-03-09-.03(8)

Compliance Method: Records of all repair and maintenance activities required above shall be recorded in a suitable permanent form and kept available for inspection by the Division. The date each maintenance and repair

activity began shall be entered in the log no later than thirty (30) days following the start of the repair or maintenance activity, and the completion date shall be entered in the log no later than thirty (30) days from activity completion.

G5. General Recordkeeping Requirements

A. The following recordkeeping requirements shall apply to this facility:

- 1) For monthly recordkeeping, all data, including the results of all calculations, must be entered into the log no later than thirty (30) days from the end of the month for which the data is required.
- 2) For weekly recordkeeping, all data, including the results of all calculations, must be entered into the log no later than seven (7) days from the end of the week for which the data is required.
- 3) For daily recordkeeping, all data, including the results of all calculations, must be entered into the log no later than seven (7) days from the end of the day for which the data is required.

B. Logs and records specified in this permit shall be kept readily available/accessible and made available upon request by the Technical Secretary or a Division representative and shall be retained for a period of not less than five (5) years. Logs and records contained in this permit are based on a recommended format. Any logs that have an alternative format may be utilized provided such logs contain the same or equivalent information that is required. Computer-generated logs are also acceptable.

Tenn. Comp. R. & Regs. 1200-03-10-.02(2)(a)

G6. Other State and Federal Regulations

This source shall comply with all applicable state and federal air pollution regulations. This includes, but is not limited to, all applicable provisions of the Tennessee Air Pollution Control Comprehensive Rules and Regulations, federal regulations published under 40 CFR 61 and 40 CFR 63 for sources of hazardous air pollutants, and federal regulations published under 40 CFR 60, New Source Performance Standards.

Tenn. Comp. R. & Regs. 1200-03-09-.03(8)

G7. Startup, Shutdown, and Malfunction Requirements

A. The facility must take all reasonable measures to keep emissions to a minimum during source startups, shutdowns, and malfunctions. These measures may include installation and use of alternate control systems, changes in operating methods or procedures, cessation of operation until the process equipment and/or air pollution control equipment is repaired, maintaining sufficient spare parts, use of overtime labor, use of outside consultants and contractors, and other appropriate means. Failures that are caused by poor maintenance, careless operation or any other preventable upset condition or preventable equipment breakdown shall not be considered malfunctions.

Tenn. Comp. R. & Regs. 1200-03-20-.02(1)

B. **Monitoring Systems:** Due allowance for failure to monitor shall be made during any period of monitoring system malfunction, provided that the source owner or operator shows, to the satisfaction of the Technical Secretary, that the malfunction was unavoidable and is being repaired as expeditiously as practicable, and that a log of all such malfunctions is being kept by the owner or operator, including the time the malfunction began, when it was detected, what was wrong, what was done to correct the malfunction, and when the

malfunction was corrected. Failures that are caused by poor maintenance, careless operation or any other preventable upset condition or preventable equipment breakdown shall not be considered malfunctions.

Tenn. Comp. R. & Regs. 1200-03-10-.02(e)

G8. Excursions

All excursions from indicated parameter limits or ranges shall be recorded in a permanent suitable format and retained at the source location and kept available for inspection by the Technical Secretary or the authorized representative. The record of excursions shall include, at a minimum, the time the excursion was discovered, the corrective action taken, and the time that the process was back within the normal operating range.

Tenn. Comp. R. & Regs. 1200-03-10-.02(2)(a)

“Excursion” shall mean a departure from an indicator range established for monitoring, consistent with any averaging period specified for averaging the results of the monitoring.

G9. Application and Agreement Letters

This source shall operate in accordance with the terms of this permit, the information submitted in the approved permit application referenced in Condition G1, and any documented agreements made with the Technical Secretary.

Tenn. Comp. R. & Regs. 1200-03-09-.01(1)(d)

G10. Permit Transference

A. This permit is not transferable from one air contaminant source to another air contaminant source or from one location to another location.

Tenn. Comp. R. & Regs. 1200-03-09-.03(6)(b)

B. In the event an ownership change occurs at this facility, written notification of the ownership change requesting a permit amendment must be submitted to the Technical Secretary no later than thirty (30) days after the change occurs. This notification must include an agreement to abide by the terms of the permit, Division 1200-03 and Division 0400-30 of the Tennessee Comprehensive Rules and Regulations, the Tennessee Air Quality Act, and any documented agreements made by the previous owner to the Technical Secretary.

Tenn. Comp. R. & Regs. 1200-03-09-.03(6)(a)

G11. Operating Permit Application Submittal

The permittee shall apply for a Title V Significant Modification within three hundred sixty (360) days of initial start-up of the first new or modified emission source. If construction of the source cannot be completed and an operating permit application cannot be filed with the Technical Secretary by the expiration date of this permit, a permit extension request must be submitted in writing at least thirty (30) days prior to the permit expiration date unless a different time frame is approved by the Technical Secretary. The permit application or the permit extension shall be submitted in hard copy to the Permitting Program at the address listed below or via e-mail:

Tennessee Dept. of Environment & Conservation
Division of Air Pollution Control
Attn: Permitting Program
William R. Snodgrass
Tennessee Tower, 15th Floor
312 Rosa L. Parks Avenue
Nashville, TN 37243

or Adobe Portable Document Format (PDF):
Air.Pollution.Control@tn.gov

Tenn. Comp. R. & Regs. 1200-03-09-.02(1) and 1200-03-09-.02(3)

G12. Temporary Operating Permit

- A. This permit shall serve as a temporary operating permit from the date of issuance to the receipt of a Title V significant modification, provided that an operating permit application is filed in a timely manner as required by condition G11.

Tenn. Comp. R. & Regs. 1200-03-09-.02(2)

- B. Operation of each air contaminant source shall be in accordance with the provisions and stipulations set forth in the operating permit, all provisions of the Tennessee Division of Air Pollution Control Comprehensive Rules and Regulations, and all provisions of the Tennessee Air Quality Act.

Tenn. Comp. R. & Regs. 1200-03-09-.02(6)

G13. Fees

This source shall comply with the requirements for payment of annual emission fees pursuant to Tenn. Comp. R. & Regs. 1200-03-26.

Tenn. Comp. R. & Regs. 1200-03-26-.02

G14. Emission Statements: Reserved.

G15. Startup Certification

The completed startup certification in Appendix 1 shall be submitted to the Permitting Program at the address listed below or via e-mail, no later than thirty (30) days after each air contaminant source is started-up. A separate startup certification must be submitted for each source included in this permit.

Tennessee Dept. of Environment &
Conservation
Division of Air Pollution Control
Permitting Program
William R. Snodgrass TN Tower, 15th Floor
312 Rosa L. Parks Avenue
Nashville, TN 37243

or Adobe Portable Document Format (PDF)
Air.Pollution.Control@TN.gov

Tenn. Comp. R. & Regs. 1200-03-09-.02(3)(b)

G16. Prevention of Significant Deterioration of Air Quality

- (a) This permit allows the construction of four natural gas and oil-fired boilers (37-0028-120, 121, 122, and 123), two insignificant fuel oil storage tanks (37-0028-124), recrystallization and coating operations (37-0028-125), insignificant milling operations (37-0028-126), and three insignificant emergency generators (37-0028-127).

The new construction is subject to the Prevention of Significant Deterioration (PSD) review provisions of Tenn. Comp. R. & Regs. 1200-03-09-.01(4) for significant emissions increases of volatile organic compounds, (VOC), carbon monoxide (CO), and greenhouse gases (as CO₂e) associated with the proposed project. This source shall construct and operate these emission sources in accordance with the terms of this permit and the information submitted in the approved permit application. Approval to construct shall not relieve any owner or operator of the responsibility to comply fully with the applicable provisions under Division 1200-03, Division 0400-30, and any other requirements under local, State, or Federal law.

- (b) Approval to construct shall become invalid if construction is not commenced within 18 months after the issue date of this permit, if construction is discontinued for a period of 18 months or more, or if construction is not completed within 18 months of the completion date specified on the construction permit application (December 31, 2018). The Tennessee Air Pollution Control Board may grant an extension to complete construction of the source, provided that adequate justification is presented. An extension shall not exceed 18 months in time.
- (c) The permittee shall apply best available control technology (**Table 1**) for each regulated NSR pollutant that it would have the potential to emit in significant amounts (volatile organic compounds and carbon monoxide).

Table 1: Best Available Control Technology (BACT)

Emission Source Reference Number	Description	Pollutant(s)	Best Available Control Technology
37-0028-120, 121, 122, 123	Natural gas and No. 2 oil-fired boilers	VOC and CO	Oxidation catalyst, good combustion practices
		CO ₂ e	Fuel selection and energy efficiency
37-0028-124	Two (2) fuel oil storage tanks	VOC	Light-color tank, submerged fill, and good maintenance practices (0.2 tons/year total emissions)
37-0028-125	Recrystallization and coating operations, process vents (Vents A and E)	VOC	Vent condenser
	Recrystallization and coating operations, process tanks (Vents B, C, D, and F)	VOC	Submerged fill and good maintenance practices (0.2 tons/year total emissions)
37-0028-127	Three (3) diesel-fired emergency generators, 1,490 hp each	VOC and CO	Comply with 40 CFR 60 Subpart IIII limits (6.4 g/kWh NO _x +NMHC, 3.5 g/kWh CO)
		CO ₂ e	Good combustion practices, including fuel-air ratios, proper operating temperatures, and proper fuel-air residence times (644 tons/year per engine)

Tenn. Comp. R. & Regs. 1200-03-09-.01(4)

G17. Emission Standards for Hazardous Air Pollutants

Where applicable, the permittee shall comply with Tenn. Comp. R. & Regs. 0400-30-38 for all emission sources subject to a requirement contained therein.

G18. Standards of Performance for New Stationary Sources

Where applicable, the permittee shall comply with Tenn. Comp. R. & Regs. 0400-30-39 for all emission sources subject to a requirement contained therein.

G19. Gasoline Dispensing Facilities

Where applicable, the permittee shall comply with Tenn. Comp. R. & Regs. Rule 1200-03-18-.24 for all emission sources subject to a requirement contained therein.

Source Specific Conditions for Source 37-0028-120, 37-0028-121, 37-0028-122, 37-0028-123
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Boilers: Four natural gas and No. 2 fuel oil-fired boilers with maximum design heat input capacities of 327 MMBtu/hr each when burning natural gas and 310 MMBtu/hr each when burning No. 2 fuel oil. Low-NO _x burners and selective catalytic reduction (SCR) will be used to control NO _x emissions from each boiler. An oxidation catalyst will be used to control CO and VOC emissions from each boiler. A wet electrostatic precipitator (WESP) will be used control particulate matter emissions from each boiler.

S1-1. Input Limitation(s)

- (a) Only natural gas and No. 2 fuel oil, with a sulfur content not to exceed 15 parts per million by weight, shall be used as fuels for this source.
- (b) The total maximum heat input capacity for each boiler in this fuel-burning installation shall not exceed 327 million British thermal units per hour (MMBtu/hr) when firing natural gas and 310 MMBtu/hr when firing fuel oil. Compliance with this requirement shall be based on a 12-month rolling average basis.
- (c) The annual capacity factor for fuel oil shall not exceed 3.8% during any period of twelve (12) consecutive months.

Tenn. Comp. R. & Regs. 1200-03-09-.01(1)(d), 1200-03-09-.01(4), application dated May 31, 2018

Compliance Method: Compliance with this condition shall be assured by compliance with §60.49b(d)(1) and **Condition S1-6A** of this permit (calculate heat input and annual capacity factor from daily fuel usage) .

S1-2. Production Limit(s): Reserved.**S1-3. Operating Hour Limit(s):** Reserved.

S1-4. Emission Limits

Volatile organic compounds (VOC), carbon monoxide (CO), and carbon dioxide equivalent (CO₂e) emitted from this fuel-burning installation shall not exceed the limits shown in **Table 2**. These limits shall represent Best Available Control Technology (BACT) for this emission source.

Table 2: BACT Emission Limits for 37-0028-120, 121, 122, 123				
Pollutant	Emission Limit	Averaging Period	Control Technology	Rule Citation(s)
CO	0.035 lb/MMBtu when burning natural gas and 0.04 lb/MMBtu when burning oil	Average of three one hour test runs	Oxidation catalyst, good combustion design and practices	1200-03-09-.01(4)
VOC	0.0015 lb/MMBtu when burning natural gas and 0.004 lb/MMBtu when burning oil	Average of three one hour test runs	Oxidation catalyst, good combustion design and practices	1200-03-09-.01(4)
CO ₂ e	678,139 tons	12 consecutive month rolling total	Energy efficiency, good combustion design and practices	1200-03-09-.01(4)

Particulate matter (PM), sulfur dioxide (SO₂), and nitrogen oxides (NO_x) emitted from this fuel-burning installation shall not exceed the limits shown in **Table 3**.

Table 3: PM, SO₂, and NO_x Emission Limits for 37-0028-120, 121, 122, 123			
Pollutant	Emission Limit	Averaging Period	Rule Citation(s)
PM	0.100 lb/MMBtu	Three one-hour test runs	1200-03-06-.02(2)(a)
SO ₂	0.80 lb/MMBtu	One-hour average	1200-03-14-.02(2)(b)
	6.4 tons/year	12 consecutive month rolling total	1200-03-09-.01(1)(d), application dated May 31, 2018
NO _x	As established by 40 CFR 60 Subpart Db.		1200-03-09-.03(8)

Compliance Methods: Compliance with each emission limit shall be assured as indicated in **Table 4**:

Table 4: Compliance Methods for 37-0028-120, 121, 122, 123	
Pollutant	Compliance Method
CO	Comply with Conditions S1-1 and S1-7 .
VOC	Comply with Conditions S1-1 and S1-9 .
CO ₂ e	Comply with Conditions S1-1 and S1-7 .
PM	Comply with Conditions S1-1 and S1-6B .
SO ₂	Comply with Condition S1-1 .
NO _x	Comply with 40 CFR 60 Subpart Db (Condition S1-6A)

S1-5. Source-Specific Visible Emission Limitation(s): Reserved.

S1-6. Source-Specific NESHAP and NSPS Conditions

S1-6A. 40 CFR Part 60 Subpart Db

The permittee shall comply with the requirements of 40 CFR Part 60 Subpart Db (Standards of Performance for Industrial-Commercial-Institutional Steam Generating Units) as indicated in **Table 5**.

Table 5: 40 CFR Part 60 Subpart Db
Specific Applicability Determinations for 37-0028-120, 121, 122, 123

Requirement	Rule Citation
Units firing only very low sulfur oil, gaseous fuel, a mixture of these fuels, or a mixture of these fuels with any other fuels with a potential SO ₂ emission rate of 0.32 lb/MMBtu heat input or less are exempt from the SO ₂ emission limit in §60.42b(k)(1). An affected facility that combusts very low sulfur oil or is demonstrating compliance under §60.45b(k) is not subject to the emission monitoring requirements under §60.47b(a) if the owner or operator maintains fuel records as described in §60.49b(r).	§60.42b(k)(2), §60.47b(b)
An affected facility not located in a non-continental area that commences construction after February 28, 2005, and that combusts only oil that contains no more than 0.30% sulfur by weight in combination with other fuels not subject to a PM standard in §60.43b and not using a post-combustion technology (except a wet scrubber) to reduce SO ₂ or PM emissions is not subject to the PM limits in §60.43b(h)(1). An affected facility burns that burns only liquid or gaseous fuels with potential SO ₂ emissions rates of 0.060 lb/MMBtu or less and does not use a post-combustion technology to reduce SO ₂ or PM emissions is not required to install or operate COMS. The owner or operator must maintain fuel records of the sulfur content of the fuels burned, as described under §60.49b(r).	§60.43b(h)(5), §60.48b(j)(2)
No owner or operator of an affected facility that commenced construction after July 9, 1997 shall cause to be discharged into the atmosphere from that affected facility any gases that contain NO _x (expressed as NO ₂) in excess of the following limits: 0.20 lb/MMBtu if the affected facility combusts coal, oil, or natural gas (or any combination of the three), alone or with any other fuels.	§60.44b(l)
The NO _x emission standards apply at all times. Compliance with the NO _x emission standards shall be determined through performance testing using the continuous system for monitoring NO _x .	§60.46b(a), (c), and (e)
An affected facility subject to a NO _x standard under §60.44b shall install, calibrate, maintain, and operate CEMS for measuring NO _x and O ₂ (or CO ₂) emissions discharged to the atmosphere, and shall record the output of the system.	§§60.48b(b), (c), (d), (e)(2), (e)(3), and (f)
Comply with the notification requirements of §60.49b(a).	§60.49b(a)
Each affected facility subject to the NO _x emission limits under §60.44b shall submit the initial performance test and the performance evaluation of the CEMS using the applicable performance specifications in 40 CFR 60 Appendix B.	§60.49b(b)
The affected facility shall record and maintain records of the amounts of each fuel combusted during each day and calculate the annual capacity factor individually for distillate oil and natural gas for the reporting period. The annual capacity factor is determined on a 12-month rolling average basis with a new annual capacity factor calculated at the end of each calendar month.	§60.49b(d)(1)
An affected facility subject to the NO _x standards under §60.44b shall maintain records of the information specified in §§60.49b(g)(1) through (10) for each steam generating unit operating day. An affected facility subject to the continuous monitoring requirements for NO _x under §60.48(b) shall submit reports containing the information recorded under §60.49b(g). An affected facility may submit electronic quarterly reports for NO _x in lieu of written reports.	§§60.49b(g), (i), and (v)
Submit reports of excess NO _x emissions to the Technical Secretary per §60.49b(h)(2). Per §60.49b(h)(4), excess emissions are defined as any calculated 30-day rolling average NO _x emission rate, as determined under §60.46b(e), which exceeds the NO _x emission rate limit in this condition. If there are no excess emissions during a calendar quarter, the owner or operator of this source shall submit a report semiannually stating that no excess NO _x emissions occurred during the semiannual reporting period. These semiannual reports shall be incorporated into the report required by the permittee's Title V Operating Permit per §60.7(e).	§§60.49b(h)(2) and (4)

**Table 5: 40 CFR Part 60 Subpart Db
Specific Applicability Determinations for 37-0028-120, 121, 122, 123**

Requirement	Rule Citation
An affected facility that elects to demonstrate that the affected facility combusts only very low sulfur oil or natural gas (as defined in §60.41b) in combination with other fuels that are known to contain an insignificant amount of sulfur shall obtain and maintain at the affected facility fuel receipts (such as a current, valid purchase contract, tariff sheet, or transportation contract) from the fuel supplier that certify that the oil meets the definition of distillate oil and gaseous fuel meets the definition of natural gas as defined in §60.41b and the applicable sulfur limit. Reports shall be submitted certifying that only very low sulfur oil and natural gas were combusted in the affected facility during the reporting period	§60.49b(r)(1)
Comply with the applicable General Provisions of 40 CFR 60 (Appendix 2).	§60.1(a)

Tenn. Comp. R. & Regs. 1200-03-09-.03(8), 40 CFR 60 Subpart Db

S1-6B. 40 CFR Part 63 Subpart DDDDD

The permittee shall comply with the requirements of 40 CFR Part 63 Subpart DDDDD (National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers and Process Heaters), as indicated in **Table 6**, upon startup.

Pursuant to §63.7545(e), affected sources must submit a Notification of Compliance Status according to §63.9(h)(2)(ii). Affected sources must submit the Notification of Compliance Status, including all performance test results and fuel analyses, before the close of business on the 60th day following the completion of all performance test and/or other initial compliance demonstrations for all boiler or process heaters at the facility. The Notification of Compliance Status report must contain the applicable information specified in §63.7545(e)(1) through (8), including:

- (1) A description of the affected unit(s).
- (2) Summary of the results of all performance tests and fuel analyses, and calculations conducted to demonstrate initial compliance including all established operating limits, and including the identification of specific emission limits.
- (3) Summary of the maximum CO emission levels recorded during the performance test to comply with any applicable emission standard in Tables 1, 2, or 11 through 13 to Subpart DDDDD, if CO CEMS is not used to demonstrate compliance.
- (4) Identification of compliance methods (performance testing, CEMS, or fuel analysis).
- (5) Emissions averaging and energy conservation provisions, as applicable.
- (6) Signed certification of compliance with all applicable emission limits and work practice standards.
- (7) Report any deviations from any emission limit, work practice standard, or operating limit, including a description of the deviation, the duration of the deviation, and the corrective action taken.
- (8) Applicable certification(s) of compliance required by §63.7545(e)(8).

Upon review and approval of the Notification of Compliance Status, the provisions of Subpart DDDDD will be incorporated into the facility's Title V Operating Permit. Tenn. Comp. R. & Regs. 1200-03-09-.03(8), 40 CFR Part 63 Subpart DDDDD.

Table 6: 40 CFR Part 63 Subpart DDDDD
Specific Applicability Determinations for 37-0028-120, 121, 122, 123

Requirement			Rule Citation
Comply with each applicable emission limit in Table 1 to Subpart DDDDD, except as provided under §63.7522.			§63.7500(a)(1), Table 1 to Subpart DDDDD
Subcategory	Pollutant	Emission Limits (excluding startup and shutdown)	
Units designed to burn liquid fuel	HCl	4.4E-04 lb/MMBtu	
	Mercury	4.8E-07 lb/MMBtu	
Units designed to burn light liquid fuel	CO	130 ppmv, dry basis corrected to 3% O ₂	
	Filterable PM (or TSM)	1.1E-03 lb/MMBtu PM (or 2.9E-05 lb/MMBtu TSM)	
Comply with each applicable work practice standard.			§63.7500(a)(1), §63.7530(h), Table 3 to Subpart DDDDD
Comply with each applicable operating limit.			§63.7500(a)(2) , Table 4 to Subpart DDDDD
At all times, operate and maintain the affected source and associated air pollution control equipment and monitoring equipment, in a manner consistent with safety and good air pollution control practices for minimizing emissions.			§63.7500(a)(3)
Emission and operating limits apply at all times except as noted in §63.7500(f).			§63.7505(a)
Site-specific monitoring plan for any CEMS, COMS, or CPMS.			§63.7505(d)
As applicable, develop and implement a written startup and shutdown plan.			§63.7505(d)
Initial compliance requirements.			§§63.7510(a) - (e)
Initial compliance demonstration.			§§63.7510(f), (g)
Comply with §63.7515 for subsequent performance tests, fuel analyses, or tune-ups.			§63.7515
Conduct performance tests in accordance with §63.7520.			§63.7520
Conduct fuel analyses in accordance with §63.7521.			§63.7521
Emissions averaging option			§63.7522, §63.7541
Continuous compliance			§63.7540
Initial notification			§63.7545(c)
Notification of performance test			§63.7545(d)
Notification of Compliance Status			§§63.7530(e) and (f), §63.7545(e)
Reporting and recordkeeping requirements			§63.7550, §63.7555, §63.7560

Table 6: 40 CFR Part 63 Subpart DDDDD
Specific Applicability Determinations for 37-0028-120, 121, 122, 123

Requirement	Rule Citation
Applicability of General Provisions	§63.7565, Table 10 to Subpart DDDDD

S1-7. Operation and maintenance of boilers

The permittee shall design, operate, maintain, and repair the emission source as required to assure compliance with the carbon monoxide and carbon dioxide equivalent emission limits. The minimum requirements shall include:

- (a) Design the boiler to minimize radiation heat loss (via adequate insulation of the furnace)
- (b) Install and maintain adequate insulation on steam piping
- (c) Design and operate the boilers, using written operating and maintenance procedures and/or manufacturer's instructions, to:
 - (i) Minimize heat loss from the stack;
 - (ii) Minimize excess air and control air infiltration;
 - (iii) Maintain boiler feedwater to minimize scaling, corrosion, embrittlement, or acid attack;
 - (iv) Maintain heat transfer surfaces; and
 - (v) Properly tune gas and oil burners.

All records shall be maintained in accordance with Condition G4 of this permit.

Tenn. Comp. R. & Regs. 1200-03-09-.01(4)

S1-8. NO_x SIP Call Requirements

The permittee shall comply with the applicable provisions of Tenn. Comp. R. & Regs. 1200-03-27-.12 (NO_x SIP Call Requirements for Stationary Boilers and Combustion Turbines).

S1-9. Performance Testing Requirement

No later than 180 days after initial start-up of each boiler, the owner or operator shall furnish the Technical Secretary a written report of the results of an emissions performance test to demonstrate compliance with the CO and VOC limits established in **Condition S1-4** of this permit. The source test shall be conducted and data reduced in accordance with methodology allowed by the Tennessee Division of Air Pollution Control. At least 30 days prior to the actual test date, the Technical Secretary shall be notified of the official test date and shall be in receipt of a test protocol detailing test methods to be used and any operational parameters to be monitored to assure continual compliance. Tenn. Comp. R. & Regs. 1200-03-10-.01(1)

S1-10. Replacement of Existing Coal Boilers

The application dated May 31, 2018 states that existing coal-fired boilers 37-0028-01, 02, 03, and 04 shall permanently cease operation following startup of emission sources 37-0028-120, 121, 122, and 123. During the shakedown period for new boilers 37-0028-120, 121, 122, and 123, the permittee shall comply with the following emission limits (**Table 7**) during any period of twelve (12) consecutive months. The combined limits shall apply beginning in the first month of operation of 37-0028-120, 121, 122, and 123 and shall cease to apply upon retirement of boilers 37-0028-01, 02, 03, and 04.

Table 7: Combined Allowable Emissions		
Emission Sources 37-0028-01, 02, 03, and 04 and Emission Sources 37-0028-120, 121, 122, and 123		
Pollutant	Combined Limit (tons/12 Months)	Basis
PM	81.9	Note 1
PM ₁₀	71.9	Note 1
PM _{2.5}	66.9	Note 1
SO ₂	1,740	Note 2
CO	231.8	Note 3
VOC	12.1	Note 2
NO _x	373.5	Note 1
CO ₂ e	246,445	Note 1
Notes: 1. Baseline emissions for the coal boilers (tons/year) plus the PSD significance threshold (tons/year), minus 1 ton/year. 2. Baseline emissions for the coal boilers (tons/year) plus allowable emissions for the gas/oil-fired boilers (tons/year). 3. Modeled emission rate.		

Tenn. Comp. R. & Regs. 1200-03-09-.01(4) and 1200-03-09-.03(8)

Compliance Method: Compliance with this condition shall be assured as follows:

- (a) The permittee shall calculate actual emissions of each pollutant as indicated in **Table 8**. Records of emissions (in tons per month and tons per 12 consecutive months) shall be maintained at the source location and kept available for inspection by the Technical Secretary or the authorized representative.

Table 8: Compliance Method for Combined Emission Rates		
Pollutant	Compliance Method (37-0028-01, 02, 03, and 04)	Compliance Method (37-0028-120, 121, 122, and 123)
PM, CO, VOC	Submit a monitoring plan describing how actual emissions will be measured or calculated for each pollutant. The monitoring plan must be received at least 30 days prior to initial operation of emission sources 37-0028-120, 121, 122, or 123.	Calculate actual emissions using the allowable emission rate specified in Condition S1-4 and the actual fuel usage (Conditions S1-1 and S1-6A).
SO ₂		Calculate actual emissions using the fuel sulfur content (Condition S1-6A and §60.49b(r)(1)) and the actual fuel usage (Conditions S1-1 and S1-6A).
NO _x		Calculate actual emissions using NO _x CEMS data (Condition S1-6A and §§60.48b(b), (c), (d), (e)(2), (e)(3), and (f))
CO ₂ e		Calculate actual emissions using emission factors (40 CFR 98 Subpart C, Tables C-1 and C-2) and the actual fuel usage (Conditions S1-1 and S1-6A).

- (b) The permittee shall notify the Technical Secretary in writing that boilers 37-0028-01, 02, 03, and 04 have ceased operation. The notification shall include the date that the emission sources ceased operation and shall be submitted no later than thirty (30) days after coal-fired boiler operations cease.

Written notifications and other correspondence shall be delivered to the permit program at the address listed below:

Tennessee Department of Environment and Conservation
Attn: Permit Program
Division of Air Pollution Control
William R. Snodgrass TN Tower, 15th Floor
312 Rosa L. Parks Avenue
Nashville, TN 37243

or Adobe Portable Document Format (PDF)
Copy to: Air.Pollution.Control@TN.gov

Source Specific Conditions for Source 37-0028-125

<p>Recrystallization and Coating Operations: Equipment for production of explosives (Vents A, B, C, D, E, and F). A primary condenser and vent condenser are used to control VOC emissions from Vent A, and a primary condenser is used to recover solvent from Vent E (100% recovery). Vents B, C, D, and F are associated with four process tanks, which are insignificant emissions units.</p>
--

S2-1. Input Limits: Reserved.

S2-2. Production Limits: Reserved.

S2-3. Operating Hour Limits: Reserved.

S2-4. Emission Limits

Volatile organic compounds emitted from this source shall not exceed the limits shown in **Table 9**. These limits shall represent Best Available Control Technology (BACT) for this emission source.

Table 9: VOC BACT Emission Limits for 37-0028-125				
Vent ID	Emission Limit	Averaging Period	Control Technology	Rule Citation(s)
A	0.42 lb/hr	Average emission rate for each batch	Primary condensers in series with vent condenser	1200-03-09-.01(4)
	4.2 tons/year	Any period of 12 consecutive months		
E	0.42 lb/hr	Average emission rate for each batch	Vent condenser	1200-03-09-.01(4)
	1.8 tons/year	Any period of 12 consecutive months		
B, C, D, and F	0.19 tons/year	Any period of 12 consecutive months	Submerged fill and good maintenance practices	1200-03-09-.01(4)

Compliance Methods: Compliance shall be assured as indicated in **Table 10**:

Table 10: Compliance Methods for 37-0028-125

Vent ID	Compliance Method
A and E	Comply with Conditions S2-7 and S2-8.
B, C, D, and F	Compliance is based on the emission calculations submitted with the May 31, 2018 application.

S2-5. Source-Specific Visible Emission Limits: Reserved.

S2-6. Source Specific NESHAP and NSPS Conditions: Reserved.

S2-7. Design Evaluation and Monitoring Requirements for Control Device

The permittee shall operate and maintain the control device so that the monitored parameters defined below remain within the approved ranges whenever emissions are routed to the control device.

- (a) No later than 180 days after initial startup of this emission source, the permittee shall prepare and submit a design evaluation for the final control device. The design evaluation shall include documentation demonstrating that the control device being used achieves the required control efficiency during the reasonably expected maximum emission rate, as follows. The design evaluation shall include:
 - (1) A description of the gas stream that enters the control device, including gas composition and flow;
 - (2) A control efficiency determination, including consideration of all vapors, gases, and liquids received by the control device;
 - (3) The final temperature of the stream vapor, the type of condenser, and the design flow rate of the emission stream; and
 - (4) The parameter(s) that will be monitored to demonstrate compliance, including parameter description, value, and averaging period.
- (b) The permittee shall continuously monitor and record the parameters specified in the design evaluation. Records of all monitoring shall be maintained at the source location and kept available for inspection by the Technical Secretary or the authorized representative.

Tenn. Comp. R. & Regs. 1200-03-09-.01(1)(d).

S2-8. Recordkeeping of VOC Emissions

A record of VOC emissions from Vents A and E, as determined by engineering calculations in combination with batch production records, must be maintained at the source location and kept available for inspection by the Technical Secretary or the authorized representative. All data, including all required calculations, must be entered in the log no later than seven (7) after production of each batch. Tenn. Comp. R. & Regs. 1200-03-09-.01(1)(d).

S2-9. Fugitive Equipment Leaks

- (a) No later than 180 days after initial start-up of this emission source, the permittee shall estimate fugitive VOC emissions due to equipment leaks from pumps, valves, connectors, pressure relief valves, agitators, compressors, sampling connections, and open-ended lines. The permittee shall identify each regulated component with a unique identification number, record each regulated component and its identification number in a log, and physically locate each regulated component in the process unit using piping and instrumentation diagrams (P&IDs), process flow diagrams, plot plans, or continuously updated equipment

log. The permittee shall promptly note in the equipment log when new and replacement pieces of equipment are added or equipment is taken out of service. Fugitive equipment leaks shall be estimated in accordance with EPA publication number EPA-453/R-95-017 (*1995 Protocol for Equipment Leak Emission Estimates*) or an equivalent methodology.

- (1) If estimated fugitive emissions due to equipment leaks are 5 tons per year or more, perform quarterly leak inspections as indicated below.
 - (2) If estimated fugitive emissions due to equipment leaks are less than 5 tons per year, perform annual leak inspections as indicated below.
- (b) (1) **Quarterly Leak Inspection:** A leak inspection of all equipment in VOC service (contains or contacts a process fluid that is at least 10% VOC by weight) that is not “in heavy liquid service” or “in vacuum service” shall be performed once per calendar quarter. For this inspection, detection methods incorporating sight (e.g. looking for drips), sound (e.g. hissing sounds indicative of a leak), or smell (e.g. strong odors traceable to piping leaks) shall be used as appropriate. “Equipment” includes piping, pumps, compressors, pressure relief devices, sampling connection systems, open-ended valves or lines, valves, and flanges. “In heavy liquid service” means when less than 20 weight percent of the process fluid consists of air contaminants having pure component vapor pressures greater than 0.044 psia at 68° F, and the process fluid is not in the gaseous state at operating conditions. “In vacuum service” means equipment that is operating at an internal pressure that is at least 0.7 psia below ambient pressure. Equipment that is covered by insulation or obstructed from sight when standing on existing floors or walkways is exempt from this inspection. Equipment that is subject to a federally required work practice standard (e.g. 40 CFR Part 60, Subpart VV, 40 CFR Part 63, Subpart H, 40 CFR Part 265, Subpart BB) is exempt from this inspection. Equipment that is in air contaminant service less than 300 hours in a calendar quarter is exempt from this inspection for that quarter.
- (2) **Annual Leak Inspection:** A leak inspection of all equipment in VOC service (contains or contacts a process fluid that is at least 10% VOC by weight) that is not “in heavy liquid service” or “in vacuum service” shall be performed once per calendar year. For this inspection, detection methods incorporating sight (e.g. looking for drips), sound (e.g. hissing sounds indicative of a leak), or smell (e.g. strong odors traceable to piping leaks) shall be used as appropriate. “Equipment” includes piping, pumps, compressors, pressure relief devices, sampling connection systems, open-ended valves or lines, valves, and flanges. “In heavy liquid service” means when less than 20 weight percent of the process fluid consists of air contaminants having pure component vapor pressures greater than 0.044 psia at 68° F, and the process fluid is not in the gaseous state at operating conditions. “In vacuum service” means equipment that is operating at an internal pressure which is at least 0.7 psia below ambient pressure. Equipment that is covered by insulation or obstructed from sight when standing on existing floors or walkways is exempt from this inspection. Equipment that is subject to a federally required work practice standard (e.g. 40 CFR Part 60, Subpart VV, 40 CFR Part 63, Subpart H, 40 CFR Part 265, Subpart BB) is exempt from this inspection. Equipment that is in air contaminant service less than 720 hours in a calendar year is exempt from this inspection for that year.
- (c) When a leak is detected, an initial attempt at repair shall be made no later than 10 calendar days after the leak is detected. Repair or replacement of leaking equipment shall be completed within 30 calendar days after detection of each leak, except as provided in paragraph (c) below.
- (d) (1) Delay of repair of leaking equipment will be allowed if the repair is technically infeasible without a process unit shutdown or if repair personnel would be exposed to an immediate danger

if attempting a repair without a process shutdown. Repair of this equipment shall occur by the end of the next process unit shutdown.

- (2) Delay of repair of equipment for which leaks have been detected is allowed for equipment that is isolated from the process and that does not remain in air contaminant service.
- (3) Delay of repair for valves, connectors, and agitators is also allowed if the owner or operator determines that emissions of purged material resulting from immediate repair would be greater than the fugitive emissions likely to result from delay of repair.
- (4) Delay of repair beyond a process unit shutdown will be allowed for a valve if valve assembly replacement is necessary during the process unit shutdown, valve assembly supplies have been depleted, and valve assembly supplies had been sufficiently stocked before the supplies were depleted. Delay of repair beyond the second process unit shutdown will not be allowed unless the third process unit shutdown occurs sooner than 6 months after the first process unit shutdown.
- (5) Delay of repair of pumps for up to 6 months after leak detection is allowed if the pump is replaced with (i) a dual mechanical seal system, (ii) a pump with no externally actuated shaft penetrating the pump housing, or (iii) a new system that the permittee has determined will provide better performance.

(e) Recordkeeping Requirements

- (1) Records must be maintained that identify piping systems or process areas subject to this plan.
- (2) Records of all inspections must be kept documenting the inspection was conducted and the date of the inspection. If no leaks are detected during the inspection, the record must indicate this result.
- (3) When a leak is detected during the quarterly inspection, the following information shall be recorded:
 - (i) Component identifier or description of location and operator name, initials, or identification number.
 - (ii) The date the leak was detected.
 - (iii) The date the initial attempt at repair is made.
 - (iv) The date of successful repair of the leak. "Successful repair" means the leak is no longer detected using the inspection procedure outlined in item 10(a).
 - (v) "Repair delayed" and the reason for the delay if a leak is not repaired within 30 days after discovery of the leak.

Tenn. Comp. R. & Regs. 1200-03-09-.01(1)(d).

(end of conditions)

The Smog Log database gives the location of this source as 36.534587° Latitude and -82.629334° Longitude.

Appendix 1: Startup Certification

Start Up Certification – submit one for each source included in this permit

Start Up Certification for Source ____ - ____ - ____

The permittee shall certify the initial start-up date(s) of the new or modified air contaminant source(s) regulated by this permit by submitting

A COPY OF THE FRONT PAGE OF THIS PERMIT, with the information required in A) and B) of this certification completed, to the Technical Secretary's representatives listed below:

A) DATE OF INITIAL START-UP: ____ / ____ / ____
month day year

B) Anticipated operating rate: ____ percent of maximum rated capacity

For the purpose of complying with this condition, "initial start-up" of the air contaminant source shall be the date the new or modified source began operation for the production of product for sale, use as raw materials, or steam or heat production under the terms of this permit.

The undersigned affirms that this person has the full authority to represent and bind the permittee in environmental permitting affairs. The undersigned further affirms that the above provided information is true to the best of his/her knowledge and belief.

Signature		Date
Signer's name (type or print)	Title	Phone (with area code)

Note: This certification is not an application for an operating permit. At a minimum, the appropriate application form, usually an APC-100, must be submitted requesting an operating permit. The application must be submitted in accordance with the requirements of this permit.

The completed certification shall be submitted to the Permit Program at the address listed below or via e-mail, no later than thirty (30) days after the air contaminant source is started-up.

TN Dept. of Environment and Conservation
Attn: Permit Program
Division of Air Pollution Control
William R. Snodgrass TN Tower, 15th Floor
312 Rosa L. Parks Avenue
Nashville, TN 37243

or Adobe Portable Document Format (PDF)
Air.Pollution.Control@TN.gov

Tenn. Comp. R. & Regs. 1200-03-09-.02(3)(b)

Appendix 2: General Provisions Applicability for 40 CFR 60 Subpart Db

Comply with the following General Provisions of the federal Standards of Performance for New Stationary Sources (40 CFR 60 Subpart A).

Rule Citation	Subject of citation	Applies to subpart?	Explanation
§60.1	Applicability	Yes	
§60.2	Definitions	Yes	
§60.3	Units and abbreviations	Yes	
§60.4	Address	Yes	
§60.5	Determination of construction or modification	No	New source
§60.6	Review of plans	Yes	
§60.7	Notification and Recordkeeping	Yes	
§60.8	Performance tests	Yes	Applies to NO _x emissions
§60.9	Availability of information	Yes	
§60.10	State Authority	Yes	
§60.11	Compliance with standards and maintenance requirements	Yes	Applies to NO _x emissions
§60.12	Circumvention	Yes	
§60.13	Monitoring requirements	Yes	
§60.14	Modification	No	New source
§60.15	Reconstruction	No	New source
§60.16	Priority list	No	
§60.17	Incorporations by reference	Yes	
§60.18	General control device requirements	No	Flaring and alternative leak detection are not used at the affected facility
§60.19	General notification and reporting requirements	Yes	

Tenn. Comp. R. & Regs. 1200-03-09-.03(8)

Appendix B – Application for PSD Permit 974192

ORDNANCE SYSTEMS INC.
4509 West Stone Drive
Kingsport, Tennessee 37660-9982
Telephone (423) 578-8010
Fax (423) 578-8054

In Reply Reference 6233RO
Federal Express Tracking Number: HAND DELIVERED

May 31, 2018

Ms. Michelle Walker Owenby, Director
Tennessee Department of Environment and Conservation
Division of Air Pollution Control
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 15th Floor
Nashville, TN 37243

Reference: BAE Systems Ordnance Systems Inc., Holston Army Ammunition Plant, source 37-0028 New Source Review Application submittal for new construction of sources supporting the HSAAP Expansion Project. This application includes three separate processes supporting the first of three phases of construction and results in emissions above the significance thresholds for volatile organic compounds, greenhouse gases, and provisionally for carbon monoxide.

Dear Ms. Owenby:

BAE Systems Ordnance Systems Inc. (OSI), operating contractor for Holston Army Ammunition Plant (HSAAP) in Kingsport (Emission Source Reference Number 37-0028), respectfully submits the enclosed Prevention of Significant Deterioration (PSD) construction permit application for sources to be located at the Area B facility in Hawkins County, Tennessee. A request flowed down by the Office of Secretary of Defense (OSD) and other Department of Defense (DoD) Services with high visibility and support because of an urgent DoD need to increase the amount of explosives produced at HSAAP. The Army and OSI have developed an Expansion Project, which involves the addition of ■ new process buildings as well as the retirement of the existing coal-fired boilers. This project has an aggressive schedule and execution plan to assure the needs of DoD are met as quickly as possible. The following process sources are included in this PSD construction permit application submittal to meet an incremental need in support of the overall expansion project:

- New Natural Gas-fired Steam Generating Boilers with fuel oil backup
- New Recrystallization at ■
- ■ Milling at ■
- Diesel-fired emergency generators
- Fuel oil storage tanks

These sources are the first of the ■ sources to be permitted and are considered new facilities subject to evaluation under the New Source Review (NSR) regulations. This application submittal is the first of three applications for an aggregation of projects designed to support an overall expansion of the HSAAP facility. Emission increases from the new processes, increases in emissions from increased utilization of existing processes, increases associated with insignificant emissions units, and related decreases from existing sources have been evaluated for comparison to the PSD significance thresholds under the NSR regulations. A detailed description of these sources, including a summary of the emissions accounting, is included in the Process Description and Regulatory Analysis sections of the enclosed PSD Application document. In accordance with the Pruitt Memo dated March 13, 2018, the accounting in the first step of the PSD process includes the reduction in emissions directly related to this project. As stated above, the existing coal-fired steam facility will be retired as part of this project and these emissions are accounted appropriately. Support facilities and other existing operations were also evaluated for reductions and are included in the emissions summary. The operation of these sources will require additional steam to be generated but the new natural gas-fired steam generating boilers are lower emitting sources and will meet all applicable air regulations for new sources.

Of the PSD applicable pollutants, emissions of volatile organic compounds (VOCs), greenhouse gases (GHGs), and provisionally carbon monoxide (CO) were determined to be above the PSD significance thresholds. All other pollutants, including particulate matter (PM) at the PSD relevant particle sizes, nitrogen oxides (NO_x), and Sulfur Dioxide (SO₂) are below these PSD significance thresholds. The PSD construction permit application consists of Section 1 through 6 with Appendices A through E. These documents provide information consistent with the requirements of Rules 1200-03-09-.01(4) of the Tennessee Department of Environment and Conservation, Division of Air Pollution Control Regulations.

Benefits of these projects beyond meeting the urgent DoD need, include improving the efficiency of the processes through current technology, reducing energy needs of the new processes, providing safe facilities for operations personnel, and reducing overall emissions, with SO₂ emissions being reduced by 1,719 tons per year, all while providing economic development, jobs, and a renewed commitment to the local area and Tennessee by the DoD for years to come. The Army has committed to a significant investment in this facility through these projects, which will ensure that the HSAAP continues to have the capabilities necessary to provide safe and versatile products needed to support our United States Armed Forces. OSI looks forward to working closely with TDEC and is available to provide any information necessary to ensure issuance of this PSD construction permit. An application for a significant modification to the Title V operating permit will be submitted separately along with proposed permit language.

A portion of the information provided in this application is considered confidential business information (CBI). A hard copy of this document will be hand delivered to the division on 31 MAY 2018 marked as CBI. OSI requests that this entire document be considered confidential and not for public distribution in accordance with TDEC-DAPC rule 1200-03-09-.02(11)(d)(iii). A separate follow-on redacted version suitable for public viewing will be submitted electronically by 1 JUNE 2018.

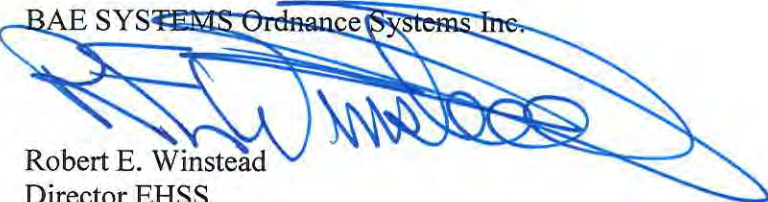
All known regulatory requirements for this project are included with this application. Therefore, a request is being made in accordance with TDEC-DAPC rule 1200-03-09-.02(11)(e)6 rule to expressly include in the permit a provision stating that compliance with the conditions of the permit shall be deemed compliance with any applicable requirements as of the date of the permit.

Pursuant to Tennessee Air Pollution Control regulation 1200-03-09 and 40 CFR 52.21, I have reviewed the information contained in this PSD Construction Permit Application dated May 31, 2018, in its entirety. To the best of my knowledge, and based on information and belief formed after reasonable inquiry, the statements and information contained in this application are true, accurate, and complete.

Mr. James Ogle serves as OSI's primary contact for air program issues and may be reached at (423) 578-6231 or by email at james.ogle@baesystems.com. Please do not hesitate to contact Mr. Ogle should questions arise or additional information be needed.

Sincerely,

BAE SYSTEMS Ordnance Systems Inc.



Robert E. Winstead
Director EHSS

cc Environmental Affairs/Ogle
HSAAP/Vestal
Environmental Affairs Files 1305/2018

Enclosure: OSI HSAAP Expansion Project 31 MAY 2018 – PSD Application CONFIDENTIAL
OSI HSAAP Expansion Project 31 MAY 2018 – PSD Application REDACTED



Prevention of Significant Deterioration (PSD) Construction Permit Application

Expansion Project

Holston Army Ammunition Plant (HSAAP) Kingsport, Tennessee

Prepared by:



BAE Systems Ordnance Systems Inc.
4509 West Stone Drive
Kingsport, Tennessee 37660

And



EnSafe Inc.
220 Athens Way, Suite 410
Nashville, Tennessee 37228

May 2018

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Appendix E	Confidential Business Information Request

1.0 INTRODUCTION

The Holston Army Ammunition Plant (HSAAP) located in Kingsport, Tennessee is an important part of the U.S. Army industrial base and produces many products which support the military. Spanning more than 6,000 acres, the HSAAP is the major supplier of explosive materials primarily Research Department eXplosive (RDX) and High Melting eXplosive (HMX)-based products, as well as Insensitive Munitions eXplosive (IMX), to the U.S. Department of Defense. The facility has equipment and capabilities for nitration chemistry, acid handling and recovery, and other chemical-processing operations. The plant is a government-owned and contractor-operated (GOCO) facility. BAE Systems Ordnance Systems Inc. (OSI) has been the operating contractor of the plant since 1999. The Department of Defense has determined there is an urgent need to increase the amount of explosives produced at HSAAP. The need exceeds the current capacity of the facility.

The HSAAP installation is currently divided into two facilities, connected by pipeline and rail, identified as Area A in Sullivan County and Area B in Hawkins County. Area A of HSAAP (Title V permit number 558407 and emission source reference number 82-0018) is located approximately 4 miles from the main production facility at Area B (Title V permit number 558406 and emission source reference numbers 37-0028, 37-1028, and 37-1029).

The main process for manufacturing the core nitramine-based explosives products uses nitric acid, acetic acid, and acetic anhydride in conjunction with select organic materials to manufacture the crude RDX and HMX explosives. From here, the crude explosives are then washed, recrystallized, coated, conditioned, and integrated into the various formulations used in multiple military applications. The acids from the crude explosive process are recycled and re-concentrated as part of an internal loop for re-use in crude explosives manufacturing. These combined processes are currently at capacity to meet the product demand for the U.S. Military.

2.0 EXPANSION PROJECT DESCRIPTION

An approximate [REDACTED] minimum increase in capacity is needed to meet the projected orders for the currently forecasted years. This equates to approximately [REDACTED] new process buildings. Two other process buildings are also scheduled to be added during the same construction period. Emissions from all new process buildings and support equipment include nitrogen oxides (NO_x), carbon monoxide (CO), particulate matter (PM), volatile organic compounds (VOC), hazardous air pollutants (HAP), and greenhouse gases (GHG). Process types include combustion for steam, chemical manufacturing, milling, distillation, coating operations, chemical storage, etc. This increase in capacity is hereinafter referred to as the Expansion Project.

The proposed permitting process for the Expansion Project includes the following:

- Expansion Project processes will be aggregated for PSD permitting purposes.
- The Expansion Project will include the retirement of the existing coal-fired boilers.
- Permitting of the Expansion Project will occur in three phases.
- Three separate PSD construction permit applications will be submitted over the next two years.
- Expansion Project is PSD Significant for VOC, GHG, and provisionally CO.

2.1 Proposed Operations

2.1.1 Phased Permitting Approach and Summary of Phase I Emissions

Construction of the Expansion Project emission units is expected to take place over several years. As a result, design of several of the emission units has not begun or is in the very early stages, therefore emission rates, locations, and stack parameters are not known with certainty. Consequently, OSI proposes to permit the Expansion Project in three phases. This permit application is for Phase I, which includes four new steam generating boilers, a new recrystallization process at existing building [REDACTED], a new [REDACTED] milling operation at existing building [REDACTED], three new diesel-fired emergency generators, and two new fuel oil storage tanks. In addition, Phase I will include the retirement of the existing coal-fired steam generating boilers when the new natural gas-fired steam generating boilers are operational. The design of the Phase I emission units is either complete, or nearing completion, and emission rates have been determined either as the result of the control technology review (Best Available Control Technology (BACT) analysis) described in Section 4.0 or by detailed design.

Because uncontrolled emission rates for the emission units in Phases II and III have not been determined by the project design teams, it is not possible to perform the control technology review for the emission units included on those phases. As the application for each subsequent phase of the Expansion Project is developed, a control technology review will be performed for the emission units included in that phase.

In addition, future phases may include emission units that are subject to additional regulatory requirements. Each subsequent application will include a complete regulatory review for not only the emission units involved in that phase, but also the emission units included in previous phases. The regulatory review presented in Section 3.0 is a complete review of the regulatory requirements of the emission units included in Phase I.

The source impact analysis described in Section 5.0, and the results of which are provided in Appendix C, includes emissions from all emission units that are a part of the Expansion Project. The emission rates, locations, and stack parameters for the emission units in Phase I are well known. The emission rates, locations, and stack parameters of the emission units in Phases II and III are uncertain but have been estimated based on the best current information and have been included in the source impact analysis. As the applications for subsequent phases are developed, more up-to-date rates, locations, and parameters will be used to update the source impact analysis.

In like manner, emissions from all the emission units included in the Expansion Project have been included in the PSD analysis presented in this application.

Table 2-1 summarizes the emissions from the new Phase I emission units as well as the emissions due to increased utilization of existing sources, and the retirement of the coal-fired boilers and support sources.

Table 2-1
Summary of Phase I Emissions

Phase	Process	PM ₁₀ (tpy)	PM _{2.5} (tpy)	SO ₂ (tpy)	NO _x (tpy)	CO (tpy)	VOC (tpy)	GHGs as CO ₂ e (tpy)
Existing	Existing Sources Increased Utilization (Open Burning)	9.4	9.4	0.4	5.1	38.2	10.2	1,283.8
	Existing Sources Increased Utilization (various)	6.4	6.4	0	0	0	3.2	0
	Retirement of Existing Coal Fired Boilers	-57.9	-57.9	-1,733.1	-334.5	-152.0	-6.7	-171,446.4
	Coal Fired Support Sources	-1.5	0	0	0	0	0	0
I	Natural Gas Boilers	15.9	15.9	6.4	226.4	100.6	22.9	678,139
	Diesel-Fired Internal Combustion Engines	0.3	0.3	0.02	10.6	5.8	0.7	1,931.9
	■ (Recrystallization)	0.01	0.01	0	0.6	0	6.2	0
	■ Milling)	6.0	6.0	0	0	0	0	0
	Back-up Fuel Oil Storage	0	0	0	0	0	0.2	0
	Phase I Total:	-21.4	-19.7	-1,726.3	-91.8	-7.4	36.7	509,908.3

2.1.2 New Natural Gas with Fuel Oil Backup Steam Generating Boilers

The HSAAP Area B facility is installing four (4) new boilers that will be dual fuel-fired. In the event natural gas is unavailable, HSAAP will maintain a back-up supply of fuel oil onsite. Each new boiler is rated at 250,000 pounds per hour (PPH) of steam and has a total heat input capacity of 327 million British thermal units per hour (MMBtu/hr.) when firing natural gas and 310 MMBtu/hr. when firing fuel oil. The boilers will be used to provide steam to the new processes as well as to existing processes. Installation of the new boilers will take place in Phase I and will be installed in a way that allows for the concurrent decommissioning of the existing coal-fired boilers.

Emissions from the boilers will consist of the products of combustion. HSAAP proposes to install catalytic oxidation, selective catalytic reduction in addition to low NO_x burners, and an electrostatic precipitator to control emissions from the boilers. See the Control Technology Review portion of the application (Section 4.0) for further information regarding emission controls.

2.1.3 New Recrystallization at [REDACTED]

Building [REDACTED] will house [REDACTED] recrystallization trains, designed to operate in parallel, and [REDACTED] vessel. The processes will be similar to existing processes located in Buildings [REDACTED] (37-0028-83 and 37-0028-84) and [REDACTED] (37-0028-23). This new process will be designed to recrystallize [REDACTED] of crude explosives in campaigns requiring a shutdown to switch between products. This is a batch process design. All process functions will be automated using a PLC-based control system located in a central control room to minimize manual tasks and allow interlocks and permissives to be established.

Recrystallization of one of the explosive types will result in emissions of volatile organic compounds (VOC) while the other emits an insignificant amount of nitrogen oxides (NO_x). Each individual process train will consist of a dissolver and a recrystallization still. All [REDACTED] trains will share a common slurry tank and multiple dewatering stations. Bag filters with steam-jacketed housings will be used for filtering hot product liquor. One vent condenser will serve as emission control and product capture for all [REDACTED] process trains. The coating operation emissions are VOC with a small potential for insignificant quantities of particulate matter (PM) emissions. In addition to the process equipment, there will be four tanks associated with the process. Each tank will have potential emissions below five tons per year, meeting the definition of an insignificant emission unit.

2.1.4 New [REDACTED] Milling Operation at [REDACTED]

Building [REDACTED] will house the [REDACTED] Mill [REDACTED] Facility. This process will be an unmanned batch process. When the [REDACTED] is processing material, operators must be out of the building, controlling the process from the remotely located control room at [REDACTED]. Building [REDACTED] will include two operations: the tray dryer and [REDACTED] trains.

[REDACTED]

[REDACTED] dedicated baghouses will be used to collect product from each [REDACTED] train with follow-on HEPA filtration control. Control devices for the tray dryer and hoods consist of a separate scrubber for each.

2.1.5 Insignificant Emissions Units (IEUs)

New Emergency Diesel Generators

The Expansion Project will also include installation of three (3) diesel-fired stationary internal combustion engines with associated emergency generators. Each engine will have a rated capacity less than 1,000 kilowatts (1,490 horsepower) and will burn ultra-low sulfur diesel fuel. Based on potential emissions from each engine, each qualifies as an insignificant emission unit.

Fuel Oil Storage Tanks

In addition, two new fuel oil storage tanks will be installed to provide fuel oil storage for the dual fuel steam generating boilers. The storage tanks will provide capacity adequate for storing enough fuel oil to operate the four new boilers at maximum steam production for fourteen days as required by the US Army installation owner. Based on emission calculations for these tanks using EPA Tanks 4.0.9d, each tank qualifies as an insignificant emission unit.

2.1.6 Retirement of Existing Coal-Fired Steam Generating Boilers and Reductions from Other Existing Sources

2.1.6.1 Coal-fired Steam Boilers

Retirement of the existing coal-fired steam generating boilers and the related coal handling facilities will result in a significant reduction in emissions. HSAAP calculated the reduction in emissions in accordance with 40 CFR 52.21(b)(48)(i)(d)(ii). The 10-year lookback period for calculating the baseline actual emissions ends at the end of April 2018, as does the 24-consecutive month lookback. The details of the calculation of baseline actual emissions are provided in Appendix B.

Emissions during the 24-month period ending with April 2018 are based on steam production records and emission factors. The emission factors used for the boilers are summarized below in Table 2-1.

Table 2-2
Boiler Emission Factor Summary

Pollutant	Emission Factor	Units	Source
SO ₂	57	lb SO ₂ per ton of coal	AP-42, Table 1.1-3
NO _x	11	lb NO _x per ton of coal	AP-42, Table 1.1-3
CO	5	lb CO per ton of coal	AP-42, Table 1.1-3
VOC	0.22	lb VOC per ton of coal	Title V permit limit
PM/PM ₁₀ /PM _{2.5}	0.07	lb/MMBtu	Title V permit limit
GHG as CO ₂ e	207.3	lb/MMBtu	40 CFR 98

The AP-42 emission factor for SO₂ for a spreader stoker boiler firing bituminous coal (as well as the current Title V permit limit) is 38S pounds per ton of coal burned where the S is the percent sulfur of the coal (Table 1.1-3). The current Title V permit limit for the sulfur content of coal burned in the HSAAP coal-fired boilers is 1.5%. Consequently, the AP-42 emission factor is calculated as follows:

$$38 \times 1.5 = 57 \text{ lb SO}_2/\text{ton of coal}$$

The AP-42 emission factor for NO_x for a spreader stoker boiler firing bituminous coal is 11 lb/ton of coal. The current Title V permit limit for NO_x is 0.4 lb/MMBtu. Assuming the heat content of the coal burned at HSAAP is 27.2 MMBtu/ton, an emission factor based on the current Title V permit limit would be calculated as follows:

$$0.4 \text{ lb/MMBtu} \times 27.2 \text{ MMBtu/ton} = 10.9 \text{ lb NO}_x/\text{ton of coal}$$

The AP-42 emission factor for CO for a spreader stoker boiler burning bituminous coal is 5 pounds per ton of coal burned (Table 1.1-3). The applicable Boiler MACT CO limit (40 CFR 63, Subpart DDDDD, Table 2) is 340 ppm corrected to 3% O₂ based on a 30-day rolling average.

That concentration equates to an emission rate of 0.282 lb/MMBtu. Assuming the heat content of the coal burned at HSAAP is 27.2 MMBtu/ton, an emission factor based on the applicable Boiler MACT limit would be calculated as follows:

$$0.282 \text{ lb/MMBtu} \times 27.2 \text{ MMBtu/ton} = 7.7 \text{ lb CO/ton of coal}$$

Since the AP-42 emission factor is lower than the applicable Boiler MACT limit, to be conservative, the AP-42 emission factor was used for these calculations.

The current Title V permit limit for VOC is 1.5 lb/hr. In addition, coal usage is limited by the Title V permit to 60,716 tons per year per boiler, which is equal to an average coal usage of 6.93 T/hr. So, the emission factor used for these calculations is calculated as follows:

$$1.5 \text{ lb/hr} / 6.93 \text{ T/hr} = 0.22 \text{ lb VOC/ton of coal}$$

The current Title V permit limit for total suspended particulate (TSP) is 0.07 lb/MMBtu. The applicable Boiler MACT limit is 0.04 lb/MMBtu for filterable PM (PM_F), only. Since PM_F is usually no more than half of TSP for boilers with baghouses for PM control, the equivalent applicable Boiler MACT limit for TSP would be 0.08 lb/MMBtu or greater. Therefore, to be conservative, the current Title V permit limit of 0.07 lb/MMBtu was used for these calculations. In addition, since the boilers have baghouses for PM control, it was assumed that PM=PM₁₀=PM_{2.5}.

The GHG emission factor is based on emission factors from 40 CFR 98, Subpart C (General Stationary Fuel Combustion Sources), Tables C-1 and C-2. The global warming factors from 40 CFR 98, Subpart A, Table A-1 were also used to calculate the emission factor as CO₂e.

Table 2-2 summarizes the emission calculations for the reduction in emissions due to the retirement of the coal-fired boilers.

Table 2-3
Summary of Emissions from the Retirement of the Coal-Fired Boilers

Pollutant	Future Potential Emissions (TPY)	Baseline Actual Emissions (TPY)	Difference in Emissions (TPY)
SO ₂	0	1,733.1	(1,733.1)
NO _x	0	334.5	(334.5)
CO	0	152.0	(152.0)
VOC	0	6.7	(6.7)
PM/PM ₁₀ /PM _{2.5}	0	57.9	(57.9)
GHG as CO ₂ e	0	171,446.4	(171,446.4)

The details of the baseline actual emission calculations are provided in Appendix B.

2.1.6.2 Coal Support

Coal support facilities associated with the coal-fired boilers will be retired when the boilers are retired. These facilities include a coal crusher, conveyors, and enclosed conveyors. PM emissions from these facilities are controlled by bag filters and wet suppression. The current Title V permit limit for PM emissions from these facilities is 3.5 lb/hr, with a potential to emit of less than 5 tons.

Using a Tennessee Division of Air Pollution Control emission factor of 0.39 lb PM/ton of coal handled, the annual coal usage for the coal-fired steam generating boilers during the 24-month lookback period of 60,814 tons (see Appendix B), an estimated 75% reduction due to the use of stoker graded coal, and 50% control efficiency from the wet suppression system, the annual baseline actual emissions for the coal support system is calculated as shown below. The emissions are assumed to be PM. Future potential emissions when the coal-fired boilers are retired will be zero.

$$(60,814 \text{ tons of coal/yr} \times 0.39 \text{ lb PM/ton of coal} \times 0.25 \times 0.5)/2000 \text{ lb/ton} = 1.5 \text{ ton PM/yr}$$

2.1.6.3 Other Existing Sources

One existing production facility is shutting down once construction of a duplicate new facility is complete. The existing [REDACTED] is building [REDACTED]. This facility is made up of sources 37-0028-92, 37-0028-94, 37-1028-86, and 37-1028-98. Emissions from this facility are VOCs. These processes [REDACTED]

Current plans are to construct a new facility, which has the same throughput capacity as the existing facility. This process would be a part of the Phase II application. Due to infrastructure and facility issues, the existing process can no longer meet the originally designed production levels. Emissions from this facility during the 24-month lookback period of May 1, 2016 and April 30, 2018 are calculated based on the number of batches and the specific batch rates for each product. The annual average VOC emissions is 3.0 TPY. These emissions are considered a reduction in VOCs.

2.1.7 Increase in Utilization of Existing Sources Including IEUs

2.1.7.1 Open Burning Ground Activities

The Expansion Project will result in an increase in the generation of potentially explosive-contaminated combustible wastes that will require thermal treatment at the permitted open burning grounds of HSAAP. The current Title V permit for Area B (37-0028/558406) limits the amount of combustible wastes going to the open burning grounds to 1,440 tpy.

To determine the increase in open burning emissions resulting from the Expansion Project, HSAAP developed a comprehensive set of calculations based on the best information available from historical open burning records. These calculations were made using the process described below. Additional details are presented in Appendix B.

- Detailed information exists for the source (i.e. building/process), volume, and type (i.e. cardboard, wood, plastic, etc.) of wastes going to open burning for thermal treatment during the years 2012 through 2015.
- Using that information and average densities for waste components (i.e. cardboard, wood, plastic, etc.), the average mass of combustible waste going to open burning from each source during those years was computed.
- Based on the source of the combustible waste (i.e. building/process), the mass of the combustible waste was allocated to one of the three HSAAP product groups (RDX, HMX, and IMX).

- Using the annual production of RDX, HMX, and IMX during the four-year period (2012 through 2015), the average pounds of combustible waste generated per pound of HSAAP product produced was calculated.
- A 10-year lookback at HSAAP product-specific production levels was used to calculate baseline actual emissions from open burning. The 24-consecutive month period used for the calculation was the 24-month period beginning with May 2016 and ending with April 2018.
- Using the average annual production of HSAAP products during this 24-month period and the calculated average pounds of combustible waste generated per pound of HSAAP product mentioned above, the annual mass of combustible wastes generated during the 24-month lookback period for each HSAAP product was calculated.
- Using these annual masses of combustible wastes for each HSAAP product and emission factors from AP-42 and other sources (Additional sources of emission factors are detailed in Appendix B), the baseline actual annual emissions were calculated.
- Since HSAAP proposes not to increase the current Title V permit limit for combustible wastes going to the open burning grounds, the future potential emissions were calculated using the aforementioned emission factors and the 1,440 tpy of combustible waste permit limit.

Table 2-3 provides a summary of the results of these calculations.

Table 2-4
Calculation of Increase in Open Burning Emissions Due to the Expansion Project

Pollutant	Baseline Actual Emissions (tpy)	Future Potential Emissions (tpy)	Emission Increase Due To Expansion Project (tpy)
PM ₁₀	7.7	17.1	9.4
PM _{2.5}	7.7	17.1	9.4
SO ₂	0.4	0.8	0.4
NO _x	3.4	8.5	5.1
CO	36.9	75.1	38.2
VOC	11.9	22.2	10.2
GHG as CO ₂ e	1,372	2,656	1,284

2.1.7.2 Increases from Other Existing Sources and IEUs

The Expansion Project will result in an increase in utilization of some of the existing sources. For the majority of the existing sources the operations are already at capacity, initiating the need for the DoD Expansion Project. The projected increase in emissions for the sources in this section were determined by calculating the annual average past actual emission during the lookback period and subtracting it from the PTE in most cases or the projected maximum utilization. [REDACTED] sources, [REDACTED] washing facilities, and an acetic acid recovery facility, emit VOCs. [REDACTED] product drying and incorporation IEUs emit particulate matter.

Existing Product Wash Facilities [REDACTED] and [REDACTED]

HSAAP products begin in the nitration process where raw materials are mixed with acids which produces crude explosives. This material is then washed to remove the residual acids and prepare it for further processing. There are currently two washing facilities at HSAAP. Buildings [REDACTED] and [REDACTED] source numbers 37-0028-17 and 37-0028-78, respectively. The lookback period to determine past actual emissions of May 2016 to April 2018 was selected based on the overall facility emissions. Emission factors for these facilities is based on the December 2013 Title V Renewal Application. For each source the VOC emissions factor is 2.63 pounds per hour. [REDACTED]

[REDACTED] Therefore the past actual VOC emissions are 9.2 TPY for [REDACTED] and 10.6 TPY. Therefore, the future increase in emissions based on the remaining hours is 2.1 TPY for [REDACTED] and 0.7 TPY for [REDACTED]. This excludes [REDACTED] days annually for maintenance.

Existing Weak Acetic Acid Recovery Process [REDACTED]

The existing Weak Acetic Acid Recovery Process located at [REDACTED], currently considered an IEU, is the first step in this acetyl loop process. Here columns are used in the recovery of and separation of materials from the dilution liquor coming from the crude explosive wash facilities. Nitrates, explosives, and a portion of the water are stripped from the weak acetic acid. The weak acetic acid is transferred to another process for concentration back to glacial acetic acid. This building routinely operates at capacity. [REDACTED]

[REDACTED] Therefore, using the PTE the projected increase in emissions is 0.38 TPY. This excludes eight days annually for maintenance.

Table 2-5
Summary of Emission Increases from Other Existing Sources

Existing Building	PM (tpy)	PM ₁₀ (tpy)	PM _{2.5} (tpy)	SO ₂ (tpy)	NO _x (tpy)	CO (tpy)	VOC (tpy)	Source
[REDACTED]	0.00	0.00	0.00	0.0	0.0	0.0	2.1	37-0028-17
[REDACTED]	0.00	0.00	0.00	0.0	0.0	0.0	0.7	37-0028-78
[REDACTED]	0.00	0.00	0.00	0.0	0.0	0.0	0.4	IEU
Total	0	0	0	0	0	0	3.2	

Existing Drying, Milling, and Incorporation Buildings at HSAAP

The existing drying, milling, and incorporation buildings at HSAAP that are not currently at capacity include Buildings [REDACTED] and [REDACTED]. Each of these sources are insignificant emissions units and are calculated to be below 5 tons per year (TPY) potential to emit (PTE).

Building [REDACTED]

[REDACTED] When applied to future emissions increases this equals approximately 0.93 TPY of PM.

Building [REDACTED]

[REDACTED] When applied to future emissions increases this equals approximately 1.5 TPY of PM.

Building [REDACTED]

[REDACTED] When applied to future emissions increases this equals approximately 1.5 TPY of PM.

Building [REDACTED]

[REDACTED] When applied to future emissions increases this equals approximately 1.5 TPY of PM.

[REDACTED] When applied to future emissions increases this equals approximately 1.4 TPY of PM.

Table 2-6
Summary of Emission Increases from IEUs

Existing Building	PM (tpy)	PM ₁₀ (tpy)	PM _{2.5} (tpy)	SO ₂ (tpy)	NO _x (tpy)	CO (tpy)	VOC (tpy)	Source
[REDACTED]	0.9	0.9	0.9	0	0	0	0	IEU
[REDACTED]	1.5	1.5	1.5	0	0	0	0	IEU
[REDACTED]	1.5	1.5	1.5	0	0	0	0	IEU
[REDACTED]	1.1	1.1	1.1	0	0	0	0	IEU
[REDACTED]	1.4	1.4	1.4	0	0	0	0	IEU
Total	6.4	6.4	6.4	0	0	0	0	

2.1.8 Phase II Planned Sources

A second phase of the Expansion Project will be needed to support additional processing of ingredients and recycling of raw materials including solvent-based lacquers, acetic acid, and anhydride. As discussed in Section 2.1.1, the Phase II emissions estimates have been included in the overall project accounting and PSD determination for Phase I. When the application for Phase II is submitted, the refined emissions estimates will be provided, as well as the BACT review, regulatory review, and revisited PSD determination. The Phase II types of processes are currently utilized at the facility and are either duplicate or expanded processes. All Phase II sources are detailed below along with the basis of estimate for future emissions. As stated, the details and design for these sources are still being finalized so the emissions have been conservatively estimated from existing source processes.

Weak Acetic Acid Recovery Process (WAARP)

Two of the primary raw materials used in the manufacturing of explosives is Concentrated Acetic Acid and Acetic Anhydride. The first step in this acetyl loop process is recovery of and separation of materials from the dilution liquor coming from the crude explosive wash facilities. Nitrates, explosives, and a portion of the water are stripped from the weak acetic acid. The emissions

from these processes are VOCs only. This process is subject to the New Source Performance Standards and requires control for BACT. The emissions estimates used for PSD evaluation are based on the WAARP section of the December 2013 Title V Renewal Application and an estimate of the currently planned storage tanks.

Table 2-7
Emissions Estimate for Weak Acetic Acid Recovery Process

Process or Tank	VOC Emissions TPY
Vacuum System	1.40
Stripping Column Vent Condenser	0.001
Storage Tanks	2.40
Total VOC Emissions TPY	3.8

Third Train Acetyl Processing

Once the weak acetic acid is recovered, it is further concentrated through distillation columns and then used to produce acetic anhydride through ketene furnaces and refining processes. Emissions from these processes are primarily VOCs and CO but do have a small amount of combustion emissions. Control devices include scrubbers and a thermal oxidizer. The emission estimates used for the PSD evaluation are based on the existing calculations for the current sources. With the exception of the VOC and NOx pollutants, identical emissions used in the latest December 2013 Title V Renewal Application were used. The VOC emissions only are expected to be higher as the distillation columns throughput design is expected to be [REDACTED] higher. Another planned change involves the use of a thermal oxidizer rather than a flare to control ketene furnace off-gas emissions; however, both are estimated to have a 98% control efficiency.

Table 2-8
Emissions Estimate for Third Train Acetyl Processing

Pollutant	PM	SO ₂	NOx	CO	VOCs
New Process Trains	2.2	4.4	4.0	33.1	8.2

Acetic Acid Tank Farm

This tank farm is a duplication of the existing tank farm used in the current Acetic Acid Concentration and Acetic Anhydride manufacturing area. Emissions are VOCs and estimates are derived from the existing tank farm with scrubber control. The design for this tank farm has not been finalized. As a conservative approach four of the largest tanks currently in use for acetic anhydride and acetic acid storage each with estimated emissions of 0.68 TPY was used for this basis of estimate. A total of 2.72 TPY is estimated for the planned tank farm expansion.

New [REDACTED] Facility

Many products at HSAAP are [REDACTED]

[REDACTED] Current plans are to construct a new facility which has the same throughput capacity as the existing facility. Due to facility infrastructure issues the existing process can no longer meet these production levels. Emissions from this facility are VOCs and the estimate for PSD review is based on the APC 28 form for the four existing sources that make up building [REDACTED] (37-0028-92, 37-0028-94, 37-1028-86, and 37-1028-98). VOC calculated emission total PTE is 36.3 TPY.

Insensitive Munitions Drying and Incorporation

■ facilities are being reconstructed to better support the insensitive munitions product expansion. Building ■ is being designed for drying of material. Building ■ will contain incorporation kettles. Emissions from these buildings consist of particulate matter only. Both buildings will have new high efficiency scrubbers. Emissions estimates are based on the following: For building M-3 there will be two identical IMX product ■. Each train is estimated to contribute ■ per hour of PM 10 for a maximum rate. The conveyor line and corresponding ventilation hoods for coated material would also contribute approximately ■ per hour at the maximum rate. These rates were determined based on potential throughput to the building and maximum potential loss for each piece of equipment.

At these maximum scrubber inlet rates with both incorporation trains and the conveyor in operation, and the scrubber minimum efficiency at 98%, the emissions rate is 0.68 lbs/hour or approximately 3.0 TPY. The incorporation trains also utilize ingredients that contains a small percentage of material at the 2.5 micron size. Particle matter 2.5 (PM 2.5) maximum emissions rate is estimated to be 8.5 pounds per hour per train. Based on maximum estimated rates from both trains and scrubber minimum efficiency of 97.5%, emissions of PM 2.5 are 0.43 pounds per hour or 1.875 TPY.

For building ■, the tray dryers use carefully temperature controlled air to dry materials. The airflow is minimal as the material is spread ■ over the trays. Maximum contribution to the scrubber system, taking into account ventilation hoods for material transfers, is approximately ■ per hour. All of these emissions would be PM 10. At a scrubber efficiency of 98%, PM 10 emissions would be approximately 0.18 pounds per hour or 0.79 TPY.

Analytical Lab

The last process included with the Phase II portion of the Expansion Project is a new analytical lab. This lab is used to verify the products meet the required specifications and are cleared for shipment or further incorporation. Emissions from this facility are primarily VOCs. Each emissions point are well below insignificant levels. Emissions estimates are based on the following information.

Current estimates of existing lab hoods are 0.1 lb/hr or 0.5 TPY for each vent. Currently there is a potential for six lab hood vents. Therefore, the analytical lab total VOC emissions would be 3.0 TPY. Two vents for NO_x emissions are also included in the total calculations at the same rates for a total of 1.0 TPY NO_x emissions. PM is estimated to be 1.0 TPY from material handling.

Table 2-9
Expansion Project Phase II Emissions Summary

Process	PM (tpy)	PM ₁₀ (tpy)	PM _{2.5} (tpy)	SO ₂ (tpy)	NO _x (tpy)	CO (tpy)	VOC (tpy)	GHG as CO ₂ e (tpy)
WAARP (Weak Acetic Acid Recovery)	0.0	0.0	0.0	0.0	0.0	0.0	3.8	NA
3rd Train Acetyl Processing	2.2	2.2	2.2	4.4	4.0	33.1	8.2	NA
Acetic Acid Tank Farm	0.0	0.0	0.0	0.0	0.0	0.0	2.7	NA
New ■ Facility	0.0	0.0	0.0	0.0	0.0	0.00	36.3	NA
■ (Insensitive Product Support)	3.8	3.8	1.9	0.0	0.0	0.0	0.0	NA
Analytical Lab	1.0	1.0	1.0	0.0	1.0	0.0	3.0	NA

2.1.9 Phase III Planned Sources

Phase III of the Expansion Project further expands the capacity of the facility to manufacture explosive mixtures and to process recycle and byproduct streams. As discussed in Section 2.1.1, the Phase III emissions estimates have been included in the overall project accounting and PSD determination for Phase I. When the application for Phase III is submitted, the refined emissions estimates will be provided, as well as the BACT review, regulatory review, and revisited PSD determination. Phase III will complete the expansion project. Emission estimates for Phase III are based on either existing sources (as these new facilities duplicate current processes) or on estimated throughputs in comparison to similar sources elsewhere. Although the design of these sources has not begun due to funding availability, they are scheduled and the emission estimates provided are adequate for the PSD review at this time. Specific information on the Phase III processes are detailed below along with the basis of estimate for relevant emissions.

Insensitive Products Nitration

The Expansion Project will also increase HSAAP's capacity to produce IMX, a formulation designed to resist premature detonation when subjected to actions such as fire, projectiles including bullets and other explosive devices, and blunt impacts. This product was designed with the protection of the soldier in mind. The planned facility to accomplish this increase is a duplication of an existing source. Currently source 37-1029-20 is designed for nitration of materials with Nitric Acid to produce the IMX products. The emissions produced by this process are nitrogen oxides (NO_x) and carbon monoxide (CO).

One of the nitration processes does generate a HAP at quantities which are estimated to be below the insignificant emission unit levels. The generation of HAP by this process does not impact the current PSD review.

Emission determinations for this source used the existing source applications. Using the APC-28 forms for source 37-1029-20, the following emissions totals are to be used for PSD review for determination of the overall accounting in relation to the PSD significance levels.

Table 2-10
Insensitive Products Nitration Emission Estimate

	SO ₂	NO _x	CO
New Insensitive Facility	0.0	10	13.8

For particulate matter emissions are included only for raw materials. These are normally considered insignificant and are fugitive emissions. Current estimates for are less than 1 TPY.

VOC may be emitted if certain formulations are produced. These would be campaigned batch processes. Emissions for a limited campaign for the products producing these emissions would result in a potential of up to 2 TPY of VOC.

Spent Nitric Acid Tank Farm

This emission unit consists of storage tanks for the spent acid, wastewater, and other byproducts produced from the Insensitive Products Nitration facility. The estimated emissions for this facility do not result from a continuous hourly exhaust or from tank calculations. The use of [REDACTED] nitric acid could result in reactions in the spent acid with residual organic materials. For PSD review purposes the emissions estimates are 1 TPY of PM, 1 TPY of NO_x, and 1 TPY of CO. These emissions are based on the following assumptions: an emission rate of 1 pound per hour for each

of the pollutants and reactions producing the pollutants for 20% of the available hours (i.e., 1,752 hr/yr). This calculates out to 0.88 TPY. For PSD review estimates 1 TPY is used.

Additional Acid Concentration Train for Insensitive Products

During the manufacturing of IMX ingredients, nitric acid needs to be recycled for continuous use to minimize waste production and for continued sustainability. The process for recycling this spent nitric acid utilizes a nitric acid concentrator/sulfuric acid concentrator unit. This again is a duplication of an existing process. Estimates used for the process emissions are derived from the permit for 37-1029-22 detailed in the table below.

Table 2-11
Emission Estimate for Nitric Acid Concentration Train

	PM	SO ₂	NO _x	CO	VOC
New NAC/SAC	0.1	4.4	2.8	10.3	0.02

Nitration, Wash, and Recrystallization Facility — [REDACTED]

HSAAP products begin with the nitration process where raw materials are mixed with acids which produces crude explosives. This material is then washed to remove the residual acids and to prepare it for further processing. Solvent is used to recrystallize the materials to meet the necessary product specifications. [REDACTED]

[REDACTED] Emissions from these sources include NO_x and VOC. Emission estimates for this source are based on the existing sources with certain assumed changes. A breakdown of these emissions are in the following table.

Table 2-12
Emissions Estimate for Nitration, Wash, and Recrystallization Facility

	PM	SO ₂	NO _x	CO	VOC
New Nitration, Wash, and Recrystallization Facility	1.0	0	7.9	0	16

The particulate matter emissions are included only for raw materials. These are normally considered insignificant and are fugitive emissions. Current estimates for are less than 1 TPY. Emissions estimates are calculated based on the stack test results of source 37-1029-09 of 1.81 pounds per hour of NO_x. Using these rates the annual emissions are 7.9 TPY. Emissions estimates are calculated based on the stack test results of source 37-1029-09 of 0.45 pounds per hour of VOC. Using these rates the annual emissions are 1.97 TPY for the nitration process. This in addition to the other sources (11.4 TPY from 37-0028-17 and 2.4 TPY from 37-0028-83) the annual emissions are 15.77 TPY.

Ammonium Nitrate Solution (ANSOL) Treatment

As described in the Phase II section acetic acid is recovered at the WAARP facility through the separation of materials from the dilution liquor coming from the crude explosive wash facilities. The nitrates are stripped from the weak acetic acid with the addition of ammonia. An ammonium nitrate solution is produced as a byproduct. [REDACTED]

[REDACTED] Little information is known about the selection of the design or the size of this facility.

Emissions generated would include NO_x, CO, PM, and potentially VOC and SO₂, if combustion is required. Emission rates could vary depending on the design. The following assumptions are being made at this point. If the material is converted to another nitrate form, NO_x, CO, and PM could be produced. NO_x is controllable and CO and PM would be dependent on the organics or non-nitrate material concentrations. PM would likely be in the form of other compounds that conglomerate to form particles. PM emissions could also be controlled effectively. Given the potential volumes of material that could be processed, the likely emissions rate would not be higher than the existing sources where nitration occurs. Using the emissions rate from source 37-1029-09 of 1.81 pounds per hour of NO_x and assuming as a worst case scenario, two vessels could be used, the total NO_x emission could be 15.9 TPY. This would be a controlled emission rate. CO emissions would be expected if NO_x emissions are being generated. CO emission estimates are based on a duplication of the NAC/SAC emission for two vessels or 20.6 TPY of CO. Particulate matter emissions are based on the worst case of PM formation as a result of chemical interaction. Based on engineering estimates, the resulting hourly rate would be 0.91 pounds per hour or an annual total of 4 TPY. VOC and SO₂ would only be generated if the design involved combustion of natural gas. In that case VOC and SO₂ emissions would both be less than 1 TPY.

Table 2-13
Expansion Project Phase III Emissions Summary

Processes	PM ₁₀ (tpy)	PM _{2.5} (tpy)	SO ₂ (tpy)	NO _x (tpy)	CO (tpy)	VOC (tpy)	GHG as CO ₂ e (tpy)
Insensitive Products Nitration	1	0	0.0	10.0	13.8	2.0	NA
Spent Nitric Acid Tank Farm	1	0	0.0	1	1	0.0	NA
Additional Acid Concentration Train for Insensitive Products	0.1	0.1	4.4	2.8	10.3	0.02	NA
Nitration, Wash, and Recrystallization Facility — [REDACTED]	1	1	0.0	7.9	0.0	16	NA
Ammonium Nitrate Solution (ANSOL) Treatment	4	4	1	15.9	20.6	1	NA

"NA" indicates that the GHG emissions from this emission unit has not yet been determined.

2.2 Project Emissions Accounting

Table 2-14 provides a summary of the emissions from the Expansion Project, including Phase I, II, and III sources.

Table 2-14
Expansion Project Emissions Accounting

Phase	Process	PM ₁₀ (tpy)	PM _{2.5} (tpy)	SO ₂ (tpy)	NO _x (tpy)	CO (tpy)	VOC (tpy)	GHGs as CO ₂ e (tpy) ¹
ALL	Existing Sources Increased Utilization (Open Burning)	9.4	9.4	0.4	5.1	38.2	10.2	1,283.8
	Existing Sources Increased Utilization (various)	6.4	6.4	0	0	0	3.2	0
	Retirement of Existing Coal Fired Boilers	(57.9)	(57.9)	(1,733.1)	(334.5)	(152.0)	(6.7)	(171,446.4)
	Coal Fired Support Sources	(1.5)	0	0	0	0	0	0
	█ (Existing █ Facility) ²	0	0	0	0	0	(3) ²	0
I	Natural Gas Boilers	15.9	15.9	6.4	226.4	100.6	22.9	678,139
	Fuel Oil Fired Internal Combustion Engines	0.3	0.3	0.02	10.6	5.8	0.7	1,931.9
	█ (Recrystallization)	0.01	0.01	0	0.6	0	6.2	0
	█ Milling)	6.0	6.0	0	0	0	0	0
	Back-up Fuel Oil Storage	0	0	0	0	0	0.2	0
	Project Running Subtotal:	(21.4)	(19.9)	(1,726.3)	(91.8)	(7.4)	36.7	509,908.3
II	3 rd Train Acetyl Processing	2.2	2.2	4.4	4	33.1	8.2	NA
	Acetic Acid Tank Farm	0	0	0	0	0	2.7	NA
	Analytical Lab	1	1	0	1	0	3	NA
	WAARP (Weak Acetic Acid Recovery)	0	0	0	0	0	3.8	NA
	New █ Facility	0	0	0	0	0	36.3	NA
	█ (Insensitive Product Support)	3.8	1.9	0	0	0	0	NA
	Project Running Subtotal:	(14.4)	(14.8)	(1,721.9)	(86.8)	25.7	87.7	509,908.3
III	ANSOL Treatment	4	4	1	15.9	20.6	1	NA
	█ (Insensitive Products Nitration)	1	0	0	10	13.8	2	NA
	█ (Spent Nitric Acid Tank Farm)	1	0	0	1	1	0	NA
	█ (Nitration, Wash, and Recrystallization)	1	1	0	7.9	0	15.8	NA
	3 rd Train NAC/SAC (Acid Concentration)	0.1	0.1	4.4	2.8	10.3	0.02	NA
	Project Total:	(7.3)	(9.7)	(1,716.5)	(49.2)	71.4	106.5	509,908.3
	PSD Threshold:	15	10	40	40	100	40	75,000

1. "NA" indicates that the GHG emissions from this emission unit has not yet been determined.

2. The reduction in emissions from this emission unit will occur in Phase II.

3.0 REGULATORY ANALYSIS

HSAAP is subject to both federal and State of Tennessee air quality regulations. These regulations impose permitting requirements and specific standards for expected air emissions. The standards and regulations that apply to HSAAP include:

- National Ambient Air Quality Standards (NAAQS) established by the U. S. Environmental Protection Agency (U. S. EPA) for specific criteria pollutants (40 Code of Federal Regulations (CFR) Part 50);
- New Source Review to determine if the facility meets the requirements of the Prevention of Significant Deterioration (PSD) regulations (40 CFR Part 52.21);
- New Source Performance Standards (NSPS) which impose emission standards on new facilities (Clean Air Act (CAA) Section 111; 40 CFR Part 60);
- Hazardous Air Pollutant (HAP) regulations for specific categories and subcategories of hazardous air pollutants (Clean Air Act Section 112(b)(1); 40 CFR 63); and
- Tennessee Air Pollution Control Regulations.

Detailed discussions of these regulations as they pertain to the HSAAP are provided in the following sections.

3.1 National Ambient Air Quality Standards (NAAQS)

The Clean Air Act Amendments of 1970 mandated that the EPA establish NAAQS to protect the public health and welfare. The EPA has promulgated standards for six criteria pollutants: particulate matter less than or equal to 10 microns in size (PM₁₀) and less than or equal to 2.5 microns in size (PM_{2.5}), sulfur dioxide (SO₂), carbon monoxide (CO), ozone (O₃), nitrogen dioxide (NO₂), and lead (Pb).

The primary NAAQS are promulgated to protect the public health, and the secondary NAAQS are promulgated to protect the public welfare from any known or anticipated adverse effects associated with the presence of pollutants in the ambient air. Areas in violation of the NAAQS are designated as nonattainment areas and new sources to be located in or near these areas may be subject to more stringent air permitting requirements. The existing applicable NAAQS are presented in Table 3-1.

3.2 Prevention of Significant Deterioration (PSD) Requirements

3.2.1 General Requirements

Under federal and State of Tennessee PSD review requirements, all major new or modified sources of air pollutants regulated under the CAA must be reviewed and a pre-construction permit issued. Tennessee's State Implementation Plan (SIP), which contains PSD regulations, has been approved by EPA, and EPA has granted PSD approval authority to the Tennessee Division of Air Pollution Control (TDAPC).

A “major facility” is defined as any one of 28 named source categories that have the potential to emit 100 tons per year (TPY) or more or any other stationary facility that has the potential to emit 250 TPY or more of any pollutant regulated under the CAA. “Potential to emit” means the capability, at maximum design capacity, to emit a pollutant after the application of control equipment.

A “major modification” is defined under PSD regulations as a change at an existing major facility that increases emissions by greater than significant amounts. PSD significant emission rates are shown in Table 3-2.

EPA has promulgated regulations that define certain increases above ambient air quality baseline concentrations for criteria pollutants as constituting significant deterioration. The EPA class designations and allowable PSD increments are presented in Table 3.1. The State of Tennessee adopted the EPA class designations and allowable PSD increments for PM₁₀, SO₂, and NO₂ increments.

Table 3-1
NAAQS and PSD Increments and Significance Levels
($\mu\text{g}/\text{m}^3$, unless otherwise noted)^[1,2]

Pollutant and Time Period	NAAQS		PSD		
	Primary	Secondary	Class I Increment	Class II Increment	Significance Levels
Particulate Matter – 10 microns or less (PM₁₀)					
24-Hour Average	150	150	8	30	5
Particulate Matter – 2.5 microns or less (PM_{2.5})					
Annual Arithmetic Mean	12.0	15.0	1	4	—
24-Hour, 98 th Percentile	35	35	2	9	—
Sulfur Dioxide (SO₂)					
3-Hour Average	—	0.5 ppm	25	512	25
1-Hour Average	75 ppb	—	—	—	7.86 ^[3]
Nitrogen Dioxide (NO₂)					
Annual Arithmetic Mean	0.053 ppm	0.053 ppm	2.5	25	1
1-Hour Average	100 ppb	—	—	—	7.5
Carbon Monoxide (CO)					
8-Hour Average	9 ppm	—	—	—	500
1-Hour Average	35 ppm	—	—	—	2,000
Ozone (O₃)					
8-Hour Average	0.070 ppm	0.070 ppm	—	—	—
Lead (Pb)					
Rolling 3-Month Average	0.15	0.15	—	—	—
Quarterly Arithmetic Mean ^[4]	1.5	1.5	—	—	—

Notes:

1. NAAQS Sources: 40 CFR Part 50 and TAPCR 1200-03-03-.03(1)(a); PSD Class Increments and Significance Level Sources: 40 CFR Part 52.21(c) and TAPCR 1200-03-09-.01(m)
2. $\mu\text{g}/\text{m}^3$ denotes microgram per cubic meter
3. Interim SIL from EPA Memorandum from Stephen D. Page, “Guidance Concerning the Implementation of the 1-hour SO₂ NAAQS for the Prevention of Significant Deterioration Program,” August 23, 2010.
4. In areas designated nonattainment for the Pb standards prior to the promulgation of the current (2008) standards, and for which implementation plans to attain or maintain the current (2008) standards have not been submitted and approved, the previous standards (1.5 $\mu\text{g}/\text{m}^3$ as a calendar quarter average) also remain in effect.

Table 3-2
PSD Significant Emission Rates and Monitoring *De Minimis* Levels ^[1]

Pollutant	PSD Significant Emission Rate (tons/year)	<i>De Minimis</i> Ambient Levels	
		Concentration (µg/m ³)	Averaging Time
Particulate Matter (PM)	25	—	—
Particulate Matter – 10 microns or less (PM ₁₀)	15	10	24-Hour
Particulate Matter – 2.5 microns or less (PM _{2.5})	10	—	—
Sulfur Dioxide (SO ₂)	40	13	24-Hour
Nitrogen Oxides (NO _x)	40	14	Annual
Carbon Monoxide (CO)	100	575	8-Hour
Ozone (Volatile organic compounds or NO _x)	40	—	—
Lead (Pb)	0.6	0.1	3-Month
Fluorides	3	0.25	24-Hour
Sulfuric Acid Mist	7	—	—
Hydrogen Sulfide (H ₂ S)	10	0.2	1-Hour
Total Reduced Sulfur (including H ₂ S)	10	10	1-Hour
Reduced Sulfur Compounds (including H ₂ S)	10	10	1-Hour

Notes:

1. Source: 40 CFR 52.21

PSD review is used to determine whether significant air quality deterioration will result from the new or modified facility. Federal PSD requirements are contained in 40 CFR 52.21, Prevention of Significant Deterioration of Air Quality. The State of Tennessee has adopted PSD regulations in TAPCR 1200-03-09-.01(4). Major new facilities and major modifications are required to undergo the following analysis related to PSD for each pollutant emitted in significant amounts:

- Control technology review,
- Source impact analysis,
- Air quality analysis (monitoring),
- Source information, and
- Additional impact analyses.

In addition to these analyses, a new facility must also be reviewed with respect to Good Engineering Practice (GEP) stack height regulations. Discussions concerning each of these requirements are presented in the following sections.

3.2.2 Control Technology Review

PSD regulations concerning control technology review require that all applicable federal and state emission standards be met, and that best available control technology (BACT) be applied to control emissions of subject pollutants from the source. The BACT requirements are applicable to all regulated pollutants if the facility is a new source that qualifies as a major PSD source, or to all regulated pollutants for which the increase in emissions from the facility or modification exceeds the significant emission rates listed in Table 3.2. Basically, major sources must install the most effective emission controls considered technically feasible by the permitting authority, taking into consideration environmental, energy, and economic impacts. As defined by EPA (40 CFR 52.21(b)(12)):

Best available control technology means an emissions limitation (including a visible emission standard) based on the maximum degree of reduction for each pollutant subject to regulation under Act which would be emitted from any proposed major stationary source or major modification which the Administrator, on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs, determines is achievable for such source or modification through application of production processes or available methods, systems, and techniques, including fuel cleaning or treatment or innovative fuel combustion techniques for control of such pollutant. In no event shall application of best available control technology result in emissions of any pollutant which would exceed the emissions allowed by any applicable standard under 40 CFR parts 60 and 61. If the Administrator determines that technological or economic limitations on the application of measurement methodology to a particular emissions unit would make the imposition of an emissions standard infeasible, a design, equipment, work practice, operational standard, or combination thereof, may be prescribed instead to satisfy the requirement for the application of best available control technology. Such standard shall, to the degree possible, set forth the emissions reduction achievable by implementation of such design, equipment, work practice or operation, and shall provide for compliance by means which achieve equivalent results.

The requirement for BACT was contained in the PSD requirements prescribed by the Clean Air Act Amendments of 1977. The premise behind the BACT requirement was that it would optimize the consumption of the available PSD air quality increments and thereby maximize the potential for future economic growth without significantly degrading air quality. Guidelines for the evaluation of BACT can be found in EPA's *Guidelines for Determining Best Available Control Technology (BACT)* (EPA, 1978) and the *PSD Workshop Manual* (EPA, 1980). These guidelines were established by EPA to provide a consistent approach to BACT and to ensure that the impacts of alternative emission control systems are measured by the same set of parameters. In addition, through implementation of these guidelines, BACT in one area may not be identical to BACT in another area. According to EPA (1980), "BACT analyses for the same types of emissions unit and the same pollutants in different locations or situations may determine that different control strategies should be applied to the different sites, depending on site-specific factors. Therefore, BACT analyses must be conducted on a case-by-case basis."

The BACT requirements are intended to ensure that the control systems incorporated in the design of a proposed facility reflect the latest in control technologies used in a particular industry and take into consideration existing and future air quality in the vicinity of the proposed facility. BACT must, at a minimum, demonstrate compliance with New Source Performance Standards (NSPS) for a source (if applicable). An evaluation of the air pollution control techniques and systems, including a cost-benefit analysis of alternative control technologies capable of achieving a higher degree of emission reduction and the proposed control technology, is required. The cost-benefit analysis requires the documentation of the materials, energy, and economic penalties associated with the proposed and alternative control systems, as well as the environmental benefits derived from these systems. A decision on BACT is to be based on sound judgment, balancing environmental benefits with energy, economic, and other impacts.

Despite EPA's definition of BACT, many of the intricacies of BACT selection have never been formally addressed in actual regulation. In December 1987, the EPA Assistant Administrator for Air and Radiation issued guidance establishing a "top-down" approach to BACT determinations. The basic steps of the top-down BACT analysis include the following:

1. Identify all potential control technologies;
2. Eliminate technically infeasible options;
3. Rank remaining control technologies; and
4. Evaluate the most effective controls.

The top-down BACT approach essentially starts with the most stringent (or top) technology and emissions limit that have been applied elsewhere to the same or similar source category. The applicant must next provide a basis for rejecting this technology in favor of the next most stringent technology or propose to use it. Rejection of control alternatives may be based on technical or economic infeasibility. Such decisions are made on the basis of physical differences (e.g., fuel type), locational differences (e.g., availability of water), or significant differences that may exist in the environmental, economic, or energy impacts. The differences between the proposed facility and the facility on which the control technique was applied previously must be justified.

3.2.3 Source Impact Analysis

All PSD applicants must conduct air quality analyses to assess the ambient impacts associated with construction and operation of the facility. A separate air quality analysis must be submitted for each regulated pollutant for which the applicant proposes to emit in a significant amount from a new or modified major source. The main purpose of the analysis is to demonstrate that the new emissions from the source, in conjunction with related emissions from other sources, will not cause or contribute to a violation of any applicable NAAQS or PSD increment. Additional studies are performed to evaluate effects on visibility and soils and vegetation.

The PSD regulations specifically provide for the use of atmospheric dispersion models in performing analyses, estimating baseline and future air quality levels, and determining compliance with NAAQS and allowable PSD increments. Designated EPA models normally must be used in performing the impact analysis. Specific applications for other than EPA approved models require EPA's consultation and prior approval. Guidance for the use and application of dispersion models is presented in 40 CFR Part 51, Appendix W – Guideline on Air Quality Models. The source impact analysis for criteria pollutants to address compliance with the NAAQS and PSD Class II Increments may be limited to the new or modified source if the net increase in impacts as a result of the new or modified source is below significance levels, as presented in Table 3.1. As is demonstrated in Section 5.0, Source Impact Analysis, the increase in ambient concentrations of the regulated pollutants is below the significance levels and therefore a source impact analysis for increment consumption is not required.

The EPA has specified significant impact levels for Class I areas. As the designated agency for oversight in air quality impacts to Class I areas, the National Park Service (NPS) has accepted EPA's significant impact levels for PSD Class I areas (see Table 3-3).

Table 3-3
EPA PSD Class I Significant Impact Levels

Pollutant	Averaging Time	Significant Impact Levels ($\mu\text{g}/\text{m}^3$)
SO ₂	Annual	0.1
	24-Hour	0.2
	3-Hour	1.0
PM _{2.5}	Annual	0.06
	24-Hour	0.07
PM ₁₀	Annual	0.2
	24-Hour	0.3
NO ₂	Annual	0.1

Various lengths of record for meteorological data can be used for impact analysis. A five-year period can be used with corresponding evaluation of highest, second-highest short-term concentrations for comparison to NAAQS or PSD increments. The term “highest, second-highest” (HSH) refers to the highest of the second-highest concentrations at all receptors (i.e., the highest concentration at each receptor is discarded). The second-highest concentration is significant because short-term NAAQS specify that the standard should not be exceeded at any location more than once per year. If fewer than five years of meteorological data are used in the modeling analysis, the highest concentration at each receptor normally must be used for comparison to air quality standards. Even with five years of meteorological data, the highest concentration at each receptor must be used for comparison with the PSD significance levels.

A PSD increment represents the maximum increase in ambient concentration allowed above an established baseline concentration for the pollutant of concern. The baselines act as yardsticks representing the actual ambient concentrations measured at the inception of the PSD program in a given area. By limiting the extent to which new sources may increase ambient concentrations above the baseline, the deterioration of air quality is managed within acceptable limits. PSD increments have been established for PM₁₀, SO₂, and NO₂, and are shown in Table 3-1.

In effect, the emissions from each new source “consume” a portion of the allowed PSD increment for a particular location. “Significant deterioration” is said to occur when new emissions would cause the applicable PSD increment to be exceeded. Finally, even if a proposed source demonstrates that not all of the available PSD increment would be consumed, emissions from a new source can never be permitted to cause pollutant concentrations above the applicable NAAQS. PSD increments are pollutant specific and vary based on whether the affected area is a Class I, II, or III area. Most parts of the country are Class II areas and are afforded allowances (i.e. increments) for normal economic growth. The EPA designated certain pristine areas, such as the National Parks and Wilderness Areas, as Class I areas. Class I areas are afforded special protection. Besides having smaller PSD increments, Class I areas are also protected against pollutants that contribute to visibility impacts such as SO₂, PM₁₀, PM_{2.5} and NO_x.

The HSAAP facility is located in a Class II area. There are two (2) Class I areas located within 100 kilometers (km) of the facility, and two (2) additional Class I areas located within 200 km of the facility. Table 3-4 lists the Class I areas within 300 km of the HSAAP facility and their relative distances from the facility.

Table 3-4
Class I Areas within 300 km of HSAAP

Class I Area	Managed By	Distance from HSAAP (km)
Linville Gorge	US Forest Service	91
Great Smoky Mountains NP	National Park Service	92
Shining Rock	US Forest Service	123
Joyce Kilmer - Slickrock	US Forest Service	169
Cohutta	US Forest Service	240

OSI consulted with the Federal Land Managers (FLMs) responsible for the Class I areas within 300 km of HSAAP regarding the need for modeling analyses to assess the impacts of emissions from this source on Class I visibility and air quality related values (AQRV). Copies of correspondence with the FLMs are included in Appendix D.

In accordance with *Federal Land Managers' Air Quality Related Values Work Group (FLAG), Phase I Report – Revised (2010)*, OSI calculated Q/D to be below zero, therefore no further analysis of Class I related values is required.

3.2.4 Air Quality Monitoring Requirements

In accordance with requirements of 40 CFR 52.21(m), any application for a PSD permit must contain an analysis of continuous ambient air quality data in the area affected by the proposed major stationary facility or major modification. For a new major facility, the affected pollutants are those that the facility potentially would emit in significant amounts. For a major modification, the pollutants are those for which the new emissions increase exceeds the significant emission rate.

Ambient air monitoring for a period of up to one year generally is appropriate to satisfy the PSD monitoring requirements. A minimum of four months of data is required. Existing data from the vicinity of the proposed source may be used if the data meet certain quality assurance requirements, otherwise, additional data may be needed. Guidance in designing a PSD monitoring network is provided in EPA's *Ambient Monitoring Guidelines for Prevention of Significant Deterioration* (EPA, 1987a).

The regulations include an exemption [TAPCR 1200-3-9-.01(4)(d)(6)] that excludes or limits the pollutants for which an air quality analysis must be conducted. This exemption states that the Technical Secretary of the Tennessee Air Pollution Control Board may exempt a proposed major facility or major modification from the monitoring requirements with respect to a particular pollutant if the emission increase of the pollutant from the facility or modification would cause, in any area, air quality impacts less than the de minimis levels presented in Table 3-2.

3.2.5 Source Information/Good Engineering Practice (GEP) Stack Height

Source information must be provided to adequately describe the proposed project. The general type of information required for this project is presented in Section 2.0.

The 1977 CAA Amendments require that the degree of emission limitation required for control of any pollutant not be affected by a stack height that exceeds GEP or any dispersion technique. On July 8, 1985, EPA promulgated final stack height regulations (EPA, 1985a). Identical regulations have been adopted by Tennessee (TAPCR 1200-3-24). GEP stack height is defined as the highest of:

1. 65 meters (213 feet); or
2. A height established by applying the formula:

$$H_g = H + 1.5L \quad [3.1]$$

Where H_g is the GEP stack height, H is the height of the structure or nearby structure, and L is the lesser dimension (height or projected width) of nearby structure(s); or

3. A height demonstrated by a fluid model or field study.

"Nearby" is defined as a distance up to five times the lesser of the height or width dimensions of a structure or terrain feature, but not greater than 0.8 km. Although GEP stack height regulations require that the stack height used in modeling for determining compliance with NAAQS and PSD increments not exceed the GEP stack height, the actual stack height may be greater.

The stack height regulations also allow increased GEP stack height beyond that resulting from the above formula in cases where plume impaction occurs. Plume impaction is defined as concentrations measured or predicted to occur when the plume interacts with the elevated terrain. Elevated terrain is defined as terrain that exceeds the height calculated by the GEP stack height formula.

3.2.6 Additional Impact Analysis

In addition to air quality impact analyses, federal and TDAPC PSD regulations require analyses of the impairment to visibility and the impacts on soils and vegetation that would occur as a result of the proposed source [40 CFR 52.21(o)]. These analyses are to be conducted primarily for PSD Class I areas. Impacts as a result of general commercial, residential, industrial, and other growth associated with the source also must be addressed. These analyses are required for each pollutant emitted in significant amounts.

3.3 Nonattainment Rules

Based on the current nonattainment provisions, all major new facilities and modifications to existing major facilities located in a nonattainment area must undergo nonattainment review. A new major facility is required to undergo this review if the proposed pieces of equipment have the potential to emit 100 TPY or more of the nonattainment pollutant. A major modification at a major facility is required to undergo review if it results in a significant net emission increase of 40 TPY or more of the nonattainment pollutant or if the modification is major (i.e. 100 TPY or more).

3.4 Emission Standards

3.4.1 New Source Performance Standards (NSPS) — 40 CFR 60

The NSPS are a set of national emissions standards that apply to specific categories of new sources. As stated in the CAA Amendments of 1977, these standards "shall reflect the degree of emission limitation and the percentage reduction achievable through application of the best technological system of continuous emissions reduction the Administrator determines has been adequately demonstrated."

3.4.2 National Emission Standards for Hazardous Air Pollutants (MACT) — 40 CFR 63
The EPA has promulgated emissions standards for HAPs for various industrial categories. These new National Emission Standards for Hazardous Air Pollutants (NESHAPs) that resulted from the 1990 CAA Amendments are based on the use of Maximum Achievable Control Technology (MACT). The adopted standards are contained in 40 CFR 63. New sources that emit more than 10 tons per year of a single HAP or 25 tons per year of total HAPs (i.e., major HAP sources) are required to apply MACT for the promulgated industrial category or to obtain a case-by-case MACT determination from the applicable regulatory authority after submitting a MACT analysis.

3.4.3 Tennessee Air Permitting Requirements

The TDAPC regulations require any new source to obtain an air permit prior to construction. Major new sources must meet the appropriate PSD and nonattainment requirements as discussed previously. Required permits and approvals for air pollution sources include NSR for nonattainment areas, PSD, NSPS, NESHAP, Construction Permits, and Operating Permits. The requirements for construction permits are contained in TAPCR 1200-03-09-.01.

3.5 Source Applicability

3.5.1 Area Classification

This proposed project will be located in Hawkins County, which is currently designated by EPA as attainment or unclassified for all criteria pollutants. As noted in Section 3.2.3, the nearest Class I Areas to the site are Linville Gorge Wilderness Area in North Carolina, and the Great Smoky Mountains National Park, which lies on the border between Tennessee and North Carolina.

3.5.2 PSD Review

OSI has evaluated the emissions from the Expansion Project for PSD applicability. The Expansion Project is a major modification, and thus subject to NSR permitting, if it causes a significant emissions increase (Step 1 of the determination process) and a significant net emissions increase (Step 2) of any regulated air pollutant. For the purposes of determining applicability of NSR permitting to the Expansion Project, OSI has considered the calculated emissions from the Phase I processes as well as the estimated emissions from Phase II and Phase III processes.

The projected emissions from Phase I of the proposed Expansion Project are estimated to exceed the PSD significant emission rates for VOC and GHG, as summarized in Table 3-5. When combined with the estimated emissions of the Phase II and III projects, the overall potential emissions from the proposed Expansion Project have the potential to exceed the PSD significant emissions rates for VOC and GHG. Therefore, PSD review is required. Because there is some uncertainty in the estimates of CO emissions in Phases II and III, OSI has decided to consider CO emissions to be above the PSD significant emission rate at this point in the process. If, in the future, is determined that CO emissions for the entire Expansion Project are below the PSD significant emission rate, CO will not be considered in those future applications.

In relation to significant net emissions increase (Step 2) and as stated in section 2.1.7 there will be no contemporaneous or credible increase or decrease requiring action under Step 2.

Table 3-5 summarizes the Expansion Project emissions (Step 1).

Table 3-5
Expansion Project Emissions Accounting (Step 1)

Phase	Process	PM ₁₀ (tpy)	PM _{2.5} (tpy)	SO ₂ (tpy)	NO _x (tpy)	CO (tpy)	VOC (tpy)	GHGs (tpy) ¹
ALL	Existing Sources Increased Utilization (Open Burning)	9.4	9.4	0.4	5.1	38.2	10.2	1,283.8
	Existing Sources Increased Utilization (various)	6.4	6.4	0	0	0	3.2	0
	Retirement of Existing Coal Fired Boilers	(57.9)	(57.9)	(1,733.1)	(334.5)	(152.0)	(6.7)	(171,446.4)
	Coal Fired Support Sources	(1.5)	0	0	0	0	0	0
	█ (Existing █ Facility) ²	0	0	0	0	0	(3) ²	0
I	Natural Gas Boilers	15.9	15.9	6.4	226.4	100.6	22.9	678,139
	Fuel Oil Fired Internal Combustion Engines	0.3	0.3	0.02	10.6	5.8	0.7	1,931.9
	█ (Recrystallization)	0.01	0.01	0	0.6	0	6.2	0
	█ Milling)	6.0	6.0	0	0	0	0	0
	Back-up Fuel Oil Storage	0	0	0	0	0	0.2	0
	Project Running Subtotal:	(21.4)	(19.9)	(1,726.3)	(91.8)	(7.4)	36.7	509,908.3
II	3 rd Train Acetyl Processing	2.2	2.2	4.4	4	33.1	8.2	NA
	Acetic Acid Tank Farm	0	0	0	0	0	2.7	NA
	Analytical Lab	1	1	0	1	0	3	NA
	WAARP (Weak Acetic Acid Recovery)	0	0	0	0	0	3.8	NA
	New █ Facility	0	0	0	0	0	36.3	NA
	█ (Insensitive Product Support)	3.8	1.9	0	0	0	0	NA
	Project Running Subtotal:	(14.4)	(14.8)	(1,721.9)	(86.8)	25.7	87.7	509,908.3
III	ANSOL Treatment	4	4	1	15.9	20.6	1	NA
	█ (Insensitive Products Nitration)	1	0	0	10	13.8	2	NA
	█ (Spent Nitric Acid Tank Farm)	1	0	0	1	1	0	NA
	█ (Nitration, Wash, and Recrystallization)	1	1	0	7.9	0	15.8	NA
	3 rd Train NAC/SAC (Acid Concentration)	0.1	0.1	4.4	2.8	10.3	0.02	NA
	Project Total:	(7.3)	(9.7)	(1,716.5)	(49.2)	71.4	106.5	509,908.3
	PSD Threshold:	15	10	40	40	100	40	75,000

1. "NA" indicates that the GHG emissions from this emission unit has not yet been determined.

2. The reduction in emissions from this emission unit will occur in Phase II.

Table 3-7 summarizes the overall Expansion Project emissions and compares them to the PSD significance rates for all PSD pollutants.

Table 3-6
PSD Significance Levels Compared to Proposed Expansion Project Emissions

Pollutant	PSD Significant Emission Rate (tons/year)	Emissions (tons/year)				PSD Significant Emission Rate Exceeded?
		Phase I	Phase II	Phase III	Project Total	
PM	25					No
PM ₁₀	15	(21.4)	7	7.1	(7.3)	No
PM _{2.5}	10	(19.9)	5.1	5.1	(9.7)	No
SO ₂	40	(1,726.3)	4.4	5.4	(1,716.5)	No
NO _x	40	(91.8)	5	37.6	(49.2)	No
CO	100	(7.4)	33.1	45.7	71.4	No
Ozone (VOCs)	40	36.7	51.0	18.8	106.5	Yes
Lead	0.6	—	—	—	—	No
Fluorides	3	—	—	—	—	No
Sulfuric Acid Mist	7	—	—	—	—	No
Hydrogen Sulfide	10	—	—	—	—	No
Total Reduced Sulfur	10	—	—	—	—	No
Reduced Sulfur Compounds	10	—	—	—	—	No
GHG	75,000	509,908.3	—	—	509,908.3	Yes

As part of the PSD review, a PSD Class I increment analysis is required if the proposed project's impacts are greater than the EPA Class I significant impact levels. Based on previously mentioned calculation of Q/D, no modeling analysis for Class I impacts is required.

3.5.3 Nonattainment Review

The HSAAP site is located in Hawkins County, which is designated as attainment or unclassified for all criteria pollutants. Therefore, nonattainment requirements are not applicable.

3.5.4 New Source Performance Standards (NSPS) — 40 CFR 60

3.5.4.1 Steam Generating Boilers

The steam generating boilers are subject to 40 CFR 60, Subpart Db — Standards of Performance for Industrial-Commercial-Institutional Steam Generating Units for emissions of PM, SO₂, and NO_x. These boilers are also subject to the General Provisions of 40 CFR 60, Subpart A, which describe performance testing, recordkeeping, reporting, and monitoring.

3.5.4.2 [REDACTED] (Recrystallization)

The proposed [REDACTED] Recrystallization process was reviewed for NSPS applicability. The following potentially applicable subparts were reviewed:

40 CFR 60, Subpart Kb - Standards of Performance for Storage Vessels (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced after July 23, 1984 for emissions of VOC. The provisions of this subpart do not apply to the [REDACTED] storage tanks since their volumes are less than 75 cubic meters.

40 CFR 60, Subpart VVa — Standards of Performance for Equipment Leaks of VOC in the Synthetic Organic Chemicals Manufacturing Industry for which Construction, Reconstruction, or Modification Commenced After November 7, 2006. The provisions of this subpart apply to process units in synthetic organic chemicals manufacturing industries that produce as intermediates or final

products one or more of the specific chemicals listed in §60.489. This process emission source does not produce one of the specific chemicals listed, therefore it is not subject to Subpart VVa.

40 CFR 60, Subpart NNN — Standards of Performance for Volatile Organic Compound Emissions From Synthetic Organic Chemical Manufacturing Industry (SOCMI) Distillation Operations. The provisions of this subpart apply to process units that produce any of the chemicals listed in §60.667 as a product, co-product, by-product or intermediate. This process emission source does not produce one of the specific chemicals listed, therefore it is not subject to Subpart NNN.

Upon review, it has been determined that there are no applicable NSPS requirements for this proposed source.

3.5.4.3 [REDACTED] Milling [REDACTED]

The proposed [REDACTED] process was reviewed for NSPS applicability. Upon review, it has been determined that there are no applicable NSPS requirements for this proposed source.

3.5.4.4 Stationary Reciprocating Internal Combustion Engines (Emergency Generators)

The proposed new emergency engines are subject to 40 CFR 60, Subpart IIII – Standards of Performance for Stationary Compression Ignition Internal Combustion Engines. The new units will be subject to emission standards, fuel, monitoring, compliance, notification, recordkeeping, and reporting requirements under Subpart IIII.

3.5.4.5 Fuel Oil Storage Tanks

The proposed new petroleum storage tanks were reviewed for applicability of 40 CFR 60, Subpart Kb - Standards of Performance for Storage Vessels (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced after July 23, 1984 for emissions of VOC. Based on the vapor pressure of the fuel oil that will be stored in the tanks, which is less than 3.5 kilopascals, the fuel oil storage tanks will not be subject to Subpart Kb.

3.5.5 National Emission Standards for Hazardous Air Pollutants (MACT) — 40 CFR 63

3.5.5.1 Steam Generating Boilers

The proposed new dual fuel-fired boilers will be subject to the applicable requirements of *40 CFR 63, Subpart DDDDD – National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers and Process Heaters*. The boilers will also be subject to the General Provisions of 40 CFR 63, Subpart A, which describe performance testing, recordkeeping, reporting, and monitoring.

3.5.5.2 [REDACTED] (Recrystallization)

The proposed [REDACTED] Recrystallization process was reviewed for MACT applicability. The following potentially applicable subparts were reviewed:

40 CFR 63, Subpart F — National Emission Standards for Organic Hazardous Air Pollutants from the Synthetic Organic Chemical Manufacturing Industry. The provisions of this subpart apply to emission units that manufacture as a primary product one or more of the specific chemicals listed in the subpart. This process does not produce one of the chemicals listed, therefore it is not subject to Subpart F. For the same reason, this process is not subject to Subparts G or H.

40 CFR 63, Subpart FFFF — National Emission Standards for Hazardous Air Pollutants: Miscellaneous Organic Chemical Manufacturing. The provisions of this subpart apply to

miscellaneous organic chemical manufacturing process units (MCPU) located at, or part of, a major source of HAP which satisfy all of the conditions specified in §63.2435(b)(1) through (3). This MCPU does not satisfy the conditions in §63.2435(b)(2) as it does not process, use, or generate any of the organic HAP listed in in section 112(b) of the CAA or hydrogen halide and halogen HAP, as defined in §63.2550. Therefore, this process will not be subject to Subpart FFFF.

3.5.5.3 [REDACTED] Milling [REDACTED]

The proposed [REDACTED] process was reviewed for MACT applicability. The following potentially applicable subpart was reviewed:

40 CFR 63, Subpart FFFF – National Emission Standards for Hazardous Air Pollutants: Miscellaneous Organic Chemical Manufacturing. The provisions of this subpart apply to miscellaneous organic chemical manufacturing process units (MCPU) located at, or part of, a major source of HAP. Explosives are classified as organic chemicals using the 1987 version of SIC code 289. This MCPU does not satisfy the conditions in §63.2435(b)(2) as it does not process, use, or generate any of the organic HAP listed in in section 112(b) of the CAA or hydrogen halide and halogen HAP, as defined in §63.2550. Therefore, this process will not be subject to Subpart FFFF.

3.5.5.4 Stationary Reciprocating Internal Combustion Engines (Emergency Generators)

The stationary reciprocating internal combustion engines used to power the emergency generators will be subject to *40 CFR 63, Subpart ZZZZ – National Emission Standard for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines.* Per §63.6590(b)(i), the engines are only subject to the initial notification requirements of §63.6645(f).

3.5.5.5 Fuel Oil Storage Tanks

Upon review, it has been determined that there are no applicable MACT requirements for this proposed source.

3.5.6 NO_x Budget Standard (NO_x SIP Call) — 40 CFR 96

The steam generating boilers, when operational, will be subject to 40 CFR 96 and TAPCR 1200-03-27-.12, *NO_x SIP Call Requirements for Stationary Boilers and Combustion Turbines.*

3.5.7 Other Requirements

3.5.7.1 Title V Program

The 1990 Clean Air Act (CAA) Amendments also established a federally mandated air operating permit program. The program requires the states to adopt regulations consistent with the CAA and the implementing regulations promulgated by EPA in 40 CFR 70. The program applies to Title V or Part 70 sources that include major stationary sources of air pollutants. The State of Tennessee has adopted the requirements of 40 CFR 70 in TAPCR 1200-03-09-.02 which specify that all affected sources, such as the proposed for this project, have a Title V permit to operate.

4.0 CONTROL TECHNOLOGY REVIEW (BEST AVAILABLE CONTROL TECHNOLOGY (BACT) ANALYSIS)

4.1 Definition of BACT

BACT is defined at 40 CFR 52.21(b)(12) as:

"an emissions limitation (including a visible emission standard) based on the maximum degree of reduction for each pollutant subject to regulation under the Clean Air Act which would be emitted from any proposed major stationary source or major modification which the Administrator, on a case-by-case basis, taking into account energy, environmental and economic impacts and other costs, determines is achievable for such a source or modification through application of production processes or available methods, systems, and techniques, including fuel cleaning or treatment or innovative fuel combustion techniques for the control of such pollutant. In no event shall application of best available control technology result in emissions of any pollutant which would exceed the emissions allowed by any applicable standard under 40 CFR Parts 60 and 61. If the Administrator determines that technological or economic limitations on the application of measurement methodology to a particular emissions unit would make imposition of an emissions standard infeasible, a design, equipment, work practice, operational standard, or combination thereof, may be prescribed instead to satisfy the requirement for the application of best available control technology. Such standard shall, to the degree possible, set forth the emissions reduction achievable by implementation of such design, equipment, work practice, or operation, and shall provide compliance by means which achieve equivalent results."

4.2 BACT Analysis Process

The analysis and proposal of BACT emission limits and controls is performed on a case-by-case and pollutant-by-pollutant basis. U.S. EPA has developed a process for conducting BACT analyses. This method is referred to as the "top-down" method. The steps to conducting a "top-down" analysis are listed in *U.S. EPA's New Source Review Workshop Manual* (U.S. EPA, 1990). The steps are summarized below:

Step 1: Identify All Control Technologies

The list of potential controls should be comprehensive.

Step 2: Eliminate Technically Infeasible Options

A demonstration of technical infeasibility should be clearly documented and should show, based on physical, chemical, and engineering principles, that technical difficulties would preclude the successful use of the control option on the emissions unit under review.

Step 3: Rank Remaining Control Technologies by Control Effectiveness

This ranking includes:

- control effectiveness (percent pollutant removed);
- expected emission rate (tons per year);
- expected emissions reduction (tons per year);

- energy impacts (Btu, kWh);
- environmental impacts (other media and the emissions of toxic and hazardous air emissions); and
- economic impacts (total cost effectiveness and incremental cost effectiveness).

Step 4: Evaluate Most Effective Controls and Document Results

This includes:

- A case-by-case consideration of energy, environmental, and economic impacts.
- Rejection of options with unacceptable energy, environmental, or economic impacts.

Step 5: Select BACT

The most effective option not rejected is proposed as BACT. However, as described above (in the definition of BACT), in no event shall application of BACT result in emissions of a pollutant which would exceed the emissions allowed by any applicable standard under 40 CFR Part 60 (New Source Performance Standard or NSPS) and 40 CFR Part 61 (National Emission Standard for Hazardous Air Pollutants or NESHAP).

Based on this 5-step analysis process and the BACT limit and control proposed by the applicant, the permitting authority selects BACT.

4.3 Point Source Emissions

New Expansion Project emission units to be installed at the HSAAP facility in Phase I which will emit VOC, CO, and GHG's must be considered in the BACT analysis. A summary of these individual emission units is shown in Table 4-1.

Table 4-1
HSAAP Expansion Project Phase 1 Emission Sources and
Respective Potential Emissions (TPY)

Source Description	VOC	CO	GHG as CO ₂ e
Natural Gas Fired Boilers	22.9	100.6	678,139
Fuel Oil Tanks	0.2	—	—
Emergency Generators	6.2	—	—
	0.7	5.8	1,932

4.4 BACT for Steam Generating Boilers

4.4.1 Process Description

HSAAP proposes to install four dual fuel boilers (natural gas and #2 fuel oil) to provide steam needed to operate production processes at HSAAP. The four proposed boilers are rated at 250,000 pounds per hour (PPH) of steam with a total heat input capacity of 327 MMBtu/hr when firing natural gas and 310 MMBtu/hr when firing fuel oil. To provide fuel oil storage for the boilers, HSAAP proposes to install two 1,024,000-gallon fuel oil storage tanks. The fuel oil storage tanks qualify as insignificant emission units.

4.4.2 BACT Analysis for VOC Emissions from the Steam Generating Boilers

Step 1: Identify All Control Technologies

Potential VOC control technologies include:

- Thermal Oxidation
- Recuperative Thermal Oxidation
- Regenerative Thermal Oxidation
- Catalytic Oxidation
- Clean Fuel and Good Combustion Practices (GCP)

Thermal Oxidation

Thermal oxidation is the process of oxidizing combustible materials by raising the temperature of the material above its auto-ignition point in the presence of oxygen, and maintaining it at high temperature for sufficient time to complete combustion to CO₂ and H₂O. Thermal incinerators can be used to reduce emissions from almost all VOC sources. Their fuel consumption is high, so thermal units are best suited for smaller process applications with moderate to high VOC loadings. Typical gas flow rates are 500 to 50,000 scfm. VOC destruction efficiency depends upon design criteria (i.e., chamber temperature, residence time, inlet VOC concentration, compound type, and degree of mixing). Typical thermal incinerator design efficiencies range from 98 to 99.99% and above depending on system requirements and characteristics of the contaminated stream.

Recuperative Thermal Oxidation

These systems incorporate a heat exchanger with a combustion chamber and can handle a wide range of process flow rates and VOC concentrations. The heat exchanger is used to preheat the VOC laden air prior to entering the combustion chamber to reduce operating costs.

Regenerative Thermal Oxidizers

Regenerative thermal oxidizers can be used to reduce emissions from a variety of stationary sources. Generally, high flow (greater than 5,000 scfm) and low VOC concentration (less than 1,000 ppmv) applications are best suited to control with regenerative incineration systems. Typical gas flow rates are 5,000 to 500,000 scfm. VOC destruction efficiency depends upon design criteria (i.e., chamber temperature, residence time, inlet VOC concentration, compound type, and degree of mixing). Typical regenerative incinerator design efficiencies range from 95 to 99% depending on system requirements and characteristics of the contaminated stream. Lower control efficiencies are generally associated with lower concentration flows. Particulate matter (PM), which can clog the incinerator's packed bed, would have to be removed by an internal filter or some pretreatment technology prior to entering the reactor chamber.

Catalytic Oxidation

Catalytic oxidation is a well-known control technology for both VOC and CO emissions and has been widely used with natural gas-fired combined cycle turbines. The products of combustion in the exhaust are introduced into a catalytic bed where the VOC is oxidized to CO₂ and H₂O. A catalytic oxidizer uses a precious metal catalyst in the packed bed, allowing oxidation to occur at approximately 800 °F. The lower temperature requirement reduces the amount of natural gas needed to fuel the VOC abatement system and the overall size of the incinerator. Catalysts typically used for VOC incineration include platinum and alumina. Typical catalytic oxidation design efficiencies range from 90% to 99%, depending on system requirements and characteristics of the contaminated stream.

Clean Fuel and GCP

Good combustion generally requires the following:

- High temperatures;
- Sufficient excess air;
- Sufficient residence times; and
- Good air/fuel mixing.

GCP's maximize combustion efficiency and minimize emissions of incomplete combustion products such as VOC. Most modern combustion systems do not produce high concentrations of VOC emissions when the system is operated and maintained properly. Natural gas is considered one of the cleanest fuels that can be used in boilers of this type.

The results of a US EPA RACT/BACT/LAER Clearinghouse (RBLC) search for 200-400 MMBtu/hr, boilers identified fifteen (15) similar sources with VOC permit limits. The lowest VOC emission limit for boilers in this size range identified in the RBLC is 0.004 lb/MMBtu when burning natural gas. Of these 15 boilers, only one has a specific permit limit listed when burning fuel oil. That limit is 0.0055 lb/MMBtu. (See Table 4-2.)

The results of a search of active PSD permits issued by TDAPC at http://environment-online.state.tn.us:8080/pls/enf_reports/f?p=19031:34001:0::NO::, identified five (5) recently permitted boilers with VOC emission limits. The lowest emission limit for the boilers in active PSD permits issued by TDAPC is also 0.004 lb/MMBtu (10 ppm @ 3% O₂), when burning both natural gas and fuel oil. (See Table 4-3.)

Table 4-2
Summary of RBLC Search for VOC Emission Limits for Boilers in the 200-400 MMBtu/hr Range

Facility Name	State	Process	Throughput (MMBtu/hr)	Control	VOC Emission Limit	
					Natural Gas	Fuel Oil ¹
					(lb/MMBtu)	
Plant McDonough Combined Cycle	GA	Auxiliary Boiler	200	None Listed	0.0051	—
AGP Soy	NE	Boilers	200	None Listed	0.0054	—
M&G Resins USA, LLC	TX	Boiler	250	GCP	0.004	—
Green River Soda Ash Plant	WY	Auxiliary Boiler	254	GCP	0.0054	—
Kenai Nitrogen Operations	AK	Package Boilers	243	No Controls	0.0054	—
El Dorado Chemical Company	AR	Startup Boiler	240	Good and Efficient Operating Practices	0.004	—
Ohio Valley Resources, LLC	IN	Four Boilers	218	Proper Design and GCP	0.0054	—
Midwest Fertilizer Company, LLC	IN	Auxiliary Boilers	218.6	GCP	0.0054	—
Indorama Lake Charles Facility	LA	Boiler	229	GCP and Proper O&M	0.0054	—
Indorama Lake Charles Facility	LA	Boilers	248	GCP and Proper O&M	0.0054	—
Dyno Nobel Louisiana Ammonia, LLC	LA	Commissioning Boilers	217.5	GCP	0.0054	—
Port Dolphin Energy, LLC	FL	Boilers	278	None Listed	0.0054	—
Ninemile Point Electric Generating Plant	LA	Auxiliary Boiler	338	GCP and Use of Pipeline Quality Natural Gas	0.0054	—
St. James Methanol Plant	LA	Boilers	350	GCP	0.0054	—
Celanese Acetate, LLC	VA	Boilers	400	GCP	0.0055	0.0055

1. A "—" indicates that either the permitted fuel is natural gas only or there is no specific permit limit for VOC emissions when the boiler is burning fuel oil.

Table 4-3
Summary of TDAPC Search for VOC Emission Limits for Boilers

Facility Name	Permit Number	Process	Throughput (MMBtu/hr)	Control	VOC Emission Limit	
					Natural Gas	Fuel Oil ¹
					(lb/MMBtu)	
Dupont Titanium Technologies	966878F	Boilers	432	None Listed	0.0075	—
Hankook Tire Manufacturing	971720	Boilers	41.31 ²	None Listed	0.0054	0.0507
Eastman Chemical Company	966859F	Boilers	³	None Listed	0.004 ⁴	0.004 ⁴
General Motors, Spring Hill	964132	Boilers	18.5	None Listed	0.0054	—
Packaging Corporation (PCA)	963239P	Combination Boiler	1,000 ⁵	None Listed	0.247	—

Notes:

1. A "—" indicates that either the permitted fuel is natural gas only or there is no specific permit limit for VOC emissions when the boiler is burning fuel oil.
2. Four boilers limited to 101 MMBtu/hr. Two boilers are natural gas only and two are dual fuel (natural gas and fuel oil).
3. Five boilers limited to a total of 35.04 TBtu/year.
4. Permit limit is 10 ppm @ 3% O₂ on both natural gas and fuel oil.
5. Boiler is limited to an annual average of 860 MMBtu/hr.

Step 2: Eliminate Technically Infeasible Options

Add-on VOC controls are typically applied to exhaust streams with high VOC concentrations and relatively high temperatures. Modern dual fuel boilers are inherently designed with high fuel combustion efficiency and low VOC emissions. Based on the review of the VOC controls applied to natural gas-fired boilers of similar size (See Table 4-2.) and boilers permitted by TDAPC (See Table 4-3.), none of the add-on VOC controls have been applied to control VOC emissions from boilers of similar size. Therefore, add-on VOC controls are generally considered inappropriate and infeasible for boilers of the size of the steam generating boilers. However, to ensure that a VOC emission rate of 0.004 lb/MMBtu can be consistently achieved, and because catalytic oxidation will control both VOC and CO emissions, catalytic oxidation, along with clean fuels and GCP are considered technically feasible.

Step 3: Rank Remaining Control Technologies by Effectiveness

The remaining control technologies are catalytic oxidation and clean fuels plus GCP. Of these two, catalytic oxidation can achieve the highest control efficiency (90-99%).

Step 4: Evaluate Most Effective Controls and Document Results

Since catalytic oxidation is being proposed as BACT, no further evaluation is required.

Step 5: Select BACT

There are no applicable NSPS or NESHAP rules that would establish a baseline VOC emission rate for the boilers.

Based on this analysis, catalytic oxidation with a VOC emission limit of 0.004 lb/MMBtu when burning both natural gas and fuel oil is proposed as BACT for the steam generating boilers.

4.4.3 BACT Analysis for CO Emissions from the Steam Generating Boilers

Step 1: Identify All Control Technologies

Potential CO control technologies include:

- Catalytic Oxidation
- Clean Fuel and GCP

Catalytic Oxidation

As stated in Section 4.4.2, catalytic oxidation is a well-known control technology for both VOC and CO emissions and has been widely used with natural gas-fired combined cycle turbines. The products of combustion in the exhaust are introduced into a catalytic bed where the CO is oxidized to CO₂. A catalytic oxidizer uses a precious metal catalyst in the packed bed, allowing oxidation to occur at approximately 800 °F. The lower temperature requirement reduces the amount of natural gas needed to fuel the CO abatement system and the overall size of the incinerator. Catalysts typically used for CO and VOC incineration include platinum and alumina. Typical catalytic oxidation design efficiencies range from 90% to 99%, depending on system requirements and characteristics of the contaminated stream.

Clean Fuel and GCP

Good combustion generally requires the following:

- High temperatures;
- Sufficient excess air;
- Sufficient residence times; and
- Good air/fuel mixing.

GCP's maximize combustion efficiency and minimize emissions of incomplete combustion products such as VOC. Most modern combustion systems do not produce high concentrations of VOC emissions when the system is operated and maintained properly. Natural gas is considered one of the cleanest fuels that can be used in boilers of this type.

The results of a US EPA RACT/BACT/LAER Clearinghouse (RBLC) search for 200-400 MMBtu/hr, boilers identified eleven (11) similar sources with CO permit limits. The lowest CO emission limit for boilers in this size range identified in the RBLC is 0.035 lb/MMBtu when burning natural gas. Of these 11 boilers none has a specific permit limit listed when burning fuel oil. (See Table 4-4.)

The results of a search of active PSD permits issued by TDAPC at http://environment-online.state.tn.us:8080/pls/enf_reports/f?p=19031:34001:0::NO::, identified four (4) recently permitted boilers with CO emission limits. The lowest emission limit for the boilers in active PSD permits issued by TDAPC is also 0.036 lb/MMBtu when burning natural gas and 0.04 lb/MMBtu when burning fuel oil. (See Table 4-5.)

Table 4-4
Summary of RBLC Search for CO Emission Limits for
Boilers in the 200-400 MMBtu/hr Range

Facility Name	State	Process	Throughput (MMBtu/hr)	Control	CO Emission Limit	
					Natural Gas	Fuel Oil ¹
					(lb/MMBtu)	
Plant McDonough Combined Cycle	GA	Auxiliary Boiler	200	None Listed	0.037	—
Karn Weadock Generating Complex	MI	Auxiliary Boiler	220	Efficient Combustion	0.035	—
Kraton Polymers	OH	Boilers	249	GCP and Clean Fuel	0.036	—
Shintech Plaquemine Plant 2	LA	Utility Boilers	25	GCP	0.0362	—
Kenai Nitrogen Operations	AK	Package Boilers	243	No Controls	0.0369	—
El Dorado Chemical Company	AR	Startup Boiler	240	Good and Efficient Operating Practices	0.037	—
Ohio Valley Resources, LLC	IN	Four Boilers	218	Proper Design and GCP	0.0365	—
Midwest Fertilizer Company, LLC	IN	Auxiliary Boilers	218.6	GCP	0.0365	—
Indorama Lake Charles Facility	LA	Boiler	229	GCP and Proper O&M	0.037	—
Indorama Lake Charles Facility	LA	Boilers	248	GCP and Proper O&M	0.082	—
Power County Advanced Energy Center	ID	Package Boilers	250	GCP	0.074	—

Note:

1. A "—" indicates that either the permitted fuel is natural gas only or there is no specific permit limit for CO emissions when the boiler is burning fuel oil.

Table 4-5
Summary of TDAPC Search for CO Emission Limits for Boilers

Facility Name	Permit Number	Process	Throughput (MMBtu/hr)	Control	CO Emission Limit	
					Natural Gas	Fuel Oil ¹
					(lb/MMBtu)	
Dupont Titanium Technologies	966878F	Boilers	432	None Listed	0.084	—
Hankook Tire Manufacturing	971720	Boilers	41.31 ²	None Listed	0.036	0.040
TVA Johnsonville Cogeneration	972969	Boilers	450	Good Combustion Design and Practices	0.084	—
General Motors, Spring Hill	964132	Boilers	18.5	None Listed	0.082	—

Notes:

1. A "—" indicates that either the permitted fuel is natural gas only or there is no specific permit limit for VOC emissions when the boiler is burning fuel oil.
2. Four boilers limited to 101 MMBtu/hr. Two boilers are natural gas only and two are dual fuel (natural gas and fuel oil).

Step 2: Eliminate Technically Infeasible Options

Based on the review of the CO controls applied to natural gas-fired boilers of similar size (See Table 4-4.) and boilers permitted by TDAPC (See Table 4-5.), add-on CO controls have not been applied to control CO emissions from boilers of similar size. Therefore, add-on CO controls are generally considered inappropriate and infeasible for boilers of the size of the steam generating boilers. The use of clean fuels and GCP are considered technically feasible.

Step 3: Rank Remaining Control Technologies by Effectiveness

The use of clean fuels plus GCP is the only remaining technically feasible option.

Step 4: Evaluate Most Effective Controls and Document Results

Since use of clean fuels is being proposed as BACT, no further evaluation is required.

Step 5: Select BACT

Because it is proposed to permit the boilers to burn fuel oil for 336 hours per year, the boilers will be classified in the "Unit designed to burn gas 2 (other) subcategory" in accordance with 40 CFR 63, Subpart DDDDD, *National Emission Standards for Hazardous Air Pollutants for Major Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters* (Boiler MACT). Based on that classification, the emissions from the boilers are limited to a CO concentration of 130 ppm corrected to 3% O₂. That concentration is equivalent to an emission rate of 0.096 lb/MMBtu based on heat input to the boilers.

Based on this analysis, use of clean fuels and GCP with a CO emission limit of 0.035 lb/MMBtu when burning natural gas and 0.04 lb/MMBtu when burning fuel oil is proposed as BACT for the steam generating boilers. It should be noted that catalytic oxidation was proposed as BACT for VOC (See Section 4.4.2). Since catalytic oxidation will reduce emissions of both VOC and CO, actual CO emission rates will be lower than the proposed CO BACT rates.

4.4.4 BACT Analysis for GHG Emissions from the Steam Generating Boilers

Carbon dioxide is the primary GHG resulting from the combustion of natural gas and fuel oil. Emissions of CH₄ and N₂O also result from fuel combustion and have been addressed below and are included in the CO₂e totals. Because the primary GHG emitted is CO₂, the control technologies and measures presented in this section focus on CO₂ control technologies.

Step 1: Identify All Control Technologies

Potential GHG control technologies include:

- Carbon Capture and Storage (CCS)
- Combustion of Clean Fuels
- Combined Heat and Power (CHP)
- Design and Operational Energy Efficiency Measures

CCS

CCS systems involve the concentration of the CO₂ stream resulting from the combustion of fuels like natural gas and fuel oil. The concentrated CO₂ is then compressed for transport via a pipeline to an appropriate location for underground injection into a suitable geological storage reservoir or for use in crude oil production for enhanced oil recovery (EAR). CCS could potentially reduce GHG emissions from the boiler flue gas by 50 to 90%.

Combustion of Clean Fuels

Natural gas is the fossil fuel with the lowest GHG emission rate.

CHP

CHP, also referred to as cogeneration, is the production of useful heat and electricity from a single thermal source, such as the combustion of natural gas and/or fuel oil. Significant efficiency gains are derived from employing CHP. While thermal electric generation processes typically lose 50–70% of the input fuel energy in the form of waste heat, by recovering this energy for steam or hot water production on-site, the overall efficiency of the process increases from 30–50% to 70–80%. The subsequent reduction in fuel requirements translates directly into reduced CO₂ and other GHG emissions.

Design and Operational Energy Efficient Measures

Several energy efficient design elements are available for dual fuel boilers. These efficiency elements can reduce the natural gas and/or fuel oil required, thus resulting in less CO₂ and other GHGs emissions.

The results of a RBLC search for 200-400 MMBtu/hr, boilers identified eleven (11) similar sources with GHG permit limits. All of the GHG emission limits for boilers in this size range that were identified in the RBLC, except for one, are based on (or consistent with) Tables C-1 and C-2 of Subpart C (Stationary Fuel Combustion Sources) of the Mandatory GHG Reporting Rule (40 CFR Part 98). These emission rates were then converted to CO₂ equivalents (CO₂e) using the global warming potential (GWP) values from Table A-1 of 40 CFR Part 98, Subpart A (General Provisions). None of the 11 boilers have a specific permit limit listed when burning fuel oil. (See Table 4-6.)

The results of a search of active PSD permits issued by TDAPC at http://environment-online.state.tn.us:8080/pls/enf_reports/f?p=19031:34001:0::NO::, identified three (3) recently permitted boilers with GHG permit limits. All of the GHG emission limits for boilers in active PSD permits issued by TDAPC are also based on (or consistent with) Tables C-1 and C-2 of Subpart C (Stationary Fuel Combustion Sources) of the Mandatory GHG Reporting Rule (40 CFR Part 98). These emission rates were then converted to CO₂e using the global warming potential (GWP) values from Table A-1 of 40 CFR Part 98, Subpart A (General Provisions). None of the 3 boilers have a specific permit limit listed when burning fuel oil. (See Table 4-7.)

Table 4-6
Summary of RBLC Search for CO₂e Emission Limits for
Boilers in the 200-400 MMBtu/hr Range

Facility Name	State	Process	Throughput (MMBtu/hr)	Control	CO ₂ e Emission Limit ¹	
					Natural Gas	Fuel Oil ²
					(lb/MMBtu)	
Ohio Valley Resources, LLC	IN	Boilers	218	Energy Efficiency and 80% Thermal Efficiency	116.9	—
Sabic Innovative Plastics	IN	Auxiliary Boilers	249	None Listed	122.4	—
El Dorado Chemical Company	AR	Startup Boiler	240	Good Operating Practices	117.4	—
Kenai Nitrogen Operations	AK	Three Package Boilers	243	None Listed	116.9	—
Agrium	TX	Package Boiler	240	Good Engineering Practices	117.1	—
Iowa State University Power Plant	IA	Boiler	213.6	None Listed	117.1	—
Indorama Lake Charles Facility	LA	Boiler	229	Gaseous fuels, GCP and Proper O&M	117.1	—
Indorama Lake Charles Facility	LA	Boilers	248	Gaseous fuels, GCP and Proper O&M	117.1	—
Southern Minnesota Sugar Beet Cooperative	MN	Boiler	257.3	Use of Natural Gas and Equipped with an Economizer and Oxygen Trim System	117.0	—
Cargill Incorporated	NE	Boiler	300	GCP	117.0	—
St. James Methanol Plant	LA	Boilers	350	GCP	117.1	—

Notes:

1. Some of these lb/MMBtu emission limits were computed based on annual CO₂e and annual heat input permit limits and are provided here for the sake of comparison. The annual permit limits were obtained from permits.
2. A "—" indicates that either the permitted fuel is natural gas only or there is no specific permit limit for VOC emissions when the boiler is burning fuel oil.

Table 4-7
Summary of TDAPC Search for GHG Emission Limits for Boilers

Facility Name	Permit Number	Process	Throughput (MMBtu/hr)	Control	CO ₂ e Emission Limit	
					Natural Gas	Fuel Oil ¹
					(lb/MMBtu)	
Dupont Titanium Technologies	966878F	Boilers	432	None Listed	117.0	—
Hankook Tire Manufacturing	971720	Boilers	41.31 ²	None Listed	117.2	—
TVA Johnsonville Cogeneration	972969	Boilers	450	Use of Natural Gas	117.0	—

Notes:

1. A "—" indicates that either the permitted fuel is natural gas only or there is no specific permit limit for VOC emissions when the boiler is burning fuel oil.
2. Four boilers limited to 101 MMBtu/hr. Two boilers are natural gas only and two are dual fuel (natural gas and fuel oil).

Step 2: Eliminate Technically Infeasible Options

In its *Draft New Source Review Workshop Manual*, October 1990, U.S. EPA explains that “two key concepts are important in determining whether an undemonstrated technology is feasible:” availability” and “applicability.” In *PSD and Title V Permitting Guidance for Greenhouse Gases*, EPA-457/B-11-001, March 2011, U.S. EPA states that it “generally considers CCS to be an “available” add-on pollution control technology for facilities emitting CO₂ in large amounts and industrial facilities with high-purity CO₂ streams.” Therefore, the issue is whether CCS is “applicable” to the control of the GHG emissions from the steam generating boilers. In *Draft New Source Review Workshop Manual*, U.S. EPA further states the following: “Technical judgment on the part of the applicant and the reviewing authority is to be exercised in determining whether a control alternative is applicable to the source type under consideration. In general, a commercially available control option will be presumed applicable if it has been or is soon to be deployed (e.g., is specified in a permit) on the same or a similar source type. Absent a showing of this type, technical feasibility would be based on examination of the physical and chemical characteristics of the pollutant-bearing gas stream and comparison to the gas stream characteristics of the source types to which the technology had been applied previously. Deployment of the control technology on an existing source with similar gas stream characteristics is generally sufficient basis for concluding technical feasibility barring a demonstration to the contrary.” As can be seen from Tables 4-4 and 4-5, there have been no CCS controls deployed or permitted in the U.S. on industrial boilers similar in size to the proposed steam generating boilers. Therefore, in accordance with U.S. EPA guidance, an “examination of the physical and chemical characteristics of the pollutant-bearing gas stream and a comparison to the gas stream characteristics of the source types to which” CCS technology has been applied is in order. In the *Report of the Interagency Task Force on Carbon Capture and Storage*, August 2010, the task force, when speaking of controlling CO₂ emissions from power plants, which are typically much larger than the steam generating boilers (a typical coal-fired power plant has a heat input capacity of 3,700–5,200 MMBtu/hr versus the 327 MMBtu/hr for the steam generating boilers), states that separating CO₂ from a flue gas is challenging because “a high volume of gas must be treated because the CO₂ is dilute (13–15% by volume in coal systems, 3–4% in natural gas systems); the flue gas is at low pressure (near atmospheric); trace impurities (PM, SO₂, NO_x, etc.) can degrade the CO₂ capture materials; and compressing captured CO₂ from near atmospheric pressure to pipeline pressure (about 2,000 psia) requires a large auxiliary power load.”

Since the steam generating boilers are much smaller than the typical power plant, the GHG emissions from the steam generating boilers will be very dilute (3-4%), and the gas stream will be at, or near, atmospheric pressure, it can be concluded that CCS is not “applicable” to control of the GHG emissions from the steam generating boilers.

CHP is also not considered technically feasible for controlling GHG emissions from the steam generating boilers because it would result in a “fundamental change” to the purpose of the boilers. The purpose of the boilers is to produce steam for the production processes at HSAAP. The U.S. Supreme Court reaffirmed in their decision in *Utility Air Regulatory Group v. Environmental Protection Agency*, et al, June 23, 2014, that “BACT cannot be used to order a fundamental redesign of the facility.”

Step 3: Rank Remaining Control Technologies by Effectiveness

The remaining control technologies are combustion of clean fuels and design and operational energy efficiency measures.

Step 4 Evaluate Most Effective Controls and Document Results

The steam generating boilers will be fired with natural gas for the overwhelming majority of their operating hours. A combination of firing natural gas most of the time and the implementation of fuel efficiency techniques is the most effective technically feasible option for reducing GHG emissions from the steam generating boilers, therefore no further analysis is required.

Step 5 Select BACT

There are no applicable NSPS or NESHAP rules that would establish a baseline GHG emission rate for the boilers.

BACT is proposed as a combination of firing natural gas most of the time and the implementation of fuel efficiency techniques with a limit of 678,139 tons as CO₂e on a 12-month rolling total basis. This limit is based on the GWP values from Table A-1 of 40 CFR Part 98; a CO₂ emission rate of 53.06 kg/MMBtu (117.0 lb/MMBtu), a CH₄ emission rate of 0.001 kg/MMBtu (0.0022 lb/MMBtu), and a N₂O emission rate of 0.0001 (0.00022 lb/MMBtu), when burning natural gas; and a CO₂ emission rate of 73.96 kg/MMBtu (163.2 lb/MMBtu), a CH₄ emission rate of 0.003 kg/MMBtu (0.007 lb/MMBtu), and a N₂O emission rate of 0.0006 (0.001 lb/MMBtu), when burning fuel oil.

4.4.5 BACT Analysis for VOC Emissions from the Fuel Oil Storage Tanks

As mentioned above, because the VOC emissions from the tanks are each well below 5 tpy, the two tanks are considered insignificant emission units. The tanks are used to store fuel oil to operate the steam generating boilers in the event of a temporary natural gas outage.

Step 1: Identify All Control Technologies

Potential VOC control technologies for the two fuel oil storage tanks include:

- Flare
- Thermal oxidation
- Condenser
- Catalytic oxidation
- Carbon adsorption
- Scrubber
- Internal floating roof
- External floating roof
- Submerged fill
- White colored tank
- Good maintenance

Flare

Flares can be used to control almost any VOC stream, and can typically handle large fluctuations in VOC concentration, flow rate, heating value, and inert species content. The primary use of flares is that of a safety device used to control a large volume of a pollutant resulting from upset conditions. The majority of chemical plants and refineries have existing flare systems designed to relieve emergency process upsets that release large volumes of gas. Flares can reduce VOC emissions by 98% or more.

Thermal Oxidation

Thermal oxidation can be used to reduce emissions from almost all VOC sources, including reactor vents, distillation vents, solvent operations, and operations performed by ovens, dryers, and kilns. Fuel consumption is high, so thermal units are best suited for smaller process applications with moderate to high VOC loadings. Thermal oxidation can reduce VOC emissions by 98-99%

Condenser

A condenser is a control device that is used to cool an emission stream having organic vapors in it and to change the vapors to a liquid. Condensed organic vapors can be recovered, refined, and might be reused, preventing their release to the ambient air. Condensers can reduce VOC emissions by 99% or more.

Catalytic Oxidation

Catalytic oxidation, like thermal oxidation, can be used to reduce emissions from a variety of sources. Catalytic oxidation is widely used to control VOC emissions from solvent evaporation processes associated with surface coating and printing operations. Catalytic oxidation can reduce VOC emissions by 95% or more depending on the volume of catalyst used.

Carbon Adsorption

With carbon adsorption, VOC vapors condense on the surface of the adsorbent, usually activated carbon. When the surface has adsorbed nearly as much as it can, the VOC is either desorbed as part of regenerating the adsorbent or the carbon, with VOC, is disposed of. If the VOC is desorbed, the VOC vapors are usually at a higher concentration, after which the VOC is either recovered or has to be destroyed. Carbon adsorption can reduce VOC emissions by 95% or more.

Scrubber

The use of a scrubber to control VOC emissions is an absorption process (as opposed to carbon adsorption, which is an adsorption process). With a scrubber, an absorbent chemical is used to remove VOC's. The absorbent chemical is chosen based on its ability to absorb the chemical or chemicals which compose the VOC waste gas stream. In a scrubber the sorbent is intimately mixed with the VOC waste gas stream to give the sorbent the opportunity to absorb as much of the VOC as possible. Scrubbers can reduce VOC emissions by 95% or more.

Internal Floating Roof

An internal floating roof tank has both a permanent fixed roof and a floating roof inside. There are two basic types of internal floating roof tanks: tanks in which the fixed roof is supported by vertical columns within the tank, and tanks with a self-supporting fixed roof and no internal support columns. An internal floating roof minimizes evaporative losses of the stored liquid. Evaporative losses from floating roofs may come from deck fittings, nonwelded deck seams, and the annular space between the deck and tank wall. Internal floating roofs can reduce VOC emissions due to breathing losses by 75-80%.

External Floating Roof

A typical external floating roof tank consists of an open- topped cylindrical steel shell equipped with a roof that floats on the surface of the stored liquid. The floating roof consists of a deck, fittings, and rim seal system. Floating decks are of two general types: pontoon or double-deck. The purpose of the floating roof and rim seal system is to reduce evaporative loss of the stored liquid. Some annular space remains between the seal system and the tank wall. The external

floating roof design is such that evaporative losses from the stored liquid are limited to losses from the rim seal system and deck fittings (breathing loss) and any exposed liquid on the tank walls (withdrawal loss). External floating roofs can reduce VOC emissions by 75-80%.

Submerged Fill

With submerged fill the fill pipe extends almost to the bottom of the tank. During most of submerged filling of the tank the fill pipe opening is below the liquid surface level. Liquid turbulence is controlled significantly, resulting in much lower vapor generation than encountered during filling without submerged fill. Submerged fill can reduce VOC emissions by 10-25%.

White Colored Tank

White or light-colored tanks do not absorb as much energy from the sun, thus they stay cooler. Since vapor pressures normally increase with increasing temperatures, cooler tanks result in lower breathing losses.

Good Tank Maintenance

Good maintenance of tanks and vents will reduce emissions from both working and breathing losses.

Twenty-five permits were found during a search of the RBLC for VOC controls for liquid storage tanks. In those 25 permits, the following was found:

Control	Number of Permits Where Control Was Required
White or Light-Colored Tank	8
Submerged Fill	7
External Floating Roof	5
Scrubber	5
Thermal Oxidation	3
Good Maintenance	3
Flare	2
Internal Floating Roof	1
Carbon Adsorption	1
Condenser	0
Catalytic Oxidation	0

Step 2: Eliminate Technically Infeasible Options

All of the control technologies listed above are considered technically feasible and most have been required in permits found during the RBLC search.

Step 3: Rank Remaining Control Technologies by Effectiveness

The control technology options are ranked in order of their approximate effectiveness in Step 1, above.

Step 4: Evaluate Most Effective Controls and Document Results

As mentioned above, the two tanks will have combined uncontrolled VOC emissions of less than 0.2 tpy. Consequently, it is not considered economically feasible to apply any add-on controls to the tanks or to require the use of either an internal or external floating roof. Based on emission calculations using EPA Tanks 4.0.9d, the maximum reduction in VOC emissions due to the use of a floating roof is about 150 pounds per year. (The EPA Tanks emission calculation reports for

the two tanks as fixed roof, external floating roof, and internal floating roof are provided in Appendix B.) Therefore, a flare, thermal oxidation, a condenser, catalytic oxidation, carbon adsorption, a scrubber, internal floating roof, and external floating roof are eliminated from further consideration.

Step 5: Select BACT

There are no applicable NSPS or NESHAP rules that would establish a baseline VOC emission rate for the fuel oil storage tanks.

BACT is proposed as white/light color, submerged fill, and good maintenance practices and a combined VOC emission rate of 0.2 tpy.

4.5 BACT for [REDACTED], Recrystallization

4.5.1. Process Description

HSAAP proposes to install process equipment in Building [REDACTED] for the recrystallization of crude explosives. The equipment in Building [REDACTED] will be used for three separate batch processes. Each of the three processes results in different emissions. The recrystallization of [REDACTED] will result in emissions of VOC. Those VOC emissions result from the use of cyclohexanone to dissolve the crude. After the crude is partially dissolved in the cyclohexanone, the majority of the cyclohexanone is recovered by boiling and condensation. VOC emissions from this process are vented to the atmosphere. In addition to this batch process, four tanks containing cyclohexanone ([REDACTED] tank), cyclohexanone and water ([REDACTED] tanks) and n-octane ([REDACTED] tank) will have small volumes of uncontrolled VOC emissions (less than 0.2 tpy for all four tanks combined). Because the VOC emissions from the tanks are each well below 5 tpy, the four tanks are considered insignificant emission units.

4.5.2 BACT Analysis for VOC Emissions from [REDACTED], Recrystallization Tanks

Step 1: Identify All Control Technologies

Potential VOC control technologies for the four [REDACTED] tanks include:

- Flare
- Thermal oxidation
- Condenser
- Catalytic oxidation
- Carbon adsorption
- Scrubber
- Internal floating roof
- External floating roof
- Submerged fill
- White colored tank
- Good maintenance

Flare

Flares can be used to control almost any VOC stream, and can typically handle large fluctuations in VOC concentration, flow rate, heating value, and inert species content. The primary use of flares is that of a safety device used to control a large volume of a pollutant resulting from upset conditions. The majority of chemical plants and refineries have existing flare systems designed to relieve emergency process upsets that release large volumes of gas. Flares can reduce VOC emissions by 98% or more.

Thermal Oxidation

Thermal oxidation can be used to reduce emissions from almost all VOC sources, including reactor vents, distillation vents, solvent operations, and operations performed by ovens, dryers, and kilns. Fuel consumption is high, so thermal units are best suited for smaller process applications with moderate to high VOC loadings. Thermal oxidation can reduce VOC emissions by 98-99%

Condenser

A condenser is a control device that is used to cool an emission stream having organic vapors in it and to change the vapors to a liquid. Condensed organic vapors can be recovered, refined, and might be reused, preventing their release to the ambient air. Condensers can reduce VOC emissions by 99% or more.

Catalytic Oxidation

Catalytic oxidation, like thermal oxidation, can be used to reduce emissions from a variety of sources. Catalytic oxidation is widely used to control VOC emissions from solvent evaporation processes associated with surface coating and printing operations. Catalytic oxidation can reduce VOC emissions by 95% or more depending on the volume of catalyst used.

Carbon Adsorption

With carbon adsorption, VOC vapors condense on the surface of the adsorbent, usually activated carbon. When the surface has adsorbed nearly as much as it can, the VOC is either desorbed as part of regenerating the adsorbent or the carbon, with VOC, is disposed of. If the VOC is desorbed, the VOC vapors are usually at a higher concentration, after which the VOC is either recovered or has to be destroyed. Carbon adsorption can reduce VOC emissions by 95% or more.

Scrubber

The use of a scrubber to control VOC emissions is an absorption process (as opposed to carbon adsorption, which is an adsorption process). With a scrubber, an absorbent chemical is used to remove VOC's. The absorbent chemical is chosen based on its ability to absorb the chemical or chemicals which compose the VOC waste gas stream. In a scrubber the sorbent is intimately mixed with the VOC waste gas stream to give the sorbent the opportunity to absorb as much of the VOC as possible. Scrubbers can reduce VOC emissions by 95% or more.

Internal Floating Roof

An internal floating roof tank has both a permanent fixed roof and a floating roof inside. There are two basic types of internal floating roof tanks: tanks in which the fixed roof is supported by vertical columns within the tank, and tanks with a self-supporting fixed roof and no internal support columns. An internal floating roof minimizes evaporative losses of the stored liquid. Evaporative losses from floating roofs may come from deck fittings, nonwelded deck seams, and the annular space between the deck and tank wall. Internal floating roofs can reduce VOC emissions due to breathing losses by 75-80%.

External Floating Roof

A typical external floating roof tank consists of an open- topped cylindrical steel shell equipped with a roof that floats on the surface of the stored liquid. The floating roof consists of a deck, fittings, and rim seal system. Floating decks are of two general types: pontoon or double-deck. The purpose of the floating roof and rim seal system is to reduce evaporative loss of the stored

liquid. Some annular space remains between the seal system and the tank wall. The external floating roof design is such that evaporative losses from the stored liquid are limited to losses from the rim seal system and deck fittings (breathing loss) and any exposed liquid on the tank walls (withdrawal loss). External floating roofs can reduce VOC emissions by 75-80%.

Submerged Fill

With submerged fill the fill pipe extends almost to the bottom of the tank. During most of submerged filling of the tank the fill pipe opening is below the liquid surface level. Liquid turbulence is controlled significantly, resulting in much lower vapor generation than encountered during filling without submerged fill. Submerged fill can reduce VOC emissions by 10-25%.

White Colored Tank

White or light-colored tanks do not absorb as much energy from the sun, thus they stay cooler. Since vapor pressures normally increase with increasing temperatures, cooler tanks result in lower breathing losses.

Good Tank Maintenance

Good maintenance of tanks and vents will reduce emissions from both working and breathing losses.

Twenty-five permits were found during a search of the RBLC for VOC controls for liquid storage tanks. In those 25 permits, the following was found:

Control	Number of Permits Where Control Was Required
White or Light-Colored Tank	8
Submerged Fill	7
External Floating Roof	5
Scrubber	5
Thermal Oxidation	3
Good Maintenance	3
Flare	2
Internal Floating Roof	1
Carbon Adsorption	1
Condenser	0
Catalytic Oxidation	0

Step 2: Eliminate Technically Infeasible Options

All of the control technologies listed above are considered technically feasible and most have been required in permits found during the RBLC search.

Step 3: Rank Remaining Control Technologies by Effectiveness

The control technology options are ranked in order of their approximate effectiveness in Step 1, above.

Step 4: Evaluate Most Effective Controls and Document Results

As mentioned above, the four tanks will have combined uncontrolled VOC emissions of less than 0.2 tpy. Consequently, it is not considered economically feasible to apply any add-on controls to the tanks. Therefore, a flare, thermal oxidation, a condenser, catalytic oxidation, carbon adsorption, and a scrubber are eliminated from further consideration.

With regard to both internal and external floating roofs, because there is the chance that trace amounts of explosives can be present in the tanks, a floating roof tank cannot be used due to explosive design standard 11507. Therefore, floating roofs are eliminated from further consideration.

With regard to white or light-colored tanks, a white or light-colored tank would impede tank surface inspections for mechanical integrity. In addition, because the explosives are light-colored, a tank color similar to the color of the explosives would complicate leak detection. Also, there are potential issues with paint compatibility with explosives. For these reasons, white or light-colored tanks are eliminated from further consideration.

Step 5: Select BACT

There are no applicable NSPS or NESHAP rules that would establish a baseline VOC emission rate for the [REDACTED], Recrystallization tanks.

BACT is proposed as submerged fill with good maintenance practices and a combined VOC emission rate of 0.18 tpy.

4.5.3 BACT Analysis for VOC Emissions from [REDACTED], Recrystallization Process Vent

Step 1: Identify All Control Technologies

Potential VOC control technologies for the [REDACTED] process vent include:

- Flare
- Thermal oxidation
- Condenser
- Catalytic oxidation
- Carbon adsorption
- Scrubber

Flare

Flares can be used to control almost any VOC stream, and can typically handle large fluctuations in VOC concentration, flow rate, heating value, and inert species content. The primary use of flares is that of a safety device used to control a large volume of a pollutant resulting from upset conditions. The majority of chemical plants and refineries have existing flare systems designed to relieve emergency process upsets that release large volumes of gas. Flares can reduce VOC emissions by 98% or more.

Thermal Oxidation

Thermal oxidation can be used to reduce emissions from almost all VOC sources, including reactor vents, distillation vents, solvent operations, and operations performed by ovens, dryers, and kilns. Fuel consumption is high, so thermal units are best suited for smaller process applications with moderate to high VOC loadings. Thermal oxidation can reduce VOC emissions by 98-99%

Condenser

A condenser is a control device that is used to cool an emission stream having organic vapors in it and to change the vapors to a liquid. Condensed organic vapors can be recovered, refined, and might be reused, preventing their release to the ambient air. Condensers can reduce VOC emissions by 99% or more.

Catalytic Oxidation

Catalytic oxidation, like thermal oxidation, can be used to reduce emissions from a variety of sources. Catalytic oxidation is widely used to control VOC emissions from solvent evaporation processes associated with surface coating and printing operations. Catalytic oxidation can reduce VOC emissions by 95% or more depending on the volume of catalyst used.

Carbon Adsorption

With carbon adsorption, VOC vapors condense on the surface of the adsorbent, usually activated carbon. When the surface has adsorbed nearly as much as it can, the VOC is either desorbed as part of regenerating the adsorbent or the carbon, with VOC, is disposed of. If the VOC is desorbed, the VOC vapors are usually at a higher concentration, after which the VOC is either recovered or has to be destroyed. Carbon adsorption can reduce VOC emissions by 95% or more.

Scrubber

The use of a scrubber to control VOC emissions is an absorption process (as opposed to carbon adsorption, which is an adsorption process). With a scrubber, an absorbent chemical is used to remove VOC's. The absorbent chemical is chosen based on its ability to absorb the chemical or chemicals which compose the VOC waste gas stream. In a scrubber the sorbent is intimately mixed with the VOC waste gas stream to give the sorbent the opportunity to absorb as much of the VOC as possible. Scrubbers can reduce VOC emissions by 95% or more.

HSAAP is the only facility in the US that produces the explosives RDX, HMX, and IMX. Consequently, there are no permits in the RBLC for the explosives recrystallization process. As described earlier, however, the VOC emissions produced during the batch process to recrystallize RDX result from the distillation and condensation of cyclohexanone. A search of the RBLC for VOC emissions from distillation processes resulted in the identification of nine (9) permitted VOC emission sources. Table 4-8 summarizes the control technologies and control efficiencies found during that RBLC search. Of the 9 permitted VOC emission sources, four are controlled by flares, three are controlled by routing the VOC's to the fuel gas system for energy recovery, one is controlled by thermal oxidation, and one is controlled by a scrubber. The control efficiency for all the sources, for which a control efficiency was specified, is 98%.

Table 4-8
Summary of RBLC Search for VOC Controls for the Distillation Process

Facility Name	State	Process	Control	VOC Control Efficiency (%)
Highlands Ethanol Facility	FL	Distillation	Scrubber	98
Grain Processing Corporation	IN	Distillation Heads Loadout	Enclosed Flare	98
Cardinal Ethanol	IN	Solids Distillation System	Enclosed Flare	98
Tradebe Treatment and Recycling, LLC	IN	Solids Distillation System	Flare	98
Central Indiana Ethanol	IN	Distillation Tower	Flare	98
Lake Charles Chemical	LA	Distillation Tower and Vacuum Distillation Tower	Flare or Route to Fuel Gas System	NA ¹
Lake Charles Chemical	LA	Distillation Units	Route to Fuel Gas System	NA ¹
Lake Charles Chemical	LA	Distillation and Drying	Route to Fuel Gas System	NA ¹
Lake Charles Chemical	LA	Distillation and Drying	Thermal Oxidation	NA ¹

Note:

1. Control efficiency not given.

Step 2: Eliminate Technically Infeasible Options

Because the processes in [REDACTED] involve the recrystallization of explosives, it is not technically feasible, from a safety standpoint, to employ any control technology that involves a flame. Consequently, flares, catalytic oxidation, and thermal oxidation are considered not technically feasible.

Step 3: Rank Remaining Control Technologies by Effectiveness

The control technology options are ranked in order of their approximate effectiveness in Step 1, above. After elimination of flares, catalytic oxidation, and thermal oxidation, the remaining control technologies in order of effectiveness are condenser, carbon adsorption, and scrubber.

Step 4: Evaluate Most Effective Controls and Document Results

The remaining control technologies provide the opportunity to recover the cyclohexanone for reuse. Cyclohexanone recovery by the emission control equipment is considered beneficial to the recrystallization process.

Recovery of the cyclohexanone by either carbon adsorption or scrubber would require extra steps to separate the cyclohexanone from either the carbon or the scrubbant. Recovery of the cyclohexanone by condensation would not require those extra steps. All three of the control technologies that provide for cyclohexanone recovery are capable of control efficiencies of 98%.

Step 5: Select BACT

There are no applicable NSPS or NESHAP rules that would establish a baseline VOC emission rate for the [REDACTED] Recrystallization tanks.

BACT is proposed as condensation.

During the first 25% of the batch process inert materials used to fill process equipment between batches for safety purposes will be purged from the system. During that time condenser control efficiencies will be slightly reduced. Consequently, BACT is proposed as the use of two condensers in series with a control efficiency during 25% of the batch process (approximately 4.25 hours) of 95% and a control efficiency during 75% of the batch process (approximately 12.75 hours) of 98%. These proposed efficiencies will result in an average hourly VOC emission rate for the batch of 0.42 lb/hr and an annual emission rate of 6.0 tpy.

4.6 BACT for Emergency Generators

In the event of the loss of electrical power, it is proposed that the facility be equipped with three emergency diesel generators. The engines will be certified by the manufacturer to the standards in 40 CFR 60, Subpart IIII. The emissions from the three proposed emergency generators will be below 5 tpy, therefore they will qualify as insignificant emission units.

4.6.1 BACT Analysis for VOC, CO, and GHG Emissions from the Emergency Generators

Step 1: Identify All Control Technologies

Potential VOC, CO, and GHG control technologies for the emergency generators include:

- Good Engine Design
- GCP

Good Engine Design

The diesel-fired emergency engines will be certified to meet the required US EPA emission standards based on their model year and size. In order to achieve this certification, the engine is optimized to perform at its best design capacity.

Good Combustion Practices

Good combustion practices are used to reduce emissions of VOC, CO, and GHG by optimizing conditions in the combustion zone of a fuel burning source. Good combustion practices typically entail introducing the proper ratio of combustion air to the fuel, maintaining a minimum temperature in the firebox of the combustor, or a minimum residence time of fuel and air in the combustion zone.

Step 2: Eliminate Technically Infeasible Options

The control technologies are technically feasible.

Step 3: Rank Remaining Control Technologies by Effectiveness

1. Good engine design.
2. Good combustion practices.

Step 4: Evaluate Most Effective Controls and Document Results

The current BACT guidelines for diesel-fired emergency generators and generally accepted emissions limits meet the NSPS requirements for Stationary Compression Ignition Internal Combustion Engines (40 CFR 60 Subpart IIII). Therefore, the use of a certified engine with good combustion practices can be considered BACT for emissions from diesel-fired emergency generators and fire pumps.

Step 5: Select BACT

BACT for the emergency generators is proposed as good engine design (NSPS Subpart IIII) and GCP with no add-on controls. Emissions from the engines will be minimal because of limited operating hours. As a result, the addition of control devices cannot be cost effective. The engines will meet BACT through EPA emission standards for NO_x+NMHC and CO and compliance with NSPS Subpart IIII as follows:

NO _x +NMHC	6.4 g/kW-hr
CO	3.5 g/kW-hr

GHG emissions are based on calculated using emission factors from 40 CFR Part 98, Subpart C, Tables C-1 and C-2.

4.7 Summary of Proposed BACT

Table 4.9 summarizes the emission limits and control technologies proposed as BACT for VOC, CO, and GHG.

Table 4-9
Summary of Proposed BACT

Emission Unit	Pollutant	Proposed Emission Limit	Proposed Control Technology
Boilers	VOC	0.004 lb/MMBtu	Catalytic oxidation
	CO	0.035 lb/MMBtu on NG 0.040 lb/MMBtu on FO	Use of clean fuel and GCP
	GHG	675,343 TPY as CO ₂ e	Use of NG and fuel efficiency
Fuel Oil Storage Tanks	VOC	0.2 TPY ¹	White/Light color, submerged fill, and good maintenance
Process Tanks	VOC	0.18 TPY ²	Submerged fill
Process Vent	VOC	0.42 lb/hr ³ 6.0 TPY	Condensation
Emergency Generators	VOC	NO _x +NMHC of 6.4 g/kW-hr ⁴	Good engine design and GCP
	CO	3.5 g/kW-hr ⁴	Good engine design and GCP
	GHG	644 TPY as CO ₂ e per generator	Good engine design and GCP

Notes:

1. Total of both tanks.
2. Total of all four tanks.
3. Average emission rate for the batch.
4. NSPS rate for emergency generators (Tier 2).

5.0 SOURCE IMPACT ANALYSIS

A source impact analysis was conducted to assess the ambient impacts from the proposed Expansion Project emissions. This analysis included all of the Expansion Project emission sources, including those that will not be permitted until Phase II and III.

The source impact analysis requires a demonstration that the project will not cause or contribute to a violation of a NAAQS or any applicable maximum allowable increase over the baseline concentration (increment). Source impact analysis requirements address the potential requirement for preconstruction ambient air quality monitoring. The source impact analysis quantifies only the impacts of the pollutants that are emitted in amounts in excess of PSD significant emission levels. The Expansion Project will result in increases in emissions of VOC and GHG's, and possibly CO that are in excess of PSD significant emission rates. There are no NAAQS or increments for GHGs, therefore GHG's do not require evaluation.

As mentioned above, there are six Class I areas located within 300 km of HSAAP. Class I areas are pristine areas (e.g., National Parks and Wilderness Areas) that have been designated by Congress and are afforded a greater degree of air quality protection. All other areas are designated as Class II areas.

The Federal Land Managers (FLMs) have been contacted (See Appendix D) and, based upon project emissions and the distance from HSAAP to the nearest Class I area, OSI has determined that a more detailed analysis is not required.

The Expansion Project's ozone precursor emissions were evaluated using the U. S. EPA's draft Modeled Emission Rates for Precursors ("MERPs") guidance and TDEC's April 10, 2018, MERPs Guidance. The Expansion Project's proposed VOC emissions increase of 115.5 tons per year is well below the lowest 8-hr ozone MERP value of 1339 tons per year (see Table 2 of the TDEC MERPs guidance). Since NO_x emissions will actually decrease, there is no need to consider NO_x emissions in the evaluation. Based upon this assessment, ozone formation due to the Expansion Project are assumed to be negligible.

The results of the CO significant impact modeling analysis indicate that the Expansion Project will result in insignificant ambient air quality impacts. Therefore, a more refined NAAQS analysis is not required.

A more detailed description of the modeling procedures and results used in the source impact analysis is provided in Appendix C.

6.0 ADDITIONAL IMPACT ANALYSIS

PSD regulations require an additional impacts analysis of each pollutant emitted by a source, including the analysis of the effects on air quality, local soils, vegetation, and visibility. The depth of the analysis performed generally depends on existing air quality, the quantity of air emissions, and the sensitivity of local soils and vegetation.

6.1 Air Quality Impacts

Hawkins County is currently in attainment with all the National Ambient Air Quality Standards or is unclassified. As described in Section 2.0, emissions of SO₂, NO_x, and PM will be reduced as a result of the Expansion Project, while CO and VOC emissions will increase. Based on the results of modeling discussed in Section 5.0, Source Impact Analysis, this project will not result in ambient air quality impacts above PSD significance levels.

6.2 Growth Impacts

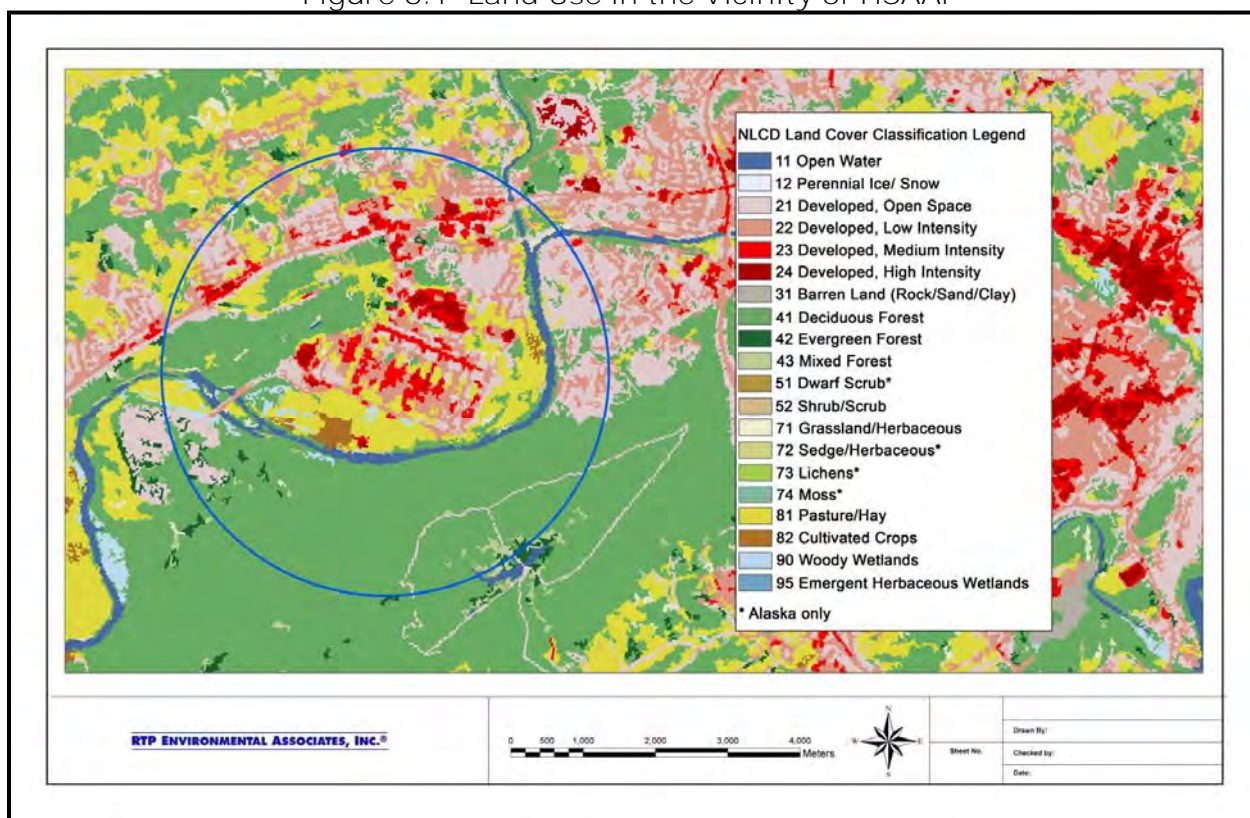
Air quality impacts projected for the area as a result of general commercial, residential, industrial, and other growth associated with this project are expected to be insignificant. HSAAP anticipates the addition of about 250 new permanent jobs as the result of the Expansion Project. Assuming an U.S. average household size of 2.64 persons per household, the estimated total increase in population would be about 660 persons. This would be a minor increase (less than 0.5 percent) compared to the 2016 population of Hawkins and Sullivan Counties (more than 213,000).

6.3 Soils Impacts

Because most air pollutants are ultimately deposited primarily on the land, the potential impact of these pollutants on terrestrial ecosystems is important. Pollutant emissions can impact the soil, ground and surface waters, and plant growth. In some cases, these pollutants can accumulate in the soil system or become concentrated in plants and animals. In other instances, these pollutants may cause leaching of soil nutrients (e.g., acid deposition) or contribute to nutritional imbalances in plant communities (e.g., excessive nitrogen deposition).

The HSAAP facility is located in extreme northeastern Hawkins County, Tennessee, near its borders with Sullivan and Hancock Counties, Tennessee. Land use in the immediate vicinity of the plant varies widely, being primarily commercial and residential to the north and west of the plant, residential to the east, and forested to the south. (See Figure 6.1) The main production area of the HSAAP facility slopes gently downward from the north toward the Holston River. The highest points on the production area are about 1,230 feet above mean sea level and the lowest points near the river are about 1,170 feet above mean sea level.

Figure 6.1 Land Use in the Vicinity of HSAAP



Soils in the immediate vicinity of the plant site are predominately well to excessively drained Holston and Dandridge loams composed of silts and shaly and cherty clays. Soils along the Holston River floodplain are predominately well drained Staser silty loams. There are some steep slopes to the south (up to 60%), but generally slopes in the area are 12-25%, except for the land along the Holston River, which is generally flat floodplain.

It is not anticipated that soils in the area would be adversely impacted by the additional VOC and CO emissions resulting from the Expansion Project and may actually benefit from the reduction in the emissions of NO_x and SO_2 .

6.4 Vegetation Impacts

The potentially impacted vegetation is mostly residential and forest vegetation. There is very little agricultural vegetation in the vicinity of the HSAAP facility. The increases in CO and VOC emissions are not anticipated to cause adverse impacts to vegetation in the vicinity of the plant. CO does not adversely impact plants since it is rapidly oxidized in the atmosphere to form CO_2 which is used by plants in the photosynthesis process. Plants are a significant source of biogenic VOC's in the atmosphere, consequently, the increase in VOC emissions due to the Expansion Project will not significantly increase ambient VOC concentrations. Furthermore, chronic pollution effects, either direct effects or effects from secondary pollutants such as ozone, are not anticipated. Ozone levels in the vicinity of the HSAAP facility are likely NO_x -limited rather than VOC-limited due to the abundance of biogenic VOC's from vegetation, so the increase in VOC emissions should not result in an increase in ozone levels. Rather, the reduction in NO_x emissions should contribute to a decrease in ozone levels.

6.5 Visibility Impacts

Visibility is impacted by both suspended particles and aerosols. Most of the particles and aerosols that impact visibility have an aerodynamic diameter of 2.5 microns or less (i.e. $PM_{2.5}$). In addition to emissions of $PM_{2.5}$ (like those from coal-fired boilers), SO_2 and NO_x emissions contribute to the formation of particles and aerosols in the atmosphere. Therefore, the reduction in PM, SO_2 , and NO_x emissions resulting from the Expansion project should contribute to an improvement in visibility in the region surrounding the HSAAP facility.

While the overall reduction in PM, SO_2 , and NO_x emissions will contribute to an improvement in visibility in the region, an increase in open burning will have short-term impacts on visibility in the immediate vicinity of HSAAP.

Appendix A
Construction Permit Application Forms



TITLE V PERMIT APPLICATION INDEX OF AIR POLLUTION PERMIT APPLICATION FORMS

Section 1: Identification and Diagrams		
This application contains the following forms:	APC Form 1, Facility Identification	
	APC Form 2, Operations and Flow Diagrams	

Section 2: Emission Source Description Forms		
		Total number of this form
This application contains the following forms (one form for each incinerator, printing operation, fuel burning installation, etc.):	APC Form 3, Stack Identification	9
	APC Form 4, Fuel Burning Non-Process Equipment	4
	APC Form 5, Stationary Gas Turbines or Internal Combustion Engines	0
	APC Form 6, Storage Tanks	4
	APC Form 7, Incinerators	0
	APC Form 8, Printing Operations	0
	APC Form 9, Painting and Coating Operations	0
	APC Form 10, Miscellaneous Processes	2
	APC Form 33, Stage I and Stage II Vapor Recovery Equipment	0
	APC Form 34, Open Burning	0

Section 3: Air Pollution Control System Forms		
		Total number of this form
This application contains the following forms (one form for each control system in use at the facility):	APC Form 11, Control Equipment - Miscellaneous	4
	APC Form 13, Adsorbers	0
	APC Form 14, Catalytic or Thermal Oxidation Equipment	1
	APC Form 15, Cyclones/Settling Chambers	0
	APC Form 17, Wet Collection Systems	2
	APC Form 18, Baghouse/Fabric Filters	0

(OVER)

Section 4: Compliance Demonstration Forms

		Total number of this form
This application contains the following forms (one form for each incinerator, printing operation, fuel burning installation, etc.):	APC Form 19, Compliance Certification - Monitoring and Reporting - Description of Methods for Determining Compliance	3
	APC Form 20, Continuous Emissions Monitoring	1
	APC Form 21, Portable Monitors	0
	APC Form 22, Control System Parameters or Operating Parameters of a Process	2
	APC Form 23, Monitoring Maintenance Procedures	2
	APC Form 24, Stack Testing	1
	APC Form 25, Fuel Sampling and Analysis	1
	APC Form 26, Record Keeping	3
	APC Form 27, Other Methods	3
	APC Form 28, Emissions from Process Emissions Sources / Fuel Burning Installations / Incinerators	3
	APC Form 29, Emissions Summary for the Facility or for the Source Contained in This Application	1
	APC Form 30, Current Emissions Requirements and Status	4
	APC Form 31, Compliance Plan and Compliance Certification	1
	APC Form 32, Air Monitoring Network	0

Section 5: Statement of Completeness and Certification of Compliance

I have reviewed this application in its entirety and to the best of my knowledge, and based on information and belief formed after reasonable inquiry, the statements and information contained in this application are true, accurate, and complete. I have provided all the information that is necessary for compliance purposes and this application consists of 74 pages and they are numbered from page A-1 to A-74. The status of this facility's compliance with all applicable air pollution control requirements, including the enhanced monitoring and compliance certification requirements of the Federal Clean Air Act, is reported in this application along with the methods to be used for compliance demonstration.

Name and Title of Responsible Official

Telephone Number with Area Code

Robert E. Winstead, Environmental Health Safety and Security
BAE Systems Ordnance Systems Inc.
Operating contractor for Holston Army Ammunition Plant (HSAAP)

(423) 578-6253

Signature of Responsible Official

Date of Application

May 31, 2018

(For definition of responsible official, see instructions for APC Form 1)



TITLE V PERMIT APPLICATION FACILITY IDENTIFICATION

SITE INFORMATION				
1. Organization's legal name BAE SYSTEMS Ordnance Systems Inc. Holston Army Ammunition Plant			For APC Use Only	APC company point no.
2. Site name (if different from legal name) Area B - Holston Army Ammunition Plant (HSAAP)				APC Log/Permit no.
3. Site address (St./Rd./Hwy.) 4509 West Stone Drive			NAICS or SIC Code 28	
City or distance to nearest town Kingsport, TN		Zip code 37660	County name Hawkins;	
4. Site location (in Lat./Long)	Latitude 17 S 353087.42 m E		Longitude 4044597.14 m N	
CONTACT INFORMATION (RESPONSIBLE OFFICIAL)				
5. Responsible official contact Robert E. Winstead, Director, Environmental Health Safety and Security (EHSS)			Phone number with area code (423) 578-6253	
6. Mailing address (St./Rd./Hwy.) 4509 West Stone Drive			Fax number with area code	
City Kingsport	State TN	Zip code 37660	Email address bob.winstead@baesystems.com	
CONTACT INFORMATION (TECHNICAL)				
7. Principal technical contact James Ogle, Environmental Affairs Specialist			Phone number with area code 423-578-6231	
8. Mailing address (St./Rd./Hwy.) 4509 West Stone Drive			Fax number with area code	
City Kingsport	State TN	Zip code 37660	Email address james.ogle@baesystems.com	
CONTACT INFORMATION (BILLING)				
11. Billing contact Jerry Andrieszyn, Financial Analyst			Phone number with area code 423-578-6101 or 423-578-6161	
12. Mailing address (St./Rd./Hwy.) 4509 West Stone Drive			Fax number with area code	
City Kingsport	State TN	Zip code 37660	Email address jerry.andrieszyn@baesystems.com	
TYPE OF PERMIT REQUESTED				
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> 13. Permit requested for: <div style="display: flex; justify-content: space-between; margin-top: 10px;"> <div style="width: 45%;"> Initial application to operate : <input style="width: 60px; height: 20px; border: 1px solid black;" type="text"/> </div> <div style="width: 45%;"> Minor permit modification : <input style="width: 60px; height: 20px; border: 1px solid black;" type="text"/> </div> </div> <div style="display: flex; justify-content: space-between; margin-top: 10px;"> <div style="width: 45%;"> Permit renewal to operate : <input style="width: 60px; height: 20px; border: 1px solid black;" type="text"/> </div> <div style="width: 45%;"> Significant modification : <input style="width: 60px; height: 20px; border: 1px solid black;" type="text"/> </div> </div> <div style="display: flex; justify-content: space-between; margin-top: 10px;"> <div style="width: 45%;"> Administrative permit amendment : <input style="width: 60px; height: 20px; border: 1px solid black;" type="text"/> </div> <div style="width: 45%;"> Construction permit : <input checked="" style="width: 60px; height: 20px; border: 1px solid black;" type="checkbox"/> </div> </div> </div> </div>				

(OVER)

HAZARDOUS AIR POLLUTANTS, DESIGNATIONS, AND OTHER PERMITS ASSOCIATED WITH FACILITY

14. Is this facility subject to the provisions governing prevention of accidental releases of hazardous air contaminants contained in Chapter 1200-03-32 of the Tennessee Air Pollution Control regulations?



Yes

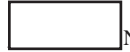


No

If the answer is Yes, are you in compliance with the provisions of Chapter 1200-03-32 of the Tennessee Air Pollution Control regulations?



Yes



No

15. If facility is located in an area designated as "Non-Attainment" or "Additional Control", indicate the pollutant(s) for the designation.

Particulate (PM 2.5 Attainment but Area A (Sullivan County) has an expired Kingsport Additional Control Area for TSP) Ozone (Attainment) and Sulfur Dioxide (Non-attainment for Sullivan County (82) and unclassified for Hawkins County (37))

16. List all valid Air Pollution permits issued to the sources contained in this application [identify all permits with most recent permit numbers and emission source reference numbers listed on the permit(s)].

Permit #	Reference #s	Facility
558406	37-0028	Area B - Title V Permits

17. Page number :

Revision number:

Date of revision:



TITLE V PERMIT APPLICATION OPERATIONS AND FLOW DIAGRAMS

1. Please list, identify, and describe briefly process emission sources, fuel burning installations, and incinerators that are contained in this application. Please attach a flow diagram for this application.

New Steam Facility

New Recrystallization Facility

New Mill

Existing sources - Increased Utilization (37-0028-10, -17, -53, and -78)

New and existing Insignificant Emissions Units (IEUs)

The current existing Title V permit for the Area B facility is 558406.

Individual Process diagrams are included for each new facility.

The existing sources with increased utilization are included with the prevention of significant deterioration (PSD) applicability document emissions table. There are no modifications for these sources so applications are not appropriate.

2. List all insignificant activities which are exempted because of size or production rate and cite the applicable regulations.

IEUs for each new source are listed in the source specific APC 2 form. The IEU is in addition to the IEU list submitted as part of the December 2013 Title V renewal application.

3. Are there any storage piles?

YES _____ NO ☒

4. List the states that are within 50 miles of your facility.

Virginia, Kentucky, North Carolina

5. Page number:

Revision Number:

Date of Revision:



TITLE V PERMIT APPLICATION COMPLIANCE PLAN AND COMPLIANCE CERTIFICATION

GENERAL IDENTIFICATION AND DESCRIPTION

1. Facility name:
BAE SYSTEMS Ordnance Systems Inc. Holston Army Ammunition Plant
2. List all the process emission source(s) or fuel burning installation(s) or incinerator(s) that are part of this application.
- | | |
|--|---|
| New Steam Facility
New Recrystallization Facility [REDACTED]
New [REDACTED] Mill ([REDACTED]) | Existing sources - Increased Utilization (37-0028-10, -17, -53, and -78)
New and existing Insignificant Emissions Units (IEUs) |
|--|---|

COMPLIANCE PLAN AND CERTIFICATION

3. Indicate that source(s) which are contained in this application are presently in compliance with all applicable requirements, by checking the following:
- ☒ A. Attached is a statement of identification of the source(s) currently in compliance. We will continue to operate and maintain the source(s) to assure compliance with all the applicable requirements for the duration of the permit.
- ☒ B. APC 30 form(s) includes new requirements that apply or will apply to the source(s) during the term of the permit. We will meet such requirements on a timely basis.
4. Indicate that there are source(s) that are contained in this application which are not presently in full compliance, by checking both of the following:
- ☐ A. Attached is a statement of identification of the source(s) not in compliance, non-complying requirement(s), brief description of the problem, and the proposed solution.
- ☐ B. We will achieve compliance according to the following schedule:

Action	Deadline

Progress reports will be submitted:

Start date: _____ and every 180 days thereafter until compliance is achieved.

5. State the compliance status with any applicable compliance assurance monitoring and compliance certification requirements that have been promulgated under section 114(a)(3) of the Clean Air Act as of the date of submittal of this APC 31.
- Except for any deviations recently reported in previously submitted or forthcoming semiannual reports, annual compliance certifications, and schedule of corrective actions, the sources covered in this application are currently in compliance with all applicable requirements, including parametric monitoring, required recordkeeping, semiannual reporting, and compliance certification requirements. HSAAP is currently under a Schedule of Corrective Action for Sources 37-0028-02 and -04. Additionally, any other applicable requirements that become effective during the permit term will be met in a timely manner.

6. Page number: _____ Revision number: _____ Date of revision: _____



TITLE V PERMIT APPLICATION APPLICATION COMPLETENESS CHECK LIST

Note to Applicants: The Application Completeness Check List is required by Division Rule 1200-03-09-.02(11)(d)1(ii)(I) and is used by Division staff to determine whether or not an application is complete. This checklist will be used to resolve any dispute between the applicant and the Division regarding the completeness of an application.

Section 1: Identification and Diagrams (APC 1 and APC 2)		
Requirement	Complete	Incomplete
Site Information	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Contact Information (Responsible Official)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Contact Information (Technical)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Contact Information (Billing)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Type of Permit Requested	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Accidental Release Information	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Nonattainment/Additional Control Area Designation	<input checked="" type="checkbox"/>	<input type="checkbox"/>
List of Valid Permits	<input checked="" type="checkbox"/>	<input type="checkbox"/>
List and description of process emission sources, fuel burning installations, and incinerators	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Flow diagram attached?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
List of Insignificant Activities	<input checked="" type="checkbox"/>	<input type="checkbox"/>
List of Storage Piles	<input checked="" type="checkbox"/>	<input type="checkbox"/>
List of States within 50 Miles	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Section 2: Emission Source Description Forms		
Forms are complete as received:		<input checked="" type="checkbox"/>
Forms are incomplete (one or more application forms not submitted)		<input type="checkbox"/>
Forms are incomplete (missing information on the following application forms):	APC Form 3, Stack Identification	<input checked="" type="checkbox"/>
	APC Form 4, Fuel Burning Non-Process Equipment	<input checked="" type="checkbox"/>
	APC Form 5, Stationary Gas Turbines or Internal Combustion Engines	<input type="checkbox"/>
	APC Form 6, Storage Tanks	<input checked="" type="checkbox"/>
	APC Form 7, Incinerators	<input type="checkbox"/>
	APC Form 8, Printing Operations	<input type="checkbox"/>
	APC Form 9, Painting and Coating Operations	<input type="checkbox"/>
	APC Form 10, Miscellaneous Processes	<input type="checkbox"/>
	APC Form 33, Stage I and Stage II Vapor Recovery Equipment	<input type="checkbox"/>
	APC Form 34, Open Burning	<input type="checkbox"/>

Section 3: Air Pollution Control System Forms			
Forms are complete as received:		<input checked="" type="checkbox"/>	
Forms are incomplete (one or more application forms not submitted)		<input type="checkbox"/>	
Forms are incomplete (missing information on the following application forms):	APC Form 11, Control Equipment - Miscellaneous	<input checked="" type="checkbox"/>	
	APC Form 13, Adsorbers	<input type="checkbox"/>	
	APC Form 14, Catalytic or Thermal Oxidation Equipment	<input checked="" type="checkbox"/>	
	APC Form 15, Cyclones/Settling Chambers	<input type="checkbox"/>	
	APC Form 17, Wet Collection Systems	<input checked="" type="checkbox"/>	
	APC Form 18, Baghouse/Fabric Filters	<input type="checkbox"/>	
Section 4: Compliance Demonstration Forms			
Forms are complete as received:		<input checked="" type="checkbox"/>	
Forms are incomplete (one or more application forms not submitted)		<input type="checkbox"/>	
Forms are incomplete (missing information on the following application forms):	APC Form 19, Compliance Certification - Monitoring and Reporting - Description of Methods for Determining Compliance	<input checked="" type="checkbox"/>	
	APC Form 20, Continuous Emissions Monitoring	<input checked="" type="checkbox"/>	
	APC Form 21, Portable Monitors	<input type="checkbox"/>	
	APC Form 22, Control System Parameters or Operating Parameters of a Process	<input checked="" type="checkbox"/>	
	APC Form 23, Monitoring Maintenance Procedures	<input checked="" type="checkbox"/>	
	APC Form 24, Stack Testing	<input checked="" type="checkbox"/>	
	APC Form 25, Fuel Sampling and Analysis	<input checked="" type="checkbox"/>	
	APC Form 26, Recordkeeping	<input checked="" type="checkbox"/>	
	APC Form 27, Other Methods	<input checked="" type="checkbox"/>	
	APC Form 28, Emissions from Process Emissions Sources / Fuel Burning Installations / Incinerators	<input checked="" type="checkbox"/>	
	APC Form 29, Emissions Summary for the Facility or for the Source Contained in This Application	<input checked="" type="checkbox"/>	
	APC Form 30, Current Emissions Requirements and Status	<input checked="" type="checkbox"/>	
	APC Form 32, Air Monitoring Network	<input type="checkbox"/>	
Section 5: Statement of Completeness and Certification of Compliance			
Requirement	Complete	Incomplete	Not Applicable
Certification of Truth, Accuracy, and Completeness (Form APC 1, Section 5)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
General Identification and Description (Form APC 31, Items 1 and 2)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Compliance Certification for Sources Currently in Compliance (Form APC 31, Item 3A)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Compliance Certification for New Applicable Requirements (Form APC 31, Item 3B)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Identification of Sources Currently Not in Compliance (Form APC 31, Item 4A)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Compliance Schedule for Sources Currently Not in Compliance (Form APC 31, Item 4B)	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Compliance Certification for Enhanced Monitoring (Form APC 31, Item 5)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Section 6: Miscellaneous Information		
Item	Included	Not Included
For Title V modifications, is a description of the modification included?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Request for Permit Shield	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Calculations on which emissions-related information are based	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Identification of alternative operating scenarios, as applicable	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Explanation of any proposed exemptions from otherwise applicable requirements	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Other information needed for completeness (explain in comments)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Section 7: Comments	
<p>Describe any missing information below or in a separate attachment:</p> <p>Included with this application is the Prevention of Significant Deterioration (PSD) Applicability, the Best Available Control Technology (BACT) determination, the modeling results summary document, and all supporting information to ensure the permit application is complete. Proposed draft language can be provided to assist in the review and evaluation of applicable regulations for these projects.</p> <p>The fees associated for these sources along with the entire facility should be based on actuals for the calendar year timeframe.</p>	

Section 8: Application Completeness	
Application is Complete	<input checked="" type="checkbox"/>
Application is Incomplete	<input type="checkbox"/>



TITLE V PERMIT APPLICATION EMISSION SUMMARY FOR THE FACILITY OR FOR THE SOURCES CONTAINED IN THIS APPLICATION

GENERAL IDENTIFICATION AND DESCRIPTION

1. Facility name: BAE SYSTEMS Ordnance Systems Inc. Holston Army Ammunition Plant

EMISSIONS SUMMARY TABLE – CRITERIA AND SELECTED POLLUTANTS

2. Complete the following emissions summary for regulated air pollutants at this facility or for the sources contained in this application.

Air Pollutant	Summary of Maximum Allowable Emissions		Summary of Actual Emissions	
	Tons per Year	Reserved for State use (Pounds per Hour- Item 4, APC 28)	Tons per Year	Reserved for State use (Pounds per Hour- Item 4, APC 28)
Particulate Matter (TSP)	22.21			
Sulfur Dioxide	6.42			
Volatile Organic Compounds	30			
Carbon Monoxide	106.4			
Lead				
Nitrogen Oxides	237.6			
Total Reduced Sulfur				
Mercury				
Asbestos				
Beryllium				
Vinyl Chlorides				
Fluorides				
Gaseous Fluorides				
Greenhouse Gases in CO ₂ Equivalents	680,070.9			

(Continued on next page)

3. Complete the following emissions summary for regulated air pollutants that are hazardous air pollutant(s) at this facility or for the sources contained in this application.

4. Page number: _____ Revision number: _____ Date of revision: _____



TITLE V PERMIT APPLICATION OPERATIONS AND FLOW DIAGRAMS

1. Please list, identify, and describe briefly process emission sources, fuel burning installations, and incinerators that are contained in this application. Please attach a flow diagram for this application.

The HSAAP Area B facility is installing four (4) new boilers with dual fuel capability. Fuel oil will be maintained onsite in the event natural gas is not readily available. Each new boiler will be rated at 250,000 pounds per hour (PPH) of steam, with a total heat input capacity of 327 million British thermal units per hour (MMBtu/hr) when firing natural gas, and 310 MMBtu/hr when firing fuel oil. The boilers will be used to provide steam to the new processes, as well as to existing processes. Installation of the new boilers will take place in Phase I and will be executed to allow for decommissioning of the existing coal-fired boilers.

Emissions from the boilers will consist of the products of combustion. HSAAP proposes to install catalytic oxidation, selective catalytic reduction in addition to low NO_x burners, and an electrostatic precipitator to control emissions from the boilers. See the BACT Analysis portion of the application (Section 4) for further information regarding emission controls.

Process Diagram is Attached.

The current existing Title V permit for the Area B facility is 558406

2. List all insignificant activities which are exempted because of size or production rate and cite the applicable regulations.

The insignificant emissions units specific for these sources are as follows:

Three diesel-fired stationary internal combustion engines with associated emergency generators. Each engine will have a rated capacity less than 1,000 kilowatts (1,490 horsepower).

Two new fuel oil storage tanks will be installed to provide fuel oil storage for the dual fuel steam generating boilers.

These IEUs are in addition to the IEU process list found in the Title V Renewal Application December 2013.

3. Are there any storage piles?

YES _____ NO ☒

4. List the states that are within 50 miles of your facility.

Virginia, Kentucky, North Carolina

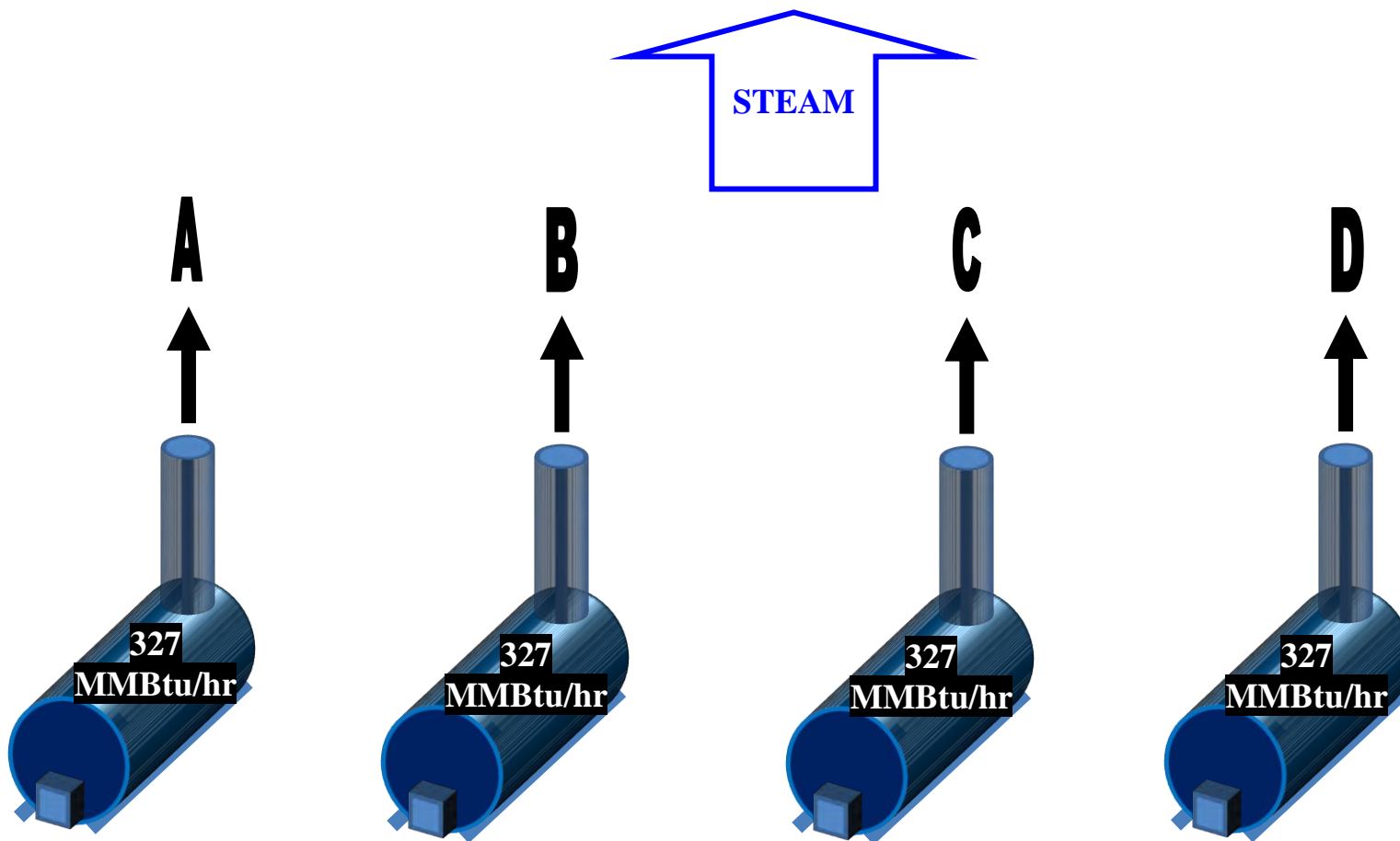
5. Page number:

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Date of Revision:

Expansion Project HSAAP Natural Gas Steam Generating Units

Total
Capacity
of 1,308
MMBtu/hr





TITLE V PERMIT APPLICATION STACK IDENTIFICATION

GENERAL IDENTIFICATION AND DESCRIPTION	
1. Facility name: BAE Systems Ordnance Systems Inc. (OSI) Holston Army Ammunition Plant (HSAAP)	
2. Emission source (identify): Rentech 327 MMBtu/hr natural gas boiler 1.	
STACK DESCRIPTION	
3. Stack ID (or flow diagram point identification): Flow Diagram Point A on the Expansion Project HSAAP Natural Gas Steam Generating Units Diagram	
4. Stack height above grade in feet: ~75	
5. Velocity (data at exit conditions): ~ 60 _____ (Actual feet per second)	6. Inside dimensions at outlet in feet: ~5.0
7. Exhaust flowrate at exit conditions (ACFM): ~70,650	8. Flow rate at standard conditions (DSCFM): ~60,000
9. Exhaust temperature: ~300 _____ Degrees Fahrenheit (°F)	10. Moisture content (data at exit conditions): <div style="display: flex; justify-content: space-between;"> ~9 _____ Percent Grains per dry standard cubic foot (gr./dscf.) </div>
11. Exhaust temperature that is equaled or exceeded during ninety (90) percent or more of the operating time (<u>for stacks subject to diffusion equation only</u>): <div style="text-align: center; margin-top: 10px;"> N/A _____ (°F) </div>	
12. If this stack is equipped with continuous pollutant monitoring equipment required for compliance, what pollutant(s) does this equipment monitor (e.g., Opacity, SO ₂ , NO _x , etc.)? NOx and CO optional	
Complete the appropriate APC form(s) 4, 5, 7, 8, 9, or 10 for each source exhausting through this stack.	
BYPASS STACK DESCRIPTION	
13. Do you have a bypass stack? <div style="text-align: center; margin-top: 10px;"> _____ Yes X _____ No </div> <p style="margin-top: 20px;">If yes, describe the conditions which require its use & complete APC form 4 for the bypass stack. Please identify the stack number(s) of flow diagram point number(s) exhausting through this bypass stack.</p>	
14. Page number:	Revision Number:
Date of Revision:	



TITLE V PERMIT APPLICATION STACK IDENTIFICATION

GENERAL IDENTIFICATION AND DESCRIPTION	
1. Facility name: BAE Systems Ordnance Systems Inc. (OSI) Holston Army Ammunition Plant (HSAAP)	
2. Emission source (identify): Rentech 327 MMBtu/hr natural gas boiler 2.	
STACK DESCRIPTION	
3. Stack ID (or flow diagram point identification): Flow Diagram Point B on the Expansion Project HSAAP Natural Gas Steam Generating Units Diagram	
4. Stack height above grade in feet: ~75	
5. Velocity (data at exit conditions): ~ 60 _____ (Actual feet per second)	6. Inside dimensions at outlet in feet: ~5.0
7. Exhaust flowrate at exit conditions (ACFM): ~70,650	8. Flow rate at standard conditions (DSCFM): ~60,000
9. Exhaust temperature: ~300 _____ Degrees Fahrenheit (°F)	10. Moisture content (data at exit conditions): ~9 _____ Percent _____ Grains per dry standard cubic foot (gr./dscf.)
11. Exhaust temperature that is equaled or exceeded during ninety (90) percent or more of the operating time (<u>for stacks subject to diffusion equation only</u>): <div style="text-align: center;">N/A _____ (°F)</div>	
12. If this stack is equipped with continuous pollutant monitoring equipment required for compliance, what pollutant(s) does this equipment monitor (e.g., Opacity, SO ₂ , NO _x , etc.)? NOx and CO optional	
Complete the appropriate APC form(s) 4, 5, 7, 8, 9, or 10 for each source exhausting through this stack.	
BYPASS STACK DESCRIPTION	
13. Do you have a bypass stack? <div style="text-align: center;"> _____ Yes X _____ No </div> <p>If yes, describe the conditions which require its use & complete APC form 4 for the bypass stack. Please identify the stack number(s) of flow diagram point number(s) exhausting through this bypass stack.</p>	
14. Page number: _____ Revision Number: _____ Date of Revision: _____	



TITLE V PERMIT APPLICATION STACK IDENTIFICATION

GENERAL IDENTIFICATION AND DESCRIPTION	
1. Facility name: BAE Systems Ordnance Systems Inc. (OSI) Holston Army Ammunition Plant (HSAAP)	
2. Emission source (identify): Rentech 327 MMBtu/hr natural gas boiler 3.	
STACK DESCRIPTION	
3. Stack ID (or flow diagram point identification): Flow Diagram Point C on the Expansion Project HSAAP Natural Gas Steam Generating Units Diagram	
4. Stack height above grade in feet: ~75	
5. Velocity (data at exit conditions): ~ 60 _____ (Actual feet per second)	6. Inside dimensions at outlet in feet: ~5.0
7. Exhaust flowrate at exit conditions (ACFM): ~70,650	8. Flow rate at standard conditions (DSCFM): ~60,000
9. Exhaust temperature: ~300 _____ Degrees Fahrenheit (°F)	10. Moisture content (data at exit conditions): <div style="display: flex; justify-content: space-between;"> ~9 _____ Percent Grains per dry standard cubic foot (gr./dscf.) </div>
11. Exhaust temperature that is equaled or exceeded during ninety (90) percent or more of the operating time (<u>for stacks subject to diffusion equation only</u>): <div style="text-align: center; margin-top: 10px;"> N/A _____ (°F) </div>	
12. If this stack is equipped with continuous pollutant monitoring equipment required for compliance, what pollutant(s) does this equipment monitor (e.g., Opacity, SO ₂ , NO _x , etc.)? NOx and CO optional	
Complete the appropriate APC form(s) 4, 5, 7, 8, 9, or 10 for each source exhausting through this stack.	
BYPASS STACK DESCRIPTION	
13. Do you have a bypass stack? <div style="text-align: center; margin-top: 10px;"> _____ Yes X _____ No </div> <p style="margin-top: 20px;">If yes, describe the conditions which require its use & complete APC form 4 for the bypass stack. Please identify the stack number(s) of flow diagram point number(s) exhausting through this bypass stack.</p>	
14. Page number:	Revision Number:
Date of Revision:	



TITLE V PERMIT APPLICATION STACK IDENTIFICATION

GENERAL IDENTIFICATION AND DESCRIPTION	
1. Facility name: BAE Systems Ordnance Systems Inc. (OSI) Holston Army Ammunition Plant (HSAAP)	
2. Emission source (identify): Rentech 327 MMBtu/hr natural gas boiler 4.	
STACK DESCRIPTION	
3. Stack ID (or flow diagram point identification): Flow Diagram Point D on the Expansion Project HSAAP Natural Gas Steam Generating Units Diagram	
4. Stack height above grade in feet: ~75	
5. Velocity (data at exit conditions): ~ 60 _____ (Actual feet per second)	6. Inside dimensions at outlet in feet: ~5.0
7. Exhaust flowrate at exit conditions (ACFM): ~70,650	8. Flow rate at standard conditions (DSCFM): ~60,000
9. Exhaust temperature: ~300 _____ Degrees Fahrenheit (°F)	10. Moisture content (data at exit conditions): <div style="display: flex; justify-content: space-between;"> ~9 _____ Percent Grains per dry standard cubic foot (gr./dscf.) </div>
11. Exhaust temperature that is equaled or exceeded during ninety (90) percent or more of the operating time (<u>for stacks subject to diffusion equation only</u>): <div style="text-align: center; margin-top: 10px;"> N/A _____ (°F) </div>	
12. If this stack is equipped with continuous pollutant monitoring equipment required for compliance, what pollutant(s) does this equipment monitor (e.g., Opacity, SO ₂ , NO _x , etc.)? NOx and CO optional	
Complete the appropriate APC form(s) 4, 5, 7, 8, 9, or 10 for each source exhausting through this stack.	
BYPASS STACK DESCRIPTION	
13. Do you have a bypass stack? <div style="text-align: center; margin-top: 10px;"> _____ Yes X _____ No </div> <p style="margin-top: 20px;">If yes, describe the conditions which require its use & complete APC form 4 for the bypass stack. Please identify the stack number(s) of flow diagram point number(s) exhausting through this bypass stack.</p>	
14. Page number:	Revision Number:
Date of Revision:	



TITLE V PERMIT APPLICATION FUEL BURNING NON-PROCESS EQUIPMENT

GENERAL IDENTIFICATION AND DESCRIPTION				
1. Facility name: BAE Systems Ordnance Systems Inc. (OSI) Holston Army Ammunition Plant (HSAAP)				
2. Stack ID or flow diagram point identification (s): Flow Diagram Point A on the Expansion Project HSAAP Natural Gas Steam Generating Units Diagram				
FUEL BURNING EQUIPMENT DESCRIPTION				
3. List all fuel burning equipment that is at this fuel burning installation (please complete an APC 4 form for each piece of fuel burning equipment). New Steam Generating Facility consisting of four Rentech Boilers each with a heat input capacity of 327 MMBtu/hr capable of producing 250,000 lbs/hr of steam. The units are natural gas fired with ULSD fuel oil as a backup fuel. The facility has a combined heat input capacity of 1,308 MMBtu/hr.				
4. Fuel burning equipment identification number: Rentech Boiler 1				
5. Fuel burning equipment description: Area B Rentech Boiler, dual fuel fired Low NOx natural gas and ULSD fuel oil fired boiler rated at 327 MMBtu/hr, Maximum operating pressure 300 psig at 525 degrees superheated steam. The boilers are "D-Type" with separate packaged economizers designed at 375 psig. The unit will be required to comply with 40 CFR Part 60 Subpart Db.				
6. Year of installation or last modification of fuel burning equipment. Installation planned complete in 2020.				
7. Furnace type: Rentech D type watertube design with separate packaged economizers with Zecco dual fuel fired low NOx (approximately 83.7% fuel-to-steam efficiency)		8. Manufacturer model number (if available): TBD		
9. Location of this fuel burning installation in UTM coordinates: UTM Vertical: <u>47 S 353025.85 m E</u> UTM Horizontal: <u>4044847.69 m N</u>				
10. Normal operating schedule: <u>24</u> Hrs./Day <u>7</u> Days/Wk. <u>365</u> Days/Yr.				
FUELS, CONTROLS, AND MONITORING DESCRIPTION				
11. Maximum rated heat input capacity (in million BTU/Hour) 327 Natural Gas - 310 Fuel Oil		12. If wood is used as a fuel, specify the amount of wood used as a fraction of total heat input. N/A		
13. Fuels:	Primary fuel	Backup fuel #1	Backup fuel #2	Backup fuel #3
Fuel name	Natural Gas	ULSD		
Actual yearly consumption	2,701 MCF	0.74 Mgal		
14. If emissions from this fuel burning equipment are controlled for compliance, please specify the type of control: Low NOx Burners, selective catalytic reduction (SCR), wet electrostatic precipitator (WESP), CO catalytic oxidation				
15. If emissions from this fuel burning equipment are monitored for compliance, please specify the type of monitoring: NOx CEMS meeting 40 CFR Part 75; optional CO CEMS				
16. Describe any fugitive emissions associated with this process, such as outdoor storage piles, open conveyors, material handling operations, etc. (please attach a separate sheet if necessary). N/A				
17. Page number:		Revision Number:		Date of Revision:



TITLE V PERMIT APPLICATION FUEL BURNING NON-PROCESS EQUIPMENT

GENERAL IDENTIFICATION AND DESCRIPTION				
1. Facility name: BAE Systems Ordnance Systems Inc. (OSI) Holston Army Ammunition Plant (HSAAP)				
2. Stack ID or flow diagram point identification (s): Flow Diagram Point B on the Expansion Project HSAAP Natural Gas Steam Generating Units Diagram				
FUEL BURNING EQUIPMENT DESCRIPTION				
3. List all fuel burning equipment that is at this fuel burning installation (please complete an APC 4 form for each piece of fuel burning equipment). New Steam Generating Facility consisting of four Rentech Boilers each with a heat input capacity of 327 MMBtu/hr capable of producing 250,000 lbs/hr of steam. The units are natural gas fired with ULSD fuel oil as a backup fuel. The facility has a combined heat input capacity of 1,308 MMBtu/hr.				
4. Fuel burning equipment identification number: Rentech Boiler 2				
5. Fuel burning equipment description: Area B Rentech Boiler, dual fuel fired Low NOx natural gas and ULSD fuel oil fired boiler rated at 327 MMBtu/hr, Maximum operating pressure 300 psig at 525 degrees superheated steam. The boilers are "D-Type" with separate packaged economizers designed at 375 psig. The unit will be required to comply with 40 CFR Part 60 Subpart Db.				
6. Year of installation or last modification of fuel burning equipment. Installation planned complete in 2020.				
7. Furnace type: Rentech D type watertube design with separate packaged economizers with Zecco dual fuel fired low NOx (approximately 83.7% fuel-to-steam efficiency)		8. Manufacturer model number (if available): TBD		
9. Location of this fuel burning installation in UTM coordinates: UTM Vertical: <u>47 S 352995.49 m E</u> UTM Horizontal: <u>4044848.47 m N</u>				
10. Normal operating schedule: <u>24</u> Hrs./Day <u>7</u> Days/Wk. <u>365</u> Days/Yr.				
FUELS, CONTROLS, AND MONITORING DESCRIPTION				
11. Maximum rated heat input capacity (in million BTU/Hour) 327 Natural Gas - 310 Fuel Oil		12. If wood is used as a fuel, specify the amount of wood used as a fraction of total heat input. N/A		
13. Fuels:	Primary fuel	Backup fuel #1	Backup fuel #2	Backup fuel #3
Fuel name	Natural Gas	ULSD		
Actual yearly consumption	2,701 MCF	0.74 Mgal		
14. If emissions from this fuel burning equipment are controlled for compliance, please specify the type of control: Low NOx Burners, selective catalytic reduction (SCR), wet electrostatic precipitator (WESP), CO catalytic oxidation				
15. If emissions from this fuel burning equipment are monitored for compliance, please specify the type of monitoring: NOx CEMS meeting 40 CFR Part 75; optional CO CEMS				
16. Describe any fugitive emissions associated with this process, such as outdoor storage piles, open conveyors, material handling operations, etc. (please attach a separate sheet if necessary). N/A				
17. Page number:		Revision Number:		Date of Revision:



TITLE V PERMIT APPLICATION FUEL BURNING NON-PROCESS EQUIPMENT

GENERAL IDENTIFICATION AND DESCRIPTION				
1. Facility name: BAE Systems Ordnance Systems Inc. (OSI) Holston Army Ammunition Plant (HSAAP)				
2. Stack ID or flow diagram point identification (s): Flow Diagram Point C on the Expansion Project HSAAP Natural Gas Steam Generating Units Diagram				
FUEL BURNING EQUIPMENT DESCRIPTION				
3. List all fuel burning equipment that is at this fuel burning installation (please complete an APC 4 form for each piece of fuel burning equipment). New Steam Generating Facility consisting of four Rentech Boilers each with a heat input capacity of 327 MMBtu/hr capable of producing 250,000 lbs/hr of steam. The units are natural gas fired with ULSD fuel oil as a backup fuel. The facility has a combined heat input capacity of 1,308 MMBtu/hr.				
4. Fuel burning equipment identification number: Rentech Boiler 3				
5. Fuel burning equipment description: Area B Rentech Boiler, dual fuel fired Low NOx natural gas and ULSD fuel oil fired boiler rated at 327 MMBtu/hr, Maximum operating pressure 300 psig at 525 degrees superheated steam. The boilers are "D-Type" with separate packaged economizers designed at 375 psig. The unit will be required to comply with 40 CFR Part 60 Subpart Db.				
6. Year of installation or last modification of fuel burning equipment. Installation planned complete in 2020.				
7. Furnace type: Rentech D type watertube design with separate packaged economizers with Zecco dual fuel fired low NOx (approximately 83.7% fuel-to-steam efficiency)		8. Manufacturer model number (if available): TBD		
9. Location of this fuel burning installation in UTM coordinates: UTM Vertical: <u>47 S 352966.23 m E</u> UTM Horizontal: <u>4044846.34 m N</u>				
10. Normal operating schedule: <u>24</u> Hrs./Day <u>7</u> Days/Wk. <u>365</u> Days/Yr.				
FUELS, CONTROLS, AND MONITORING DESCRIPTION				
11. Maximum rated heat input capacity (in million BTU/Hour) 327 Natural Gas - 310 Fuel Oil		12. If wood is used as a fuel, specify the amount of wood used as a fraction of total heat input. N/A		
13. Fuels:	Primary fuel	Backup fuel #1	Backup fuel #2	Backup fuel #3
Fuel name	Natural Gas	ULSD		
Actual yearly consumption	2,701 MCF	0.74 Mgal		
14. If emissions from this fuel burning equipment are controlled for compliance, please specify the type of control: Low NOx Burners, selective catalytic reduction (SCR), wet electrostatic precipitator (WESP), CO catalytic oxidation				
15. If emissions from this fuel burning equipment are monitored for compliance, please specify the type of monitoring: NOx CEMS meeting 40 CFR Part 75; optional CO CEMS				
16. Describe any fugitive emissions associated with this process, such as outdoor storage piles, open conveyors, material handling operations, etc. (please attach a separate sheet if necessary). N/A				
17. Page number:		Revision Number:		Date of Revision:



TITLE V PERMIT APPLICATION FUEL BURNING NON-PROCESS EQUIPMENT

GENERAL IDENTIFICATION AND DESCRIPTION				
1. Facility name: BAE Systems Ordnance Systems Inc. (OSI) Holston Army Ammunition Plant (HSAAP)				
2. Stack ID or flow diagram point identification (s): Flow Diagram Point D on the Expansion Project HSAAP Natural Gas Steam Generating Units Diagram				
FUEL BURNING EQUIPMENT DESCRIPTION				
3. List all fuel burning equipment that is at this fuel burning installation (please complete an APC 4 form for each piece of fuel burning equipment). New Steam Generating Facility consisting of four Rentech Boilers each with a heat input capacity of 327 MMBtu/hr capable of producing 250,000 lbs/hr of steam. The units are natural gas fired with ULSD fuel oil as a backup fuel. The facility has a combined heat input capacity of 1,308 MMBtu/hr.				
4. Fuel burning equipment identification number: Rentech Boiler 4				
5. Fuel burning equipment description: Area B Rentech Boiler, dual fuel fired Low NOx natural gas and ULSD fuel oil fired boiler rated at 327 MMBtu/hr, Maximum operating pressure 300 psig at 525 degrees superheated steam. The boilers are "D-Type" with separate packaged economizers designed at 375 psig. The unit will be required to comply with 40 CFR Part 60 Subpart Db.				
6. Year of installation or last modification of fuel burning equipment. Installation planned complete in 2020.				
7. Furnace type: Rentech D type watertube design with separate packaged economizers with Zecco dual fuel fired low NOx (approximately 83.7% fuel-to-steam efficiency)		8. Manufacturer model number (if available): TBD		
9. Location of this fuel burning installation in UTM coordinates: UTM Vertical: <u>47 S 352932.92 m E</u> UTM Horizontal: <u>4044846 m N</u>				
10. Normal operating schedule: <u>24</u> Hrs./Day <u>7</u> Days/Wk. <u>365</u> Days/Yr.				
FUELS, CONTROLS, AND MONITORING DESCRIPTION				
11. Maximum rated heat input capacity (in million BTU/Hour) 327 Natural Gas - 310 Fuel Oil		12. If wood is used as a fuel, specify the amount of wood used as a fraction of total heat input. N/A		
13. Fuels:	Primary fuel	Backup fuel #1	Backup fuel #2	Backup fuel #3
Fuel name	Natural Gas	ULSD		
Actual yearly consumption	2,701 MCF	0.74 Mgal		
14. If emissions from this fuel burning equipment are controlled for compliance, please specify the type of control: Low NOx Burners, selective catalytic reduction (SCR), wet electrostatic precipitator (WESP), CO catalytic oxidation				
15. If emissions from this fuel burning equipment are monitored for compliance, please specify the type of monitoring: NOx CEMS meeting 40 CFR Part 75; optional CO CEMS				
16. Describe any fugitive emissions associated with this process, such as outdoor storage piles, open conveyors, material handling operations, etc. (please attach a separate sheet if necessary). N/A				
17. Page number:		Revision Number:		Date of Revision:



TITLE V PERMIT APPLICATION CONTROL EQUIPMENT - MISCELLANEOUS

GENERAL IDENTIFICATION AND DESCRIPTION		
1. Facility name: BAE Systems Ordnance Systems Inc. (OSI) Holston Army Ammunition Plant (HSAAP)	2. Emission source (identify): Expansion Project New Steam Facility Boilers 1-4	
3. Stack ID or flow diagram point identification (s): Points A through D on the Expansion Project Natural Gas Steam Units Diagram		
CONTROL EQUIPMENT DESCRIPTION		
4. Describe the device in use. List the key operating parameters of this device and their normal operating range (e.g., pressure drop, gas flow rate, temperature): <p>NOx - The control for NOx for each of the four boilers includes Low NOx Burners in series with a Selective Catalytic Reduction (SCR) with ammonia control. The efficiency is discussed in the calculations section. The vendor will establish and provide key operating parameters which will likely consist of temperature and ammonia feed rate. However, parameters will not be utilized for compliance since these units will have a NOx SIP call compliant CEMs for NOx.</p> <p>VOC - The control device for VOCs includes good combustion and use of a catalytic oxidation control device. The parameter associated with this unit will likely be temperature but will be established by the manufacturer or vendor. See form APC 14.</p> <p>CO - As stated there is a catalytic oxidation control device for VOC. While operating this unit will also provide CO control even though the BACT rate for this pollutant is established based on good combustion. This is discussed in detail in the BACT and calculation section. The parameters will be established by the manufacturer or vendor and during any applicable testing. See form APC 14.</p> <p>Particulate Matter - PM is controlled by a wet electrostatic precipitator (WESP). Parameter will likely be total power input however this will be established by the manufacturer or vendor and during any applicable testing.</p> <p>The unit is subject to 40 CFR 60 Subpart Db and will meet the applicable requirements.</p>		
5. Manufacturer and model number (if available): Boilers are Rentech boilers. The model number is TBD. Controls are TBD.		
6. Year of installation: Installation planned complete in 2020.		
7. List of pollutant (s) to be controlled by this equipment and the expected control efficiency for each pollutant.		
Pollutant	Efficiency (%)	Source of data
NOx	50	Vendor supplied. All units 40 CFR 60 Subpart Db
VOC	20	Vendor supplied.
CO	50	Vendor supplied.
Particulate Matter	50	Vendor supplied.
8. Discuss how collected material is handled for reuse or disposal. Any wet ESP material collected will be properly disposed of following all solid waste management and resource conservation recovery act applicable regulations.		
9. If this control equipment is in series with some other control equipment, state and specify the overall efficiency. N/A		
10. Page number:	Revision Number:	Date of Revision:

GENERAL IDENTIFICATION AND DESCRIPTION		
1. Facility name: BAE Systems Ordnance Systems Inc. (OSI) Holston Army Ammunition Plant (HSAAP)		2. Emission source (identify): Expansion Project New Steam Facility Boilers 1-4
3. Stack ID or flow diagram point identification (s): Points A through D on the Expansion Project Natural Gas Steam Units Diagram		
OXIDIZER DESCRIPTION		
4. Describe the oxidation system in use. List the key operating parameters of this device and their normal operating range. VOC - The control device for VOCs includes good combustion and use of a catalytic oxidation control device. The parameter associated with this unit will likely be temperature but will be established by the manufacturer or vendor. CO - As stated there is a catalytic oxidation control device for VOC. While operating this unit will also provide CO control even though the BACT rate for this pollutant is established based on good combustion. This is discussed in detail in the BACT and calculation section. The parameters will be established by the manufacturer or vendor and during any applicable testing.		
5. Manufacturer and model number (if available): TBD	6. Year of installation: Installation planned complete in 2020.	7. Type (check one): Catalytic oxidizer <input checked="checked" type="checkbox"/> Thermal oxidizer <input type="checkbox"/>
8. List of pollutant (s) to be controlled and the expected control efficiency for each pollutant.		
Pollutant	Efficiency (%)	Source of data
VOC	20	Estimate based on vendor information. TBD
CO	50	Estimate based on vendor information. TBD
9. If applicable, discuss how spent catalyst is handled for reuse or disposal. All spent catalyst will be properly disposed of or recycled following all solid waste management and resource conservation recovery act applicable regulations.		
10. Equipment specifications:		
Catalytic oxidation	Thermal oxidation	
10A. Minimum operating temperature (°F): TBD	10B. Minimum operating temperature (°F): NA	
11A. Type of fuel used: TBD	11B. Type of fuel used: NA	
12. Type of catalyst used and volume of catalyst used (Ft. ³): TBD	12. Not applicable. NA	
13A. Maximum fuel use: TBD	13B. Maximum fuel use: NA	
14A. Residence time (sec.): TBD	14B. Residence time (sec.): NA	
15. If this control equipment is in series with some other control equipment, state and specify the overall efficiency. NA		
16. Page number:	Revision Number:	Date of Revision:



TITLE V PERMIT APPLICATION
COMPLIANCE CERTIFICATION - MONITORING AND REPORTING
DESCRIPTION OF METHODS USED FOR DETERMINING COMPLIANCE

All sources that are subject to 1200-03-09-.02(11) of the Tennessee Air Pollution Control Regulations are required to certify compliance with all applicable requirements by including a statement within the permit application of the methods used for determining compliance. This statement must include a description of the monitoring, recordkeeping, and reporting requirements and test methods. In addition, the application must include a schedule for compliance certification submittals during the permit term. These submittals must be no less frequent than annually and may need to be more frequent if specified by the underlying applicable requirement or the Technical Secretary.

GENERAL IDENTIFICATION AND DESCRIPTION

1. Facility name: **BAE SYSTEMS Ordnance Systems Inc. (OSI) Holston Army Ammunition Plant (HSAAP)**
2. Process emission source, fuel burning installation, or incinerator (identify): **Expansion Project New Natural Gas Steam Boilers 1-4**
3. Stack ID or flow diagram point identification(s): **Flow Diagram Points A through D on the Expansion Natural Gas Steam Units Diagram**

METHODS OF DETERMINING COMPLIANCE

4. This source as described under Item #2 of this application will use the following method(s) for determining compliance with applicable requirements (and special operating conditions from an existing permit). Check all that apply and attach the appropriate form(s)

☒ Continuous Emission Monitoring (CEM) - APC 20
 Pollutant(s): NOx and CO optional

☐ Emission Monitoring Using Portable Monitors - APC 21
 Pollutant(s): _____

☒ Monitoring Control System Parameters or Operating Parameters of a Process - APC 22
 Pollutant(s): SCR for NOx, WESP for PM, and Catalytic Oxidation for VOC and CO - vendor recommended parameters

☒ Monitoring Maintenance Procedures - APC 23
 Pollutant(s): SCR for NOx, WESP for PM, and Catalytic Oxidation for VOC and CO - vendor recommended procedures

☒ Stack Testing - APC 24
 Pollutant(s): Optional

☒ Fuel Sampling & Analysis (FSA) - APC 25
 Pollutant(s): SO2 (for natural gas)

☒ Recordkeeping - APC 26
 Pollutant(s): PM, SO2, NOX, CO, VOC (natural gas usage)

☒ Other (please describe) - APC 27
 Pollutant(s): Opacity
5. Compliance certification reports will be submitted to the Division according to the following schedule:
 Start date: In accordance with the Title V permit certification requirements/frequency
 And every 365 days thereafter.
6. Compliance monitoring reports will be submitted to the Division according to the following schedule:
 Start date: In accordance with the Title V permit certification requirements/frequency
 And every 180 days thereafter.
7. Page number: _____ Revision number: _____ Date of revision: _____



TITLE V PERMIT APPLICATION COMPLIANCE DEMONSTRATION BY CONTINUOUS EMISSIONS MONITORING

GENERAL IDENTIFICATION AND DESCRIPTION			
1. Facility name: BAE Systems Ordnance Systems Inc. (OSI) Holston Army Ammunition Plant (HSAAP)			
2. Stack ID or flow diagram point identification(s): Points A to D on the Expansion Project Natural Gas Steam Units		3. Process emission source or fuel burning installation or incinerator: Expansion Project New Steam Facility Boilers 1-4	
MONITOR DESCRIPTION			
4. Description of equipment monitoring pollutant: Part 75 compliant NOx CEMs Pollutant being monitored: NOx			
4A. Name of Manufacturer: To be determined (TBD)		4B. Model number: TBD	
4C. Installation year Project scheduled complete 2020	4D. Type: <input type="checkbox"/> In situ <input checked="" type="checkbox"/> Extractive <input type="checkbox"/> Dilution <input checked="" type="checkbox"/> Other (Specify): IF SME Recommends		
4E. Describe how the monitor works: 40 CFR Part 75 compliant and based on vendor recommendations			
5. Description of equipment monitoring diluent: NA Diluent being monitored: NA			
5A. Name of manufacturer: NA		5B. Model number: NA	
5C. Installation year NA	5D. Type: <input type="checkbox"/> In situ <input type="checkbox"/> Extractive <input type="checkbox"/> O ₂ <input type="checkbox"/> CO ₂ <input type="checkbox"/> Other (Specify):		
5E. Describe how the monitor works: NA			
6. Description of equipment monitoring flow: TBD Amount of flow (DSCFM): TBD			
6A. Name of manufacturer: TBD		6B. Model number: TBD	
6C. Installation year TBD	6D. Type: <input type="checkbox"/> Differential pressure <input type="checkbox"/> Thermal <input type="checkbox"/> Other (Specify):		
7. Opacity (or use of visible emission evaluations in lieu of opacity monitoring) <div style="display: flex; justify-content: space-between; align-items: flex-start;"> <div style="width: 60%;"> 7A. Indicate which is used. <input type="checkbox"/> Monitor <input type="checkbox"/> Visible emission evaluations* </div> <div style="width: 35%; font-size: small;"> * For "Visible emission evaluation" choice, procedures will be specified as a condition in the source's operating permit. </div> </div>			
7B. Opacity monitor (state the name of manufacturer, model number, and year of installation): N/A			
8. Page number:		Revision Number: Date of Revision:	



**TITLE V PERMIT APPLICATION - COMPLIANCE DEMONSTRATION BY
 MONITORING CONTROL SYSTEM PARAMETERS OR OPERATING PARAMETERS OF A PROCESS**

The monitoring of a control system parameter or a process parameter shall be acceptable as a compliance demonstration method provided that a correlation between the parameter value and the emission rate of a particular pollutant is established.

GENERAL IDENTIFICATION AND DESCRIPTION

1. Facility name: BAE Systems Ordnance Systems Inc. (OSI) Holston Army Ammunition Plant (HSAAP)	2. Stack ID or flow diagram point identification(s) Points A-D - Expansion Project Natural Gas Steam Unit Diagram
3. Emission source: Expansion Project New Steam Facility Boilers 1-4	

MONITORING DESCRIPTION

4. Pollutant(s) being monitored: Parameters for CO, VOCs, and Particulate Matter (PM)
5. Description of the method of monitoring and establishment of correlation between the parameter value and the emission rate of a particular pollutant: <p>Applicable parameters, in accordance with pollution control manufacturers recommendations and design requirements will be monitored at a frequency established by the manufacturer or site specific plan; the following parameters may be optionally monitored.</p> <p>For CO and VOC a temperature range will be determined for the catalytic oxidation system to ensure the unit is operating at the appropriate range to verify compliance based on manufacturers information . As an alternative the vendor may recommend a more accurate parameter that better correlates to control efficiency. This information should be maintained in the vendor documents or onsite procedures. An annual tune-up of the boiler will also be required under the boiler MACT.</p> <p>For PM the WESP will be monitored, similarly, in accordance with the manufacturers recommendations. Likely this will require monitoring of the total power input for the WESP. The vendor may recommend a more accurate parameter that better correlates to control efficiency and if so can be monitored as an alternative. The chosen parameter will be monitored at a frequency established by the manufacturer or site specific plan.</p>
6. Compliance demonstration frequency (specify the frequency with which compliance will be demonstrated): Frequency to be determined and reported Semi-annually, if applicable.

7. Page number:	Revision number:	Date of revision:
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TITLE V PERMIT APPLICATION

COMPLIANCE DEMONSTRATION BY MONITORING MAINTENANCE PROCEDURES

The monitoring of a maintenance procedure shall be acceptable as a compliance demonstration method provided that a correlation between the procedure and the emission rate of a particular pollutant is established.

GENERAL IDENTIFICATION AND DESCRIPTION

1. Facility name:
 BAE Systems Ordnance Systems Inc. (OSI) Holston Army Ammunition Plant (HSAAP)

2. Stack ID or flow diagram point identification(s):
 Points A through D on the Expansion Project Natural Gas Steam Units Diagram

3. Emission source (identify):
 Expansion Project New Steam Facility Boilers 1-4

MONITORING DESCRIPTION

4. Pollutant(s) being monitored:
 NOx, CO, VOC, and PM

5. Procedure being monitored:
 For each of the three control devices (Selective Catalytic Reduction (SCR), CO and VOC catalytic oxidation, and wet electrostatic precipitator (WESP) the vendor recommended or approved optional maintenance procedures will be followed.

6. Description of the method of monitoring and establishment of correlation between the procedure and the emission rate of a particular pollutant:
 The vendor recommended or approved optional maintenance procedures will be established for each system. The requirements will be tracked in OSI's electronic preventive maintenance tracking system.

 The vendor maintenance procedures or a site specific maintenance plan will detail the required maintenance for these control devices.

7. Compliance demonstration frequency (specify the frequency with which compliance will be demonstrated):
 Frequency to be determined and records maintained on site.

8. Page number: Revision number: Date of revision:



TITLE V PERMIT APPLICATION COMPLIANCE DEMONSTRATION BY STACK TESTING

The performance of an appropriate EPA stack test method for demonstrating compliance with an emission limitation has always been acceptable. EPA test methods contain quality assurance procedures that shall be strictly adhered to by the source.

GENERAL IDENTIFICATION AND DESCRIPTION

1. Facility name:

BAE Systems Ordnance Systems Inc. (OSI)
Holston Army Ammunition Plant (HSAAP)

2. Stack ID or flow diagram point identification(s):

Points A through D on the Expansion Project Natural Gas Steam Units Diagram

3. Emission source (identify):

Expansion Project New Steam Facility Boilers 1-4

STACK TESTING DESCRIPTION

4. Pollutant(s) being monitored:

Stack Testing may be optional for CO, VOC, and PM. Currently there is no requirement for stack testing these units. OSI is providing this form as an optional compliance method in lieu of manufacturer's recommendations if the state determines these methods inadequate.

5. Test method:

To provide a one time correlation between parameters or maintenance procedures, stack testing can optionally be used for CO, VOC, and/or PM depending on the adequacy of the manufacturer's information.

The following stack test methods are recommended however approved alternatives can also be used.

PM - Method 5

CO - Method 10

VOC - TBD if required

6. Compliance demonstration frequency (specify the frequency with which compliance will be demonstrated):

One time testing with the report required within 60 days of testing. This option is only to be executed if the adequacy of the manufacturer's control device information is challenged and the state requests these tests be performed.

7. Page number:

Revision number:

Date of revision:



TITLE V PERMIT APPLICATION COMPLIANCE DEMONSTRATION BY FUEL SAMPLING AND ANALYSIS

GENERAL IDENTIFICATION AND DESCRIPTION		
1. Facility name: BAE Systems Ordnance Systems Inc. (OSI) Holston Army Ammunition Plant (HSAAP)	2. Stack ID or flow diagram point identification(s): Points A through D on the Expansion Project Natural Gas Steam Units Diagram	
3. Emission source (identify): Expansion Project New Steam Facility Boilers 1-4		
MONITORING THROUGH FUEL SAMPLING AND ANALYSIS		
4. Pollutant(s) being monitored: SO ₂		
5. Fuel being sampled: Natural Gas and ultra low sulfur diesel (ULSD) fuel sample sufficient to meet the definitions of each of these fuels under 40 CFR Part 60 Subpart Db and in compliance with fuel record requirements of this NSPS requirement.		
6. List the fuel sample collecting and analyzing method used (if an ASTM method is not applicable, propose a method acceptable to the Technical Secretary). As defined in 40 CFR Part 60 Subpart Db		
7. Compliance demonstration frequency (specify the frequency with which compliance will be demonstrated): As required by 40 CFR Part 60 Subpart Db		
8. Page number:	Revision number:	Date of revision:

State of Tennessee
Department of Environment and Conservation
Division of Air Pollution Control
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 15th Floor
Nashville, TN 37243
Telephone: (615) 532-0554



APC 26

TITLE V PERMIT APPLICATION
COMPLIANCE DEMONSTRATION BY RECORDKEEPING

Recordkeeping shall be acceptable as a compliance demonstration method provided that a correlation between the parameter value recorded and the applicable requirement is established.

GENERAL IDENTIFICATION AND DESCRIPTION

1. Facility name: BAE Systems Ordnance Systems Inc. (OSI) Holston Army Ammunition Plant (HSAAP)	2. Stack ID or flow diagram point identification(s): Points A through D on the Expansion Project Natural Gas Steam Units Diagram
3. Emission source (identify): Expansion Project New Steam Facility Boilers 1-4	

MONITORING AND RECORDKEEPING DESCRIPTION

4. Pollutant(s) or parameter being monitored: Sulfur content monitored as required by 40 CFR Part 60 Subpart Db. Fuel usage records are also required by this NSPS subpart.
5. Material or parameter being monitored and recorded: Natural gas and ultra low sulfur diesel (ULSD) fuel
6. Method of monitoring and recording: In accordance with 40 CFR Part 60 Subpart Db
7. Compliance demonstration frequency (specify the frequency with which compliance will be demonstrated): In accordance with 40 CFR Part 60 Subpart Db

8. Page number:	Revision number:	Date of revision:
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TITLE V PERMIT APPLICATION COMPLIANCE DEMONSTRATION BY OTHER METHOD(S)

GENERAL IDENTIFICATION AND DESCRIPTION		
1. Facility name: BAE SYSTEMS Ordnance Systems Inc. (OSI) Holston Army Ammunition Plant (HSAAP)	2. Stack ID or flow diagram point identification(s): Entire Source	
3. Emission source (identify): Expansion Project New Steam Facility Boilers 1-4		
MONITORING DESCRIPTION		
4. Pollutant(s) or parameter being monitored: Opacity		
5. Description of the method of monitoring: <p>Compliance with the standard shall be determined by the procedures of the Tennessee Division of Air Pollution Control's Opacity Matrix dated June 18, 1996 and amended September 12, 2005.</p> <p>Note that in the latest version of the Division's Opacity Matrix natural gas or No. 2 Oil-fired combustion sources do not require Visible emission evaluations.</p> <p>Standard: Visible emissions from this source shall not exhibit greater than twenty percent (20%) opacity (6-minute average), except for one 6-minute period per hour of not more than 27 percent (27%) opacity. Visible emissions from this source shall be determined by EPA Method 9, as published in the current 40 CFR 60, Appendix A.</p>		
6. Compliance demonstration frequency (specify the frequency with which compliance will be demonstrated): Frequency as required per the Tennessee Division of Air Pollution Control's Opacity Matrix		
7. Page number:	Revision number:	Date of revision:



TITLE V PERMIT APPLICATION

EMISSIONS FROM PROCESS EMISSION SOURCE / FUEL BURNING INSTALLATION / INCINERATOR

GENERAL IDENTIFICATION AND DESCRIPTION				
1. Facility name: BAE Systems Ordnance Systems Inc. (OSI) Holston Army Ammunition Plant (HSAAP)		2. Stack ID or flow diagram point identification(s): Entire Source		
3. Process emission source / Fuel burning installation / Incinerator (identify): New Steam Generating Facility consisting of four Rentech Boilers each with a heat input capacity of 327 MMBtu/hr capable of producing 250,000 lbs/hr of steam. The units are natural gas fired with ULSD fuel oil as a backup fuel. The facility has a combined heat input capacity of 1,308 MMBtu/hr. The calculations below are explained in more detail in the calculations section of this application. Only maximum allowable emissions are listed because this is a new source. Calculations are included in Appendix B of this Application.				
EMISSIONS SUMMARY TABLE – CRITERIA AND FUGITIVE EMISSIONS				
4. Complete the following <u>emissions summary for regulated air pollutants</u> . Fugitive emissions shall be included. Attach calculations and emission factor references.				
Air Pollutant	Maximum Allowable Emissions		Actual Emissions	
	Tons per Year	Reserved for State use (Pounds per Hour - Item 7, APC 30)	Tons per Year	Reserved for State use (Pounds per Hour - Item 8, APC 30)
Particulate Matter (TSP)	15.9			
(Fugitive Emissions)				
Sulfur Dioxide	6.4			
(Fugitive Emissions)				
Volatile Organic Compounds	22.9			
(Fugitive Emissions)				
Carbon Monoxide	100.6			
(Fugitive Emissions)				
Lead				
(Fugitive Emissions)				
Nitrogen Oxides	226.4			
(Fugitive Emissions)				
Total Reduced Sulfur				
(Fugitive Emissions)				
Mercury				
(Fugitive Emissions)				

(Continued on next page)

(Continued from last page)

AIR POLLUTANT	Maximum Allowable Emissions		Actual Emissions	
	Tons per Year	Reserved for State use (Pounds per Hour - Item 7, APC 30)	Tons per Year	Reserved for State use (Pounds per Hour - Item 8, APC 30)
Asbestos				
(Fugitive Emissions)				
Beryllium				
(Fugitive Emissions)				
Vinyl Chloride				
(Fugitive Emissions)				
Fluorides				
(Fugitive Emissions)				
Gaseous Fluorides				
(Fugitive Emissions)				
Greenhouse Gases in CO ₂ Equivalents	678,139			

EMISSIONS SUMMARY TABLE – FUGITIVE HAZARDOUS AIR POLLUTANTS

5. Complete the following emissions summary for regulated air pollutants that are hazardous air pollutant(s). Fugitive emissions shall be included. Attach calculations and emission factor references.

Air Pollutant & CAS	Maximum Allowable Emissions		Actual Emissions	
	Tons per Year	Reserved for State use (Pounds per Hour - Item 7, APC 30)	Tons per Year	Reserved for State use (Pounds per Hour - Item 8, APC 30)

6. Page number: Revision number: Date of revision



TITLE V PERMIT APPLICATION CURRENT EMISSIONS REQUIREMENTS AND STATUS

GENERAL IDENTIFICATION AND DESCRIPTION

1. Facility name: BAE SYSTEMS Ordnance Systems Inc. (OSI) Holston Army Ammunition Plant (HSAAP)	2. Emission source number Expansion Project New Steam Facility Boilers
3. Describe the process emission source / fuel burning installation / incinerator. 4 Rentech Boilers each with a heat input capacity of 327 MMBtu/hr capable of producing 250,000 lbs/hr of steam. The units are natural gas fired with ULSD fuel oil as a backup fuel.	

EMISSIONS AND REQUIREMENTS

4. Identify if only a part of the source is subject to this requirement	5. Pollutant	6. Applicable requirement(s): TN Air Pollution Control Regulations, 40 CFR, permit restrictions, air quality based standards	7. Limitation	8. Maximum actual emissions	9. Compliance status (In/Out)
Entire Source	Heat Input capacity	Rule 1200-03-06-.01(7) and this application	Monthly log of fuel usage and hours of operation maintained to determine the maximum heat input of the source on and hourly average basis	Monthly log of fuel usage and hours of operation maintained to determine the maximum heat input of the source on and hourly average basis	IN
Entire Source	HAPs	40 CFR 63 Subpart DDDDD – Boiler NESHAP	Work Practice Standards and boiler tune-ups	NA	IN
Entire Source	NOx, SO2	40 CFR 60 Subpart Db	Fuel restrictions	NA	IN
Entire Source	NOx	40 CFR 96	NOx Budget permit and applicable NOx Budget trading program requirements	NA	IN
Entire Source	NOX	TAPCR 1200-3-6-.03(2)	226.4 tons per year	226.4 tons per year	IN
Entire Source	SO2	TAPCR 1200-03-14-.01(3) and application	13.7 pounds per hour and 6.4 tons per year	13.7 pounds per hour and 6.4 tons per year	IN
Entire Source	Particulates	TAPCR 1200-03-06-.01(7) and application	2.2 pounds per hour and 15.9 tons per year	2.2 pounds per hour and 15.9 tons per year	IN
Entire Source	CO	TAPCR 1200-3-6-.03(2)	100.6 tons per year	100.6 tons per year	IN
Entire Source	VOC	TAPCR 1200-3-6-.02(2)	22.9 tons per year	22.9 tons per year	IN

10. Other applicable requirements (new requirements that apply to this source during the term of this permit)

11. Page number:	Revision number:	Date of revision:
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State of Tennessee
 Department of Environment and Conservation
 Division of Air Pollution Control
 William R. Snodgrass Tennessee Tower
 312 Rosa L. Parks Avenue, 15th Floor
 Nashville, TN 37243
 Telephone: (615) 532-0554



APC 30

TITLE V PERMIT APPLICATION CURRENT EMISSIONS REQUIREMENTS AND STATUS

GENERAL IDENTIFICATION AND DESCRIPTION

1. Facility name: BAE SYSTEMS Ordnance Systems Inc. (OSI) Holston Army Ammunition Plant (HSAAP)	2. Emission source number Source reference #: 37-1029-17
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3. Describe the process emission source / fuel burning installation / incinerator.

Steam Generating Units

EMISSIONS AND REQUIREMENTS

4. Identify if only a part of the source is subject to this requirement	5. Pollutant	6. Applicable requirement(s): TN Air Pollution Control Regulations, 40 CFR, permit restrictions, air quality based standards	7. Limitation	8. Maximum actual emissions	9. Compliance status (In/Out)
Entire Source	VOC	TAPCR 1200-03-09-.01(4)(j)	0.004 lb/MMBtu	0.004 lb/MMBtu	IN
When Firing Natural Gas	CO	TAPCR 1200-03-09-.01(4)(j)	0.035 lb/MMBtu	0.035 lb/MMBtu	IN
When Firing Fuel Oil	CO	TAPCR 1200-03-09-.01(4)(j)	0.04 lb/MMBtu	0.04 lb/MMBtu	IN
Entire Source	NOX	TAPCR 1200-3-6-.03(2)	Low NOX burners (all)	Low NOX burners (all)	IN
Entire Source	Opacity	40 CFR 60.43b(f), 40 CFR 60.48b(l), and 1200-3-9-.02(11)(e)(iii) Divisions Opacity Matrix	20% opacity (maximum)	27% opacity (maximum)	IN

10. Other applicable requirements (new requirements that apply to this source during the term of this permit)

11. Page number:	Revision number:	Date of revision:
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TITLE V PERMIT APPLICATION OPERATIONS AND FLOW DIAGRAMS

1. Please list, identify, and describe briefly process emission sources, fuel burning installations, and incinerators that are contained in this application. Please attach a flow diagram for this application.

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

2. List all insignificant activities which are exempted because of size or production rate and cite the applicable regulations.

-Storage Tanks Identified by APC 6 forms (4 forms total)

■ recrystallization process and acid storage - Included in Calculation section Appendix B

3. Are there any storage piles?

YES _____ NO ☒

4. List the states that are within 50 miles of your facility.

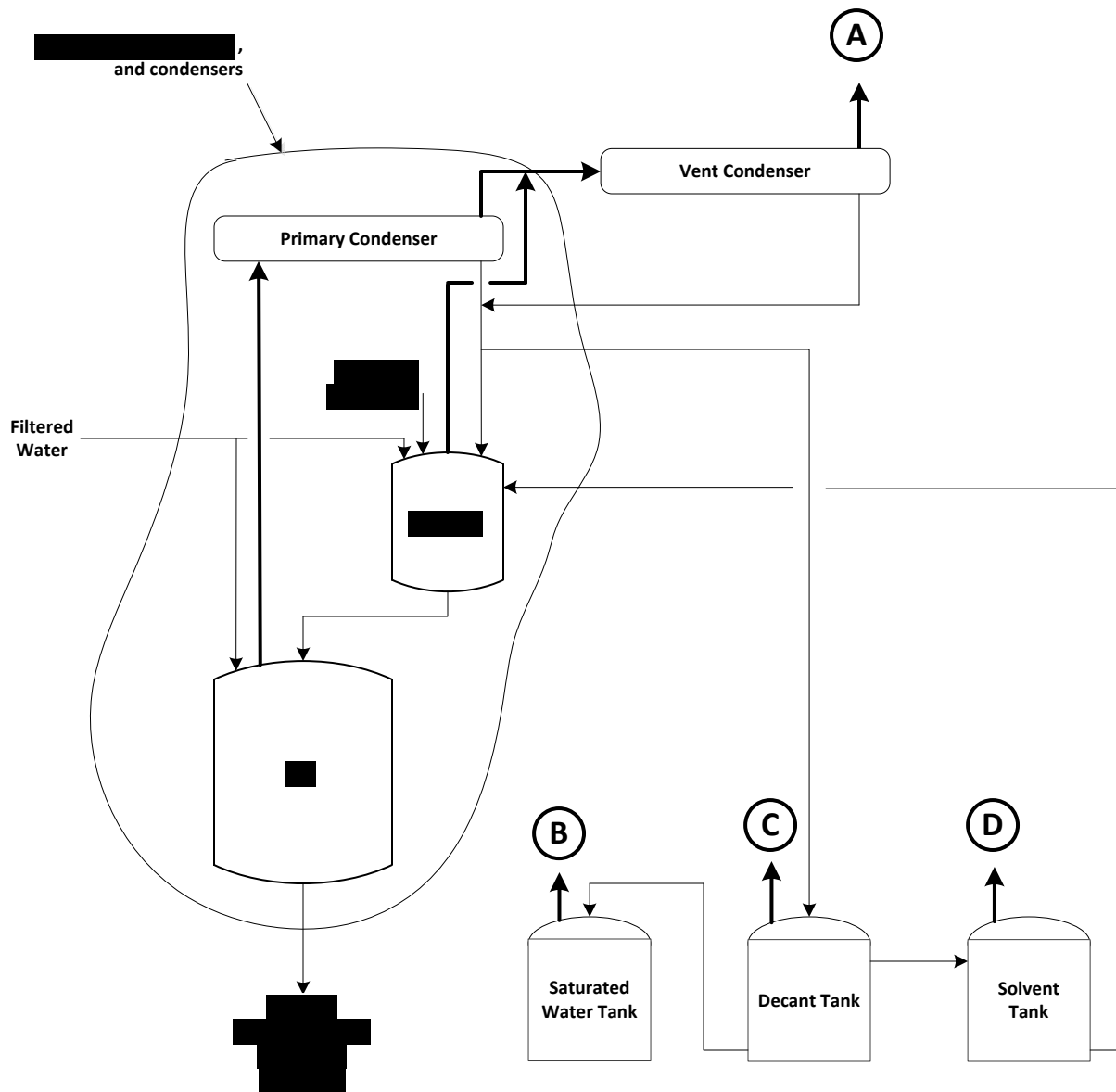
Virginia, Kentucky, North Carolina

5. Page number:

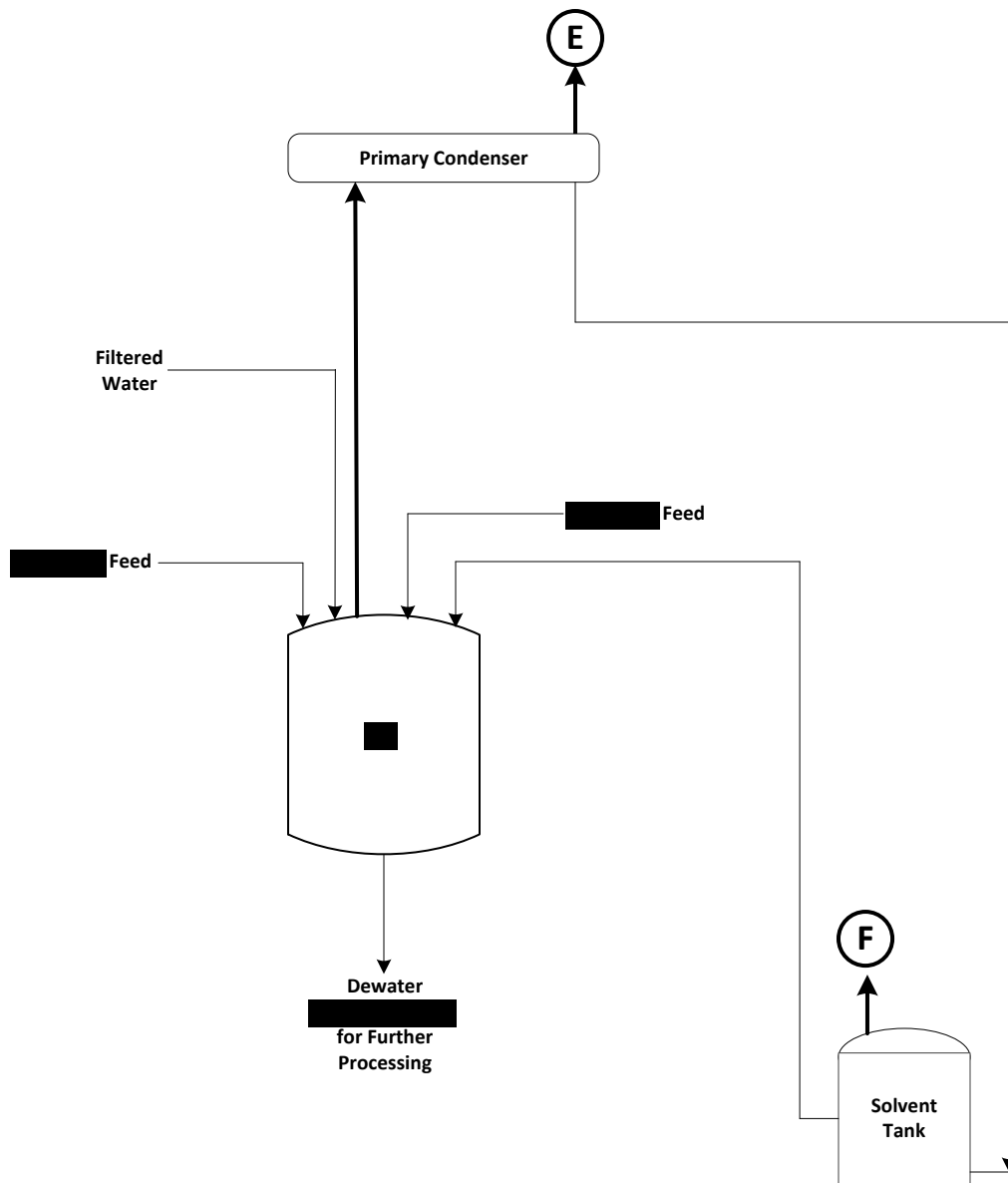
Revision Number:

Date of Revision:

Explosives Recrystallization Process



Explosives Coating Process





TITLE V PERMIT APPLICATION STACK IDENTIFICATION

GENERAL IDENTIFICATION AND DESCRIPTION	
1. Facility name: BAE Systems Ordnance Systems Inc., Holston Army Ammunition Plant	
2. Emission source (identify): Building [REDACTED] Recrystallization	
STACK DESCRIPTION	
3. Stack ID (or flow diagram point identification): Vent A	
4. Stack height above grade in feet: 52	
5. Velocity (data at exit conditions): 2.16 (Actual feet per second)	6. Inside dimensions at outlet in feet: 0.172
7. Exhaust flowrate at exit conditions (ACFM): 3.02	8. Flow rate at standard conditions (DSCFM): 2.67
9. Exhaust temperature: 85 Degrees Fahrenheit (°F)	10. Moisture content (data at exit conditions): <div style="display: flex; justify-content: space-between;"> 2.8 Percent Grains per dry standard cubic foot (gr./dscf.) </div>
11. Exhaust temperature that is equaled or exceeded during ninety (90) percent or more of the operating time (<u>for stacks subject to diffusion equation only</u>): <div style="text-align: center;"> N/A _____ (°F) </div>	
12. If this stack is equipped with continuous pollutant monitoring equipment required for compliance, what pollutant(s) does this equipment monitor (e.g., Opacity, SO ₂ , NO _x , etc.)? Not Applicable	
Complete the appropriate APC form(s) 4, 5, 7, 8, 9, or 10 for each source exhausting through this stack.	
BYPASS STACK DESCRIPTION	
13. Do you have a bypass stack? <div style="text-align: center; margin-top: 10px;"> _____ Yes X _____ No </div> <p style="margin-top: 20px;">If yes, describe the conditions which require its use & complete APC form 4 for the bypass stack. Please identify the stack number(s) of flow diagram point number(s) exhausting through this bypass stack.</p>	
14. Page number:	Revision Number:
Date of Revision:	



TITLE V PERMIT APPLICATION STACK IDENTIFICATION

GENERAL IDENTIFICATION AND DESCRIPTION	
1. Facility name: BAE Systems Ordnance Systems Inc., Holston Army Ammunition Plant	
2. Emission source (identify): Building [REDACTED]	
STACK DESCRIPTION	
3. Stack ID (or flow diagram point identification): Vent E	
4. Stack height above grade in feet: 52	
5. Velocity (data at exit conditions): 12.7 _____ (Actual feet per second)	6. Inside dimensions at outlet in feet: 0.172
7. Exhaust flowrate at exit conditions (ACFM): 17.8	8. Flow rate at standard conditions (DSCFM): 15.1
9. Exhaust temperature: 122 _____ Degrees Fahrenheit (°F)	10. Moisture content (data at exit conditions): 0.9% _____ Percent _____ Grains per dry standard cubic foot (gr./dscf.)
11. Exhaust temperature that is equaled or exceeded during ninety (90) percent or more of the operating time (for stacks subject to diffusion equation only): N/A _____ (°F)	
12. If this stack is equipped with continuous pollutant monitoring equipment required for compliance, what pollutant(s) does this equipment monitor (e.g., Opacity, SO₂, NO_x, etc.)? Not Applicable	
Complete the appropriate APC form(s) 4, 5, 7, 8, 9, or 10 for each source exhausting through this stack.	
BYPASS STACK DESCRIPTION	
13. Do you have a bypass stack? <div style="text-align: center;"> _____ Yes <input checked="" type="checkbox"/> No </div> <p>If yes, describe the conditions which require its use & complete APC form 4 for the bypass stack. Please identify the stack number(s) of flow diagram point number(s) exhausting through this bypass stack.</p>	
14. Page number: _____ Revision Number: _____ Date of Revision: _____	

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15. For Internal Floating Roof tanks:

A. Rim Seal system description:

_____ Liquid Mounted Primary _____ Liquid Mounted Primary plus Secondary Seal
 _____ Vapor Mounted Primary _____ Vapor Mounted Primary plus Secondary Seal

B. Number of Columns: _____ D. Deck Type (check one): _____ Welded _____ Bolted

C. Effective Column diameter: _____ (Feet) E. Total Deck Seam length: _____ (Feet)

F. Deck Area: _____ (Square Feet)

G. Deck Fitting types (indicate the number of each type):

Access Hatch (24" Dia.)	Automatic Gauge Float Well	Column Well
_____ Bolted cover, gasketed	_____ Bolted cover, gasketed	_____ Built-up Column-Sliding cover, gasketed
_____ Unbolted cover, gasketed	_____ Unbolted cover, gasketed	_____ Built-up Column-Sliding cover, ungasketed
_____ Unbolted cover, ungasketed	_____ Unbolted cover, ungasketed	_____ Pipe Column-Flexible fabric sleeve seal
		_____ Pipe Column-Sliding cover, gasketed
		_____ Pipe Column-Sliding cover, ungasketed
Ladder well	Sample Pipe and Well	Roof Leg or Hanger Well
_____ Sliding cover, gasketed	_____ Slotted Pipe-Sliding cover, gasketed	_____ Adjustable
_____ Sliding cover, ungasketed	_____ Slotted Pipe-Sliding cover, ungasketed	_____ Fixed
	_____ Sample Well-Slit fabric seal, 10% open area	
	_____ Stub Drain, 1 inch diameter	
Vacuum Breaker		
_____ Weighted Mechanical Actuation, gasketed		
_____ Weighted Mechanical Actuation, ungasketed		

16. For variable vapor space tanks:

Volume expansion capacity _____ (Gallons)

TANK CONTENTS AND OPERATION DESCRIPTION

17. Complete the flowing table for materials to be stored in this tank:

Material or component stored	Wt. %	Material Annual Throughput (Gal./Yr.)	Material stored Daily Average (Gallons)	Component Molecular weights (Lb./Lb. Mole)	Component Vapor Pressures (PSIA)	Material storage pressure(PSIA)	Material average storage temp. (Deg. F)
Cyclohexanone	2.4	████████	██████	██████	0.67	14.1	150
Water	97.6	9,167,231	25,116	18	0.93	14.1	150

Multipurpose tank with variable composition:

_____ Yes X No

18. Describe the operation this tank will serve:

The tank stores water from the decant tank which is reused in the ██████████ recrystallization process. This water contains some cyclohexanone due to the solvent's solubility in water.

19. Page number:

Revision Number:

Date of Revision:



TITLE V PERMIT APPLICATION STORAGE TANKS

GENERAL IDENTIFICATION AND DESCRIPTION			
1. Facility name: BAE Systems Ordnance Systems Inc., Holston Army Ammunition Plant			
2. Process emission source (identify): Building [REDACTED] Recrystallization (Vent C on Process Flow Diagram)			
STORAGE TANK DESCRIPTION			
3. Storage tank identification: [REDACTED]-T-11			
4. Location of the storage tank or tank farm in UTM coordinates: UTM Vertical: 17 4044216N UTM Horizontal: 353785E			
5. Storage tank capacity: 7340 (Gallons)	6. Year of installation: 2019	7. Tank height 11.3 (Feet)	8. Tank diameter: 10.5 (Feet)
9. Color of tank: _____ White <input checked="" type="checkbox"/> _____ Other Specify aluminum (specular) _____			
10. Is this tank equipped with a submerged fill pipe? <input checked="" type="checkbox"/> Yes _____ No			
11. Type of storage tank: <div style="display: flex; justify-content: space-between;"> <div> <input type="checkbox"/> Open top tank <input type="checkbox"/> Pressurized tank </div> <div> <input checked="" type="checkbox"/> Fixed roof <input type="checkbox"/> External floating roof </div> <div> <input type="checkbox"/> Fixed roof w/internal floating roof <input type="checkbox"/> Variable vapor space </div> <div> <input type="checkbox"/> Other (specify) _____ </div> </div>			
12. For fixed roof tanks: A. Tank configuration (check one): <input checked="" type="checkbox"/> Vertical (upright cylinder) _____ Horizontal B. Tank roof type: _____ Cone roof – indicate tank roof height _____ (ft) (check one) <input checked="" type="checkbox"/> Dome roof – indicate tank roof height 1.83 (ft) Indicate shell radius 10.5 (ft)			
FLOATING ROOF TANK DESCRIPTION			
13. For Floating Roof tanks (both internal and external) – shell condition (check one): _____ Light rust _____ Dense rust _____ Gunite lined			
14. For External Floating Roof tanks: A. Tank construction (check one): _____ Welded tank _____ Riveted tank B. Rim Seal system description (check one): _____ Shoe Mounted Primary _____ Vapor Mounted Primary _____ Liquid Mounted Primary _____ Shoe Primary, Rim Secondary _____ Vapor Primary, Rim Secondary _____ Liquid Primary, Rim Secondary _____ Liquid Primary w/Weather Shield _____ Shoe Primary and Secondary _____ Vapor Primary w/Weather Shield C. Roof type (check one): _____ Pontoon roof _____ Double Deck roof D. Roof fitting types (indicate the number of each type): <div style="display: flex; flex-wrap: wrap;"> <div style="width: 33%;"> Access Hatch (24" Diameter well) _____ Bolted cover, gasketed _____ Unbolted cover, gasketed _____ Unbolted cover, ungasketed Gauge-Hatch/Sample Well (8" Dia.) _____ Weighted Mechanical _____ Actuation Gasketed _____ Weighted Mechanical _____ Actuation Ungasketed Slotted Guide-Pole/Sample Well (8" Slotted Pole, 21" Dia. Well) _____ Ungasketed Sliding Cover, without Float _____ Ungasketed Sliding Cover, with Float _____ Gasketed Sliding Cover, without Float _____ Gasketed Sliding Cover, with Float </div> <div style="width: 33%;"> Unslotted Guide-Pole Well (8" Diameter Unslotted Pole, 21" Dia. Well) _____ Ungasketed sliding cover _____ Gasketed sliding cover Vacuum Breaker (10" Dia. Well) _____ Weighted Mechanical _____ Actuation Gasketed _____ Weighted Mechanical _____ Actuation Ungasketed Roof Leg (3" Dia.) _____ Adjustable, Pontoon area _____ Adjustable, Center area _____ Adjustable, Double-Deck roofs _____ Fixed </div> <div style="width: 33%;"> Gauge-Float Well (20" Diameter) _____ Unbolted cover, ungasketed _____ Unbolted cover, gasketed _____ Bolted cover, gasketed Roof Drain _____ Open _____ 90% Closed Roof Leg (2 1/2" Dia.) _____ Adjustable, Pontoon area _____ Adjustable, Center area _____ Adjustable, Double-Deck roofs _____ Fixed </div> </div>			

15. For Internal Floating Roof tanks:

A. Rim Seal system description:

_____ Liquid Mounted Primary _____ Liquid Mounted Primary plus Secondary Seal
 _____ Vapor Mounted Primary _____ Vapor Mounted Primary plus Secondary Seal

B. Number of Columns: _____

D. Deck Type (check one): _____ Welded _____ Bolted

C. Effective Column diameter: _____ (Feet)

E. Total Deck Seam length: _____ (Feet)

F. Deck Area: _____ (Square Feet)

G. Deck Fitting types (indicate the number of each type):

Access Hatch (24" Dia.)

_____ Bolted cover, gasketed

_____ Unbolted cover, gasketed

_____ Unbolted cover, ungasketed

Automatic Gauge Float Well

_____ Bolted cover, gasketed

_____ Unbolted cover, gasketed

_____ Unbolted cover, ungasketed

Column Well

_____ Built-up Column-Sliding cover, gasketed

_____ Built-up Column-Sliding cover, ungasketed

_____ Pipe Column-Flexible fabric sleeve seal

_____ Pipe Column-Sliding cover, gasketed

_____ Pipe Column-Sliding cover, ungasketed

Ladder well

_____ Sliding cover, gasketed

_____ Sliding cover, ungasketed

Sample Pipe and Well

_____ Slotted Pipe-Sliding cover, gasketed

_____ Slotted Pipe-Sliding cover, ungasketed

_____ Sample Well-Slit fabric seal, 10% open area

_____ Stub Drain, 1 inch diameter

Roof Leg or Hanger Well

_____ Adjustable

_____ Fixed

Vacuum Breaker

_____ Weighted Mechanical Actuation, gasketed

_____ Weighted Mechanical Actuation, ungasketed

16. For variable vapor space tanks:

Volume expansion capacity _____ (Gallons)

TANK CONTENTS AND OPERATION DESCRIPTION

17. Complete the flowing table for materials to be stored in this tank:

Material or component stored	Wt. %	Material Annual Throughput (Gal./Yr.)	Material stored Daily Average (Gallons)	Component Molecular weights (Lb./Lb. Mole)	Component Vapor Pressures (PSIA)	Material storage pressure (PSIA)	Material average storage temp. (Deg. F)
Cyclohexanone	50	████████	████████	████████	0.055	14.1	60
Water	50	7,861,916	21,539	18	0.253	14.1	60

Multipurpose tank with variable composition:

_____ Yes _____ X _____ No

18. Describe the operation this tank will serve:

Tank is used to decant water and cyclohexanone for use in recrystallization ██████████.

19. Page number:

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15. For Internal Floating Roof tanks:

A. Rim Seal system description:

_____ Liquid Mounted Primary _____ Liquid Mounted Primary plus Secondary Seal
 _____ Vapor Mounted Primary _____ Vapor Mounted Primary plus Secondary Seal

B. Number of Columns: _____ D. Deck Type (check one): _____ Welded _____ Bolted

C. Effective Column diameter: _____ (Feet) E. Total Deck Seam length: _____ (Feet)

F. Deck Area: _____ (Square Feet)

G. Deck Fitting types (indicate the number of each type):

Access Hatch (24" Dia.)	Automatic Gauge Float Well	Column Well
_____ Bolted cover, gasketed	_____ Bolted cover, gasketed	_____ Built-up Column-Sliding cover, gasketed
_____ Unbolted cover, gasketed	_____ Unbolted cover, gasketed	_____ Built-up Column-Sliding cover, ungasketed
_____ Unbolted cover, ungasketed	_____ Unbolted cover, ungasketed	_____ Pipe Column-Flexible fabric sleeve seal
		_____ Pipe Column-Sliding cover, gasketed
		_____ Pipe Column-Sliding cover, ungasketed
Ladder well	Sample Pipe and Well	Roof Leg or Hanger Well
_____ Sliding cover, gasketed	_____ Slotted Pipe-Sliding cover, gasketed	_____ Adjustable
_____ Sliding cover, ungasketed	_____ Slotted Pipe-Sliding cover, ungasketed	_____ Fixed
	_____ Sample Well-Slit fabric seal, 10% open area	
	_____ Stub Drain, 1 inch diameter	
Vacuum Breaker		
_____ Weighted Mechanical Actuation, gasketed		
_____ Weighted Mechanical Actuation, ungasketed		

16. For variable vapor space tanks:

Volume expansion capacity _____ (Gallons)

TANK CONTENTS AND OPERATION DESCRIPTION

17. Complete the flowing table for materials to be stored in this tank:

Material or component stored	Wt. %	Material Annual Throughput (Gal./Yr.)	Material stored Daily Average (Gallons)	Component Molecular weights (Lb./Lb. Mole)	Component Vapor Pressures (PSIA)	Material storage pressure (PSIA)	Material average storage temp. (Deg. F)
Cyclohexanone	100	████████	████████	████████	0.055	14.1	60

Multipurpose tank with variable composition:

_____ Yes X No

18. Describe the operation this tank will serve:

Storage of cyclohexanone for recrystallization ██████████.

19. Page number:

Revision Number:

Date of Revision:

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Application

15. For Internal Floating Roof tanks:

A. Rim Seal system description:

_____ Liquid Mounted Primary
 _____ Vapor Mounted Primary

_____ Liquid Mounted Primary plus Secondary Seal
 _____ Vapor Mounted Primary plus Secondary Seal

B. Number of Columns: _____

D. Deck Type (check one):

_____ Welded

_____ Bolted

C. Effective Column diameter: _____ (Feet)

E. Total Deck Seam length: _____ (Feet)

F. Deck Area: _____

(Square Feet)

G. Deck Fitting types (indicate the number of each type):

Access Hatch (24" Dia.)

_____ Bolted cover, gasketed

_____ Unbolted cover, gasketed

_____ Unbolted cover, ungasketed

Automatic Gauge Float Well

_____ Bolted cover, gasketed

_____ Unbolted cover, gasketed

_____ Unbolted cover, ungasketed

Column Well

_____ Built-up Column-Sliding cover, gasketed

_____ Built-up Column-Sliding cover, ungasketed

_____ Pipe Column-Flexible fabric sleeve seal

_____ Pipe Column-Sliding cover, gasketed

_____ Pipe Column-Sliding cover, ungasketed

Ladder well

_____ Sliding cover, gasketed

_____ Sliding cover, ungasketed

Sample Pipe and Well

_____ Slotted Pipe-Sliding cover, gasketed

_____ Slotted Pipe-Sliding cover, ungasketed

_____ Sample Well-Slit fabric seal, 10% open area

_____ Stub Drain, 1 inch diameter

Roof Leg or Hanger Well

_____ Adjustable

_____ Fixed

Vacuum Breaker

_____ Weighted Mechanical Actuation, gasketed

_____ Weighted Mechanical Actuation, ungasketed

16. For variable vapor space tanks:

Volume expansion capacity _____ (Gallons)

TANK CONTENTS AND OPERATION DESCRIPTION

17. Complete the flowing table for materials to be stored in this tank:

Material or component stored	Wt. %	Material Annual Throughput (Gal./Yr.)	Material stored Daily Average (Gallons)	Component Molecular weights (Lb./Lb. Mole)	Component Vapor Pressures (PSIA)	Material storage pressure (PSIA)	Material average storage temp. (Deg. F)
n-Octane	100	██████	██████	██████	0.147	14.1	60

Multipurpose tank with variable composition:

_____ Yes

X _____ No

18. Describe the operation this tank will serve:

Storage of n-Octane for use in the ██████████.

19. Page number:

Revision Number:

Date of Revision:



TITLE V PERMIT APPLICATION MISCELLANEOUS PROCESSES

GENERAL IDENTIFICATION AND DESCRIPTION			
1. Facility name: BAE Systems Ordnance Systems Inc., Holston Army Ammunition Plant			
2. Process emission source (identify): Building [REDACTED] Recrystallization and [REDACTED] Processes			
3. Stack ID or flow diagram point identification (s): See process flow diagrams		4. Year of construction or last modification: 2019	
If the emissions are controlled for compliance, attach an appropriate Air Pollution Control system form.			
5. Normal operating schedule: 24 Hrs./Day 7 Days/Wk. 365 Days/Yr.			
6. Location of this process emission source in UTM coordinates: UTM Vertical: 17 4044216N UTM Horizontal: 353785 E			
7. Describe this process (Please attach a flow diagram of this process) and check one of the following: <div style="display: flex; align-items: center;"> <input checked="" type="checkbox"/> Batch <input type="checkbox"/> Continuous </div>			
PROCESS MATERIAL INPUT AND OUTPUT			
8. List the types and amounts of raw materials input to this process:			
Material	Storage/Material handling process	Average usage (units)	Maximum usage (units)
Water	Closed Pipe	~20,000 lbs/batch	~30,000 lbs/batch
Organic Solvent	Closed Pipe	[REDACTED]	[REDACTED]
[REDACTED]	Closed Pipe or Hopper	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED] or Hopper	[REDACTED]	[REDACTED]
9. List the types and amounts of primary products produced by this process:			
Material	Storage/Material handling process	Average usage (units)	Maximum usage (units)
[REDACTED]	Closed Pipe	[REDACTED]	[REDACTED]
Organic Solvent	Closed Pipe	[REDACTED]	[REDACTED]
10. Process fuel usage:			
Type of fuel	Max heat input (10 ⁶ BTU/Hr.)	Average usage (units)	Maximum usage (units)
Not applicable			
11. List any solvents, cleaners, etc., associated with this process: Typically cyclohexanone or acetone			
If the emissions and/or operations of this process are monitored for compliance, please attach the appropriate Compliance Demonstration form.			
12. Describe any fugitive emissions associated with this process, such as outdoor storage piles, open conveyors, open air sand blasting, material handling operations, etc. (please attach a separate sheet if necessary). Equipment leaks			
13. Page number: Revision Number: Date of Revision:			



TITLE V PERMIT APPLICATION CONTROL EQUIPMENT - MISCELLANEOUS

GENERAL IDENTIFICATION AND DESCRIPTION																	
1. Facility name: BAE Systems Ordnance Systems Inc., Holston Army Ammunition Plant	2. Emission source (identify): Building [REDACTED] Recrystallization																
3. Stack ID or flow diagram point identification (s): Vent A																	
CONTROL EQUIPMENT DESCRIPTION																	
4. Describe the device in use. List the key operating parameters of this device and their normal operating range (e.g., pressure drop, gas flow rate, temperature): 8.5 inch x 8 foot stainless steel shell and tube condenser Operating temperature range 85-212°F Vent condenser is used for solvent recovery. The solvent is reused in the process. Key operating parameter is cooling water ON/OFF. Process interlocks require the cooling water to be ON.																	
5. Manufacturer and model number (if available): TBD																	
6. Year of installation: 2019																	
7. List of pollutant (s) to be controlled by this equipment and the expected control efficiency for each pollutant. <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th style="width: 35%;">Pollutant</th> <th style="width: 25%;">Efficiency (%)</th> <th style="width: 40%;">Source of data</th> </tr> </thead> <tbody> <tr> <td>VOC</td> <td>95-98%</td> <td>BACT analysis</td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>			Pollutant	Efficiency (%)	Source of data	VOC	95-98%	BACT analysis									
Pollutant	Efficiency (%)	Source of data															
VOC	95-98%	BACT analysis															
8. Discuss how collected material is handled for reuse or disposal. The material is piped to a storage tank for reuse in the process.																	
9. If this control equipment is in series with some other control equipment, state and specify the overall efficiency. Not applicable.																	
10. Page number:	Revision Number:	Date of Revision:															

GENERAL IDENTIFICATION AND DESCRIPTION		
1. Facility name: BAE Systems Ordnance Systems Inc., Holston Army Ammunition Plant	2. Emission source (identify): Building XXXXXXXXXX Coating	
3. Stack ID or flow diagram point identification (s): Vent E		
CONTROL EQUIPMENT DESCRIPTION		
4. Describe the device in use. List the key operating parameters of this device and their normal operating range (e.g., pressure drop, gas flow rate, temperature): 12 inch x 12 foot stainless steel shell and tube condenser Operating temperature range 80-122°F Condenser is used for solvent recovery. The solvent is reused in the process. Key operating parameter is cooling water ON/OFF. Process interlocks require the cooling water to be ON.		
5. Manufacturer and model number (if available): TBD		
6. Year of installation: 2019		
7. List of pollutant (s) to be controlled by this equipment and the expected control efficiency for each pollutant.		
Pollutant	Efficiency (%)	Source of data
VOC	95-98%	BACT analysis
8. Discuss how collected material is handled for reuse or disposal. The material is piped to a storage tank for reuse in the process.		
9. If this control equipment is in series with some other control equipment, state and specify the overall efficiency. Not applicable.		
10. Page number:	Revision Number:	Date of Revision:



TITLE V PERMIT APPLICATION **COMPLIANCE CERTIFICATION - MONITORING AND REPORTING** **DESCRIPTION OF METHODS USED FOR DETERMINING COMPLIANCE**

All sources that are subject to 1200-03-09-.02(11) of the Tennessee Air Pollution Control Regulations are required to certify compliance with all applicable requirements by including a statement within the permit application of the methods used for determining compliance. This statement must include a description of the monitoring, recordkeeping, and reporting requirements and test methods. In addition, the application must include a schedule for compliance certification submittals during the permit term. These submittals must be no less frequent than annually and may need to be more frequent if specified by the underlying applicable requirement or the Technical Secretary.

GENERAL IDENTIFICATION AND DESCRIPTION

1. Facility name: **BAE Systems Ordnance Systems Inc., Holston Army Ammunition Plant**
2. Process emission source, fuel burning installation, or incinerator (identify): **Building [REDACTED] Recrystallization and [REDACTED] Processes**
3. Stack ID or flow diagram point identification(s): **See process flow diagrams**

METHODS OF DETERMINING COMPLIANCE

4. This source as described under Item #2 of this application will use the following method(s) for determining compliance with applicable requirements (and special operating conditions from an existing permit). Check all that apply and attach the appropriate form(s)

- ☐ Continuous Emission Monitoring (CEM) - APC 20
 Pollutant(s): _____
- ☐ Emission Monitoring Using Portable Monitors - APC 21
 Pollutant(s): _____
- ☐ Monitoring Control System Parameters or Operating Parameters of a Process - APC 22
 Pollutant(s): _____
- ☐ Monitoring Maintenance Procedures - APC 23
 Pollutant(s): _____
- ☐ Stack Testing - APC 24
 Pollutant(s): _____
- ☐ Fuel Sampling & Analysis (FSA) - APC 25
 Pollutant(s): _____
- ☒ Recordkeeping - APC 26
 Pollutant(s): **VOC (vent points with potential to emit > 5 tons per year)**
- ☒ Other (please describe) - APC 27
 Pollutant(s): **Opacity**

5. Compliance certification reports will be submitted to the Division according to the following schedule:

Start date: **In accordance with Title V permit certification requirements/frequency**

And every **365** days thereafter.

6. Compliance monitoring reports will be submitted to the Division according to the following schedule:

Start date: **In accordance with Title V permit certification requirements/frequency**

And every **180** days thereafter.

7. Page number: _____ Revision number: _____ Date of revision: _____



TITLE V PERMIT APPLICATION
COMPLIANCE DEMONSTRATION BY RECORDKEEPING

Recordkeeping shall be acceptable as a compliance demonstration method provided that a correlation between the parameter value recorded and the applicable requirement is established.

GENERAL IDENTIFICATION AND DESCRIPTION

1. Facility name: BAE Systems Ordnance Systems Inc. Holston Army Ammunition Plant	2. Stack ID or flow diagram point identification(s): Vents A and E
3. Emission source (identify): Building [REDACTED] Recrystallization and [REDACTED]	

MONITORING AND RECORDKEEPING DESCRIPTION

4. Pollutant(s) or parameter being monitored: VOC
5. Material or parameter being monitored and recorded: VOC using batch records
6. Method of monitoring and recording: Batch emission factors determined by engineering calculations in combination with batch production records are used to demonstrate the source has not exceeded its permitted limit.
7. Compliance demonstration frequency (specify the frequency with which compliance will be demonstrated): Monthly

8. Page number:	Revision number:	Date of revision:
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TITLE V PERMIT APPLICATION COMPLIANCE DEMONSTRATION BY OTHER METHOD(S)

GENERAL IDENTIFICATION AND DESCRIPTION		
1. Facility name: BAE Systems Ordnance Systems Inc., Holston Army Ammunition Plant	2. Stack ID or flow diagram point identification(s): Vent Points A, B, C, D, E, and F on the process flow diagrams	
3. Emission source (identify): Building [REDACTED] Recrystallization and [REDACTED] Processes		
MONITORING DESCRIPTION		
4. Pollutant(s) or parameter being monitored: Opacity		
5. Description of the method of monitoring: <p>Compliance with the standard shall be determined by the procedures of the Tennessee Division of Air Pollution Control's Opacity Matrix dated June 18, 1996 and amended September 12, 2005.</p> <p>Note that in the latest version of the Division's Opacity Matrix colorless pollutants such as VOCs do not require Visible emission evaluations.</p> <p>Standard: Visible emissions from this source shall not exhibit greater than twenty percent (20%) opacity, except for an aggregate of no more than five (5) minutes in any one (1) hour period, and no more than twenty (20) minutes in any twenty-four (24) hour period. Visible emissions from these sources shall be determined by Tennessee Visible Emission Evaluation Method 2, as adopted by the Tennessee Air Pollution Control Board on August 24 1984 (aggregate count). TAPCR 1200-3-5-.01(1)</p>		
6. Compliance demonstration frequency (specify the frequency with which compliance will be demonstrated): Frequency as required per the Tennessee Division of Air Pollution Control's Opacity Matrix		
7. Page number:	Revision number:	Date of revision:



TITLE V PERMIT APPLICATION

EMISSIONS FROM PROCESS EMISSION SOURCE / FUEL BURNING INSTALLATION / INCINERATOR

GENERAL IDENTIFICATION AND DESCRIPTION				
1. Facility name: BAE Systems Ordnance Systems Inc., Holston Army Ammunition Plant		2. Stack ID or flow diagram point identification(s): See process flow diagram		
3. Process emission source / Fuel burning installation / Incinerator (identify): Building [REDACTED] Recrystallization and [REDACTED] Processes. See Appendix B for emissions calculations.				
EMISSIONS SUMMARY TABLE – CRITERIA AND FUGITIVE EMISSIONS				
4. Complete the following <u>emissions summary for regulated air pollutants</u> . Fugitive emissions shall be included. Attach calculations and emission factor references.				
Air Pollutant	Maximum Allowable Emissions		Actual Emissions	
	Tons per Year	Reserved for State use (Pounds per Hour - Item 7, APC 30)	Tons per Year	Reserved for State use (Pounds per Hour - Item 8, APC 30)
Particulate Matter (TSP)	0.01			
(Fugitive Emissions)				
Sulfur Dioxide				
(Fugitive Emissions)				
Volatile Organic Compounds	6.2			
(Fugitive Emissions)				
Carbon Monoxide				
(Fugitive Emissions)				
Lead				
(Fugitive Emissions)				
Nitrogen Oxides	0.6			
(Fugitive Emissions)				
Total Reduced Sulfur				
(Fugitive Emissions)				
Mercury				
(Fugitive Emissions)				

(Continued on next page)

(Continued from last page)

AIR POLLUTANT	Maximum Allowable Emissions		Actual Emissions	
	Tons per Year	Reserved for State use (Pounds per Hour - Item 7, APC 30)	Tons per Year	Reserved for State use (Pounds per Hour - Item 8, APC 30)
Asbestos				
(Fugitive Emissions)				
Beryllium				
(Fugitive Emissions)				
Vinyl Chloride				
(Fugitive Emissions)				
Fluorides				
(Fugitive Emissions)				
Gaseous Fluorides				
(Fugitive Emissions)				
Greenhouse Gases in CO ₂ Equivalents				

EMISSIONS SUMMARY TABLE – FUGITIVE HAZARDOUS AIR POLLUTANTS

5. Complete the following emissions summary for regulated air pollutants that are hazardous air pollutant(s). Fugitive emissions shall be included. Attach calculations and emission factor references.

Air Pollutant & CAS	Maximum Allowable Emissions		Actual Emissions	
	Tons per Year	Reserved for State use (Pounds per Hour - Item 7, APC 30)	Tons per Year	Reserved for State use (Pounds per Hour - Item 8, APC 30)

6. Page number: Revision number: Date of revision



**TITLE V PERMIT APPLICATION
 CURRENT EMISSIONS REQUIREMENTS AND STATUS**

GENERAL IDENTIFICATION AND DESCRIPTION

1. Facility name: BAE Systems OSI, Holston Army Ammunition Plant	2. Emission source number See process flow diagram
--	--

3. Describe the process emission source / fuel burning installation / incinerator.

Building [REDACTED] Recrystallization and [REDACTED] Processes

EMISSIONS AND REQUIREMENTS

4. Identify if only a part of the source is subject to this requirement	5. Pollutant	6. Applicable requirement(s): TN Air Pollution Control Regulations, 40 CFR, permit restrictions, air quality based standards	7. Limitation	8. Maximum actual emissions	9. Compliance status (In/Out)
All	VOC	TVEE Method 2	20% Opacity	N/A	IN
Recrystallization	VOC	TAPCR 1200-03-09-.01(4)(j)	0.42 lb/hr	N/A	IN
Recrystallization	VOC	TAPCR 1200-03-09-.01(4)(j)	6.0 TPY	N/A	IN

10. Other applicable requirements (new requirements that apply to this source during the term of this permit)

11. Page number:	Revision number:	Date of revision:
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TITLE V PERMIT APPLICATION OPERATIONS AND FLOW DIAGRAMS

1. Please list, identify, and describe briefly process emission sources, fuel burning installations, and incinerators that are contained in this application. Please attach a flow diagram for this application.

[REDACTED]

[REDACTED]

2. List all insignificant activities which are exempted because of size or production rate and cite the applicable regulations.

As discussed later in this section, the control equipment associated with the process equipment is interlocked to ensure the controls are operating when the processes are operating. This is for safety purposes and the controls are integral to each process. The forms include all emissions associated with each source. OSI requests this information be evaluated to determine if these processes should be considered insignificant activities as defined in 1200-03-09-.04 and requests an official determination be made.

3. Are there any storage piles?

YES _____ NO ☒

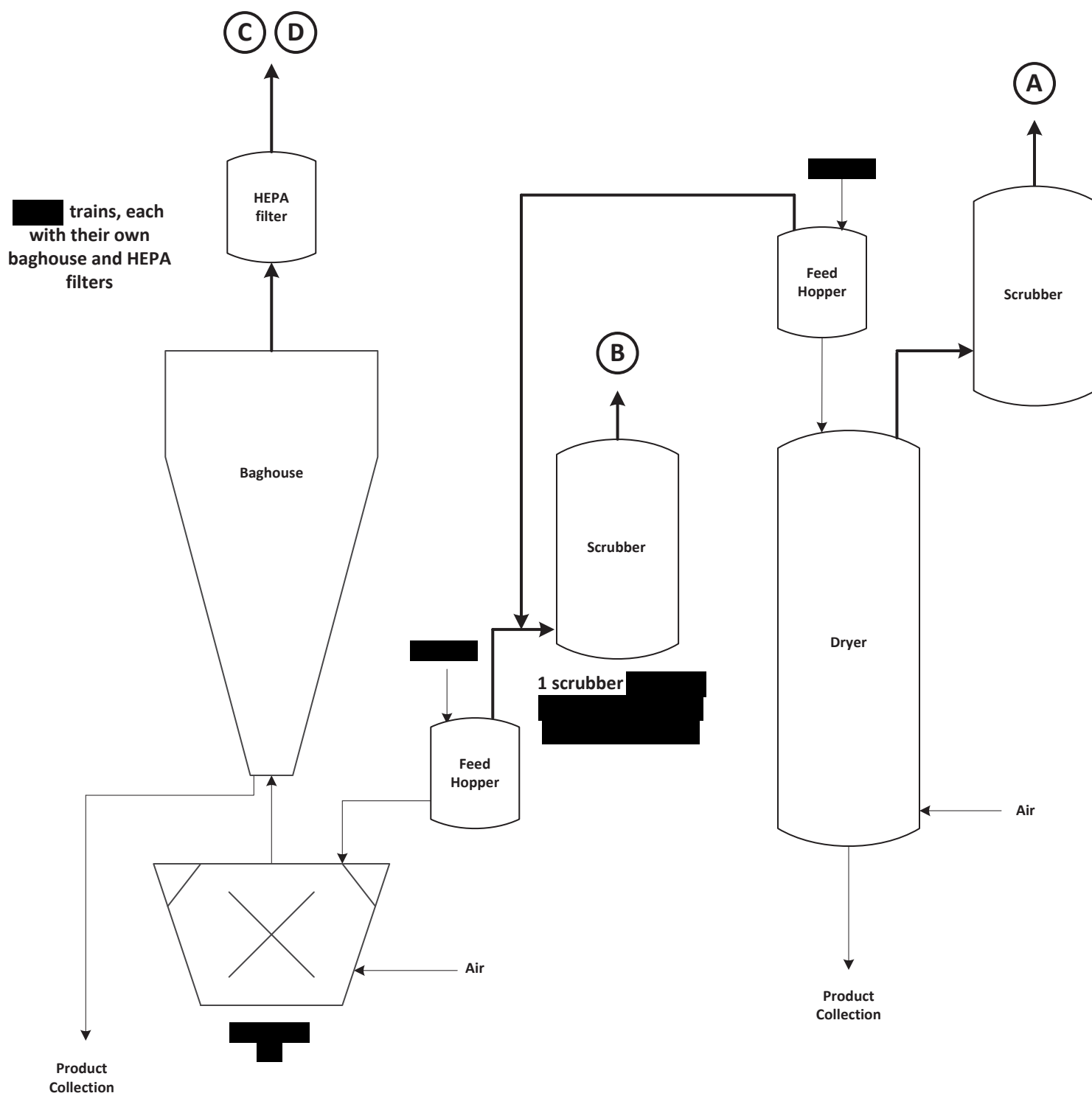
4. List the states that are within 50 miles of your facility.

Kentucky, North Carolina, Virginia

5. Page number:

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TITLE V PERMIT APPLICATION STACK IDENTIFICATION

GENERAL IDENTIFICATION AND DESCRIPTION	
1. Facility name: BAE SYSTEMS Ordnance Systems Inc., Holston Army Ammunition Plant	
2. Emission source (identify): Building [REDACTED] Milling [REDACTED]	
STACK DESCRIPTION	
3. Stack ID (or flow diagram point identification): Vent Point A - Dryer Scrubber	
4. Stack height above grade in feet: 11 ft	
5. Velocity (data at exit conditions): 33.4 (Actual feet per second)	6. Inside dimensions at outlet in feet: 2.0 ft
7. Exhaust flowrate at exit conditions (ACFM): ~6,300	8. Flow rate at standard conditions (DSCFM): ~6,000
9. Exhaust temperature: 175.0 Degrees Fahrenheit (°F)	10. Moisture content (data at exit conditions): ~15 Percent Grains per dry standard cubic foot (gr./dscf.)
11. Exhaust temperature that is equaled or exceeded during ninety (90) percent or more of the operating time (<u>for stacks subject to diffusion equation only</u>): <div style="text-align: center;">Ambient _____ (°F)</div>	
12. If this stack is equipped with continuous pollutant monitoring equipment required for compliance, what pollutant(s) does this equipment monitor (e.g., Opacity, SO ₂ , NO _x , etc.)? NA	
Complete the appropriate APC form(s) 4, 5, 7, 8, 9, or 10 for each source exhausting through this stack.	
BYPASS STACK DESCRIPTION	
13. Do you have a bypass stack? <div style="text-align: center;"> _____ Yes X No </div> <p>If yes, describe the conditions which require its use & complete APC form 4 for the bypass stack. Please identify the stack number(s) of flow diagram point number(s) exhausting through this bypass stack.</p>	
14. Page number: Revision Number: Date of Revision:	



TITLE V PERMIT APPLICATION STACK IDENTIFICATION

GENERAL IDENTIFICATION AND DESCRIPTION	
1. Facility name: BAE SYSTEMS Ordnance Systems Inc., Holston Army Ammunition Plant	
2. Emission source (identify): Building [REDACTED] Milling [REDACTED]	
STACK DESCRIPTION	
3. Stack ID (or flow diagram point identification): Vent Point B - Feed Hopper Scrubber	
4. Stack height above grade in feet: 11 ft	
5. Velocity (data at exit conditions): 34.0 (Actual feet per second)	6. Inside dimensions at outlet in feet: 2.5 ft
7. Exhaust flowrate at exit conditions (ACFM): ~10,000	8. Flow rate at standard conditions (DSCFM): ~9,300
9. Exhaust temperature: 70.0 Degrees Fahrenheit (°F)	10. Moisture content (data at exit conditions): ~15 Percent Grains per dry standard cubic foot (gr./dscf.)
11. Exhaust temperature that is equaled or exceeded during ninety (90) percent or more of the operating time (<u>for stacks subject to diffusion equation only</u>): <div style="text-align: center;">Ambient _____ (°F)</div>	
12. If this stack is equipped with continuous pollutant monitoring equipment required for compliance, what pollutant(s) does this equipment monitor (e.g., Opacity, SO ₂ , NO _x , etc.)? NA	
Complete the appropriate APC form(s) 4, 5, 7, 8, 9, or 10 for each source exhausting through this stack.	
BYPASS STACK DESCRIPTION	
13. Do you have a bypass stack? <div style="text-align: center;"> _____ Yes X No </div> <p>If yes, describe the conditions which require its use & complete APC form 4 for the bypass stack. Please identify the stack number(s) of flow diagram point number(s) exhausting through this bypass stack.</p>	
14. Page number: Revision Number: Date of Revision:	



**TITLE V PERMIT APPLICATION
STACK IDENTIFICATION**

GENERAL IDENTIFICATION AND DESCRIPTION	
1. Facility name: BAE SYSTEMS Ordnance Systems Inc., Holston Army Ammunition Plant	
2. Emission source (identify): Building [REDACTED] Milling [REDACTED]	
STACK DESCRIPTION	
3. Stack ID (or flow diagram point identification): Vent Points C and D - HEPA Filters on [REDACTED]	
4. Stack height above grade in feet: 65 ft	
5. Velocity (data at exit conditions): 18.0 (Actual feet per second)	6. Inside dimensions at outlet in feet: 0.33 ft
7. Exhaust flowrate at exit conditions (ACFM): ~100	8. Flow rate at standard conditions (DSCFM): ~90
9. Exhaust temperature: 80.0 Degrees Fahrenheit (°F)	10. Moisture content (data at exit conditions): ~6 Percent Grains per dry standard cubic foot (gr./dscf.)
11. Exhaust temperature that is equaled or exceeded during ninety (90) percent or more of the operating time (for stacks subject to diffusion equation only): Ambient (°F)	
12. If this stack is equipped with continuous pollutant monitoring equipment required for compliance, what pollutant(s) does this equipment monitor (e.g., Opacity, SO ₂ , NO _x , etc.)? NA	
Complete the appropriate APC form(s) 4, 5, 7, 8, 9, or 10 for each source exhausting through this stack.	
BYPASS STACK DESCRIPTION	
13. Do you have a bypass stack? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> If yes, describe the conditions which require its use & complete APC form 4 for the bypass stack. Please identify the stack number(s) of flow diagram point number(s) exhausting through this bypass stack.	
14. Page number:	Revision Number: Date of Revision:

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TITLE V PERMIT APPLICATION CONTROL EQUIPMENT - MISCELLANEOUS

GENERAL IDENTIFICATION AND DESCRIPTION																	
1. Facility name: BAE Systems Ordnance Systems Inc., Holston Army Ammunition Plant	2. Emission source (identify): Building [REDACTED] Milling [REDACTED]																
3. Stack ID or flow diagram point identification (s): Vent Points C and D - HEPA Filters on [REDACTED]																	
CONTROL EQUIPMENT DESCRIPTION																	
4. Describe the device in use. List the key operating parameters of this device and their normal operating range (e.g., pressure drop, gas flow rate, temperature): High efficiency filter for removal of fine particles. Key operating parameter is pressure drop. Normal operating range will be established by the vendor. The HEPA Filters are located at the exhaust for the baghouses associated with product capture [REDACTED]. Each HEPA filter system and baghouse is equipped with a pressure drop indicator. Control interlocks are connected to these indicators and any change from a valid range will trigger [REDACTED] associated with this equipment to cease operations. This is designed for safety purposes and to ensure explosives are contained to areas specifically designed for collection of this material. Therefore, the HEPA filters are integral to the [REDACTED].																	
5. Manufacturer and model number (if available): To be determined																	
6. Year of installation: 2019																	
7. List of pollutant (s) to be controlled by this equipment and the expected control efficiency for each pollutant. <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th style="width: 35%;">Pollutant</th> <th style="width: 20%;">Efficiency (%)</th> <th style="width: 45%;">Source of data</th> </tr> </thead> <tbody> <tr> <td>PM10</td> <td>99.9</td> <td>Vendor data</td> </tr> <tr> <td>PM2.5</td> <td>99.9</td> <td>Vendor data</td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>			Pollutant	Efficiency (%)	Source of data	PM10	99.9	Vendor data	PM2.5	99.9	Vendor data						
Pollutant	Efficiency (%)	Source of data															
PM10	99.9	Vendor data															
PM2.5	99.9	Vendor data															
8. Discuss how collected material is handled for reuse or disposal. Material that cannot be used as product is disposed of as hazardous waste at the facility's Subpart X permitted open burning unit.																	
9. If this control equipment is in series with some other control equipment, state and specify the overall efficiency. Not applicable																	
10. Page number:	Revision Number:	Date of Revision:															



TITLE V PERMIT APPLICATION CONTROL EQUIPMENT - WET COLLECTION SYSTEMS

GENERAL IDENTIFICATION AND DESCRIPTION														
1. Facility name: BAE SYSTEMS Ordnance Systems Inc. Holston Army Ammunition Plant	2. Emission source (identify): Building [REDACTED] Milling [REDACTED]													
3. Stack ID or flow diagram point identification(s): Vent Point A - Dryer Scrubber														
WET COLLECTION SYSTEM DESCRIPTION														
4. Describe the device in use. List the key operation parameters of this device and their normal operating range. <p>The [REDACTED] dryer scrubber will be a wet scrubber that uses water to remove PM from the dryer exhaust stream. The scrubber will be designed to have a minimum recirculation rate which will be provided by the manufacturer.</p> <p>The scrubber is integral to the process and the dryer can not operate without the scrubber in operation for safety purposes. Additionally, 29 CFR 1910.109 requires areas processing explosive to minimize dust and Army safety rules specify wet collection systems be operated as control for manned operations in specific site distance circumstances. Therefore, the scrubber operation is interlocked in the control system and the dryer will not operate unless the scrubber is operational.</p>														
5. Manufacturer and model number (if available): TBD	6. Year of installation: 2018													
7. List of pollutant (s) to be controlled and the expected control efficiency for each pollutant. <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th style="width: 35%;">Pollutant</th> <th style="width: 25%;">Efficiency (%)</th> <th style="width: 40%;">Source of data</th> </tr> </thead> <tbody> <tr> <td>PM10</td> <td>99.9%</td> <td>Vendor supplied</td> </tr> <tr> <td>PM2.5</td> <td>99.9%</td> <td>Vendor supplied</td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>			Pollutant	Efficiency (%)	Source of data	PM10	99.9%	Vendor supplied	PM2.5	99.9%	Vendor supplied			
Pollutant	Efficiency (%)	Source of data												
PM10	99.9%	Vendor supplied												
PM2.5	99.9%	Vendor supplied												
8. Discuss how collected material and effluent is handled for reuse or disposal.. The scrubber water is filtered then recirculated in the scrubber.														
9. Scrubbing medium (water, sodium hydroxide slurry, etc.): Water														
10. If this control equipment is in series with some other control equipment, state and specify the overall efficiency. NA														
11. Page number:	Revision Number:	Date of Revision:												



TITLE V PERMIT APPLICATION CONTROL EQUIPMENT - WET COLLECTION SYSTEMS

GENERAL IDENTIFICATION AND DESCRIPTION														
1. Facility name: BAE SYSTEMS Ordnance Systems Inc. Holston Army Ammunition Plant	2. Emission source (identify): Building [REDACTED] Milling [REDACTED]													
3. Stack ID or flow diagram point identification(s): Vent B, Feed Hopper Scrubber														
WET COLLECTION SYSTEM DESCRIPTION														
4. Describe the device in use. List the key operation parameters of this device and their normal operating range. <p>The scrubber for the ventilation hoods over the [REDACTED] feed hoppers will be a wet scrubber. The scrubber will be designed to have a minimum recirculation rate which will be provided by the manufacturer.</p> <p>The scrubber is integral to the process and the feeders can not operate without the scrubber in operation for safety purposes. Additionally, 29 CFR 1910.109 requires areas processing explosive to minimize dust and Army safety rules specify wet collection systems be operated as control for manned operations in specific site distance circumstances. Therefore, the scrubber operation is interlocked in the control system and the feeders will not operate unless the scrubber is operational.</p>														
5. Manufacturer and model number (if available): TBD	6. Year of installation: 2018													
7. List of pollutant (s) to be controlled and the expected control efficiency for each pollutant. <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th style="width: 35%;">Pollutant</th> <th style="width: 25%;">Efficiency (%)</th> <th style="width: 40%;">Source of data</th> </tr> </thead> <tbody> <tr> <td>PM10</td> <td style="text-align: center;">99.9</td> <td>Vendor Supplied</td> </tr> <tr> <td>PM2.5</td> <td style="text-align: center;">99.9</td> <td>Vendor Supplied</td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>			Pollutant	Efficiency (%)	Source of data	PM10	99.9	Vendor Supplied	PM2.5	99.9	Vendor Supplied			
Pollutant	Efficiency (%)	Source of data												
PM10	99.9	Vendor Supplied												
PM2.5	99.9	Vendor Supplied												
8. Discuss how collected material and effluent is handled for reuse or disposal.. The scrubber water is filtered then recirculated in the scrubber.														
9. Scrubbing medium (water, sodium hydroxide slurry, etc.): Water														
10. If this control equipment is in series with some other control equipment, state and specify the overall efficiency. NA														
11. Page number:	Revision Number:	Date of Revision:												



TITLE V PERMIT APPLICATION
COMPLIANCE CERTIFICATION - MONITORING AND REPORTING
DESCRIPTION OF METHODS USED FOR DETERMINING COMPLIANCE

All sources that are subject to 1200-03-09-.02(11) of the Tennessee Air Pollution Control Regulations are required to certify compliance with all applicable requirements by including a statement within the permit application of the methods used for determining compliance. This statement must include a description of the monitoring, recordkeeping, and reporting requirements and test methods. In addition, the application must include a schedule for compliance certification submittals during the permit term. These submittals must be no less frequent than annually and may need to be more frequent if specified by the underlying applicable requirement or the Technical Secretary.

GENERAL IDENTIFICATION AND DESCRIPTION

1. Facility name: **BAE SYSTEMS Ordnance Systems Holston Army Ammunition Plant**
2. Process emission source, fuel burning installation, or incinerator (identify): Building [REDACTED] Milling [REDACTED]
3. Stack ID or flow diagram point identification(s): **See flow diagram**

METHODS OF DETERMINING COMPLIANCE

4. This source as described under Item #2 of this application will use the following method(s) for determining compliance with applicable requirements (and special operating conditions from an existing permit). Check all that apply and attach the appropriate form(s)

☐ Continuous Emission Monitoring (CEM) - APC 20
 Pollutant(s): _____

☐ Emission Monitoring Using Portable Monitors - APC 21
 Pollutant(s): _____

☒ Monitoring Control System Parameters or Operating Parameters of a Process - APC 22
 Pollutant(s): **PM, PM10, PM2.5**

☒ Monitoring Maintenance Procedures - APC 23
 Pollutant(s): **PM, PM10, PM2.5**

☐ Stack Testing - APC 24
 Pollutant(s): _____

☐ Fuel Sampling & Analysis (FSA) - APC 25
 Pollutant(s): _____

☒ Recordkeeping - APC 26
 Pollutant(s): **PM, PM10, PM2.5**

☒ Other (please describe) - APC 27
 Pollutant(s): **PM, PM10, PM2.5**

5. Compliance certification reports will be submitted to the Division according to the following schedule:
 Start date: **In accordance with Title V permit certification requirements/frequency**
 And every **365** days thereafter.

6. Compliance monitoring reports will be submitted to the Division according to the following schedule:
 Start date: **In accordance with Title V permit certification requirements/frequency**
 And every **180** days thereafter.

7. Page number: _____ Revision number: _____ Date of revision: _____



**TITLE V PERMIT APPLICATION - COMPLIANCE DEMONSTRATION BY
 MONITORING CONTROL SYSTEM PARAMETERS OR OPERATING PARAMETERS OF A PROCESS**

The monitoring of a control system parameter or a process parameter shall be acceptable as a compliance demonstration method provided that a correlation between the parameter value and the emission rate of a particular pollutant is established.

GENERAL IDENTIFICATION AND DESCRIPTION

1. Facility name: BAE SYSTEMS Ordnance Systems Inc., Holston Army Ammunition Plant	2. Stack ID or flow diagram point identification(s) Vent Points A and B
3. Emission source: Building [REDACTED] Milling [REDACTED]	

MONITORING DESCRIPTION

4. Pollutant(s) being monitored: PM, PM10, PM2.5
5. Description of the method of monitoring and establishment of correlation between the parameter value and the emission rate of a particular pollutant: The dryer scrubber will be monitored in accordance with the manufacturer's recommendation and suggested frequency. Likely the water recirculation flow rate and the feed hopper scrubber recirculation flow rate will be monitored once per shift when the process emission unit is in operation. The minimum flow rate or alternative metric will be recommended along with frequency by the manufacturer.
6. Compliance demonstration frequency (specify the frequency with which compliance will be demonstrated): Either once per shift or as recommended by the scrubber manufacturer - when the emission unit is in operation

7. Page number:	Revision number:	Date of revision:
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TITLE V PERMIT APPLICATION
COMPLIANCE DEMONSTRATION BY MONITORING MAINTENANCE PROCEDURES

The monitoring of a maintenance procedure shall be acceptable as a compliance demonstration method provided that a correlation between the procedure and the emission rate of a particular pollutant is established.

GENERAL IDENTIFICATION AND DESCRIPTION

1. Facility name:
BAE SYSTEMS Ordnance Systems Inc., Holston Army Ammunition Plant

2. Stack ID or flow diagram point identification(s):
Vent Points A, B, C, and D

3. Emission source (identify):
Building [REDACTED] Milling [REDACTED]

MONITORING DESCRIPTION

4. Pollutant(s) being monitored:
PM, PM10, PM2.5

5. Procedure being monitored:
For each of the control devices (dryer scrubber, feed hopper scrubber, HEPA filters), the manufacturer's recommended or approved optional maintenance procedures will be followed.

6. Description of the method of monitoring and establishment of correlation between the procedure and the emission rate of a particular pollutant:

The manufacturer's recommended or approved optional maintenance procedures established and correlated preventive maintenance procedures will be tracked in OSI's electronic preventive maintenance tracking system.

7. Compliance demonstration frequency (specify the frequency with which compliance will be demonstrated):
Frequency to be determined per vendor recommendations and records to be maintained on-site.

8. Page number: Revision number: Date of revision:



TITLE V PERMIT APPLICATION
COMPLIANCE DEMONSTRATION BY RECORDKEEPING

Recordkeeping shall be acceptable as a compliance demonstration method provided that a correlation between the parameter value recorded and the applicable requirement is established.

GENERAL IDENTIFICATION AND DESCRIPTION

1. Facility name: BAE SYSTEMS Ordnance Systems Holston Army Ammunition Plant	2. Stack ID or flow diagram point identification(s): Vent Points A and B
3. Emission source (identify): Building [REDACTED] Milling [REDACTED]	

MONITORING AND RECORDKEEPING DESCRIPTION

4. Pollutant(s) or parameter being monitored: PM, PM10, PM2.5
5. Material or parameter being monitored and recorded: Scrubber Flow Rate
6. Method of monitoring and recording: The [REDACTED] dryer scrubber recirculation flow rate and feed hopper scrubber recirculation flow rate shall be monitored and recorded once per shift when the process emission source is in operation. As an alternative the manufacturer's recommended parameter or metric at the manufacturer's recommended frequency will be monitored in lieu of the flow rate.
7. Compliance demonstration frequency (specify the frequency with which compliance will be demonstrated): Once per shift when the process emission source is in operation or as recommended by the manufacturer. The records will be maintained on-site.
8. Page number: Revision number: Date of revision:



**TITLE V PERMIT APPLICATION
COMPLIANCE DEMONSTRATION BY OTHER METHOD(S)**

GENERAL IDENTIFICATION AND DESCRIPTION		
1. Facility name: BAE SYSTEMS Ordnance Systems Inc., Holston Army Ammunition Plant	2. Stack ID or flow diagram point identification(s): Vent Points A, B, C, and D	
3. Emission source (identify): Building [REDACTED] Milling [REDACTED]		
MONITORING DESCRIPTION		
4. Pollutant(s) or parameter being monitored: Opacity		
5. Description of the method of monitoring: Compliance with the standard shall be determined by the procedures of the Tennessee Division of Air Pollution Control's Opacity Matrix dated June 18, 1996 and amended September 12, 2005. Standard: Visible emissions from this source shall not exhibit greater than twenty percent (20%) opacity, except for an aggregate of no more than five (5) minutes in any one (1) hour period, and no more than twenty (20) minutes in any twenty-four (24) hour period. Visible emissions from these sources shall be determined by Tennessee Visible Emission Evaluation Method 2, as adopted by the Tennessee Air Pollution Control Board on August 24 1984 (aggregate count). TAPCR 1200-3-5-.01(1)		
6. Compliance demonstration frequency (specify the frequency with which compliance will be demonstrated): Frequency as required per the Tennessee Division of Air Pollution Control's Opacity Matrix		
7. Page number:	Revision number:	Date of revision:



TITLE V PERMIT APPLICATION
EMISSIONS FROM PROCESS EMISSION SOURCE / FUEL BURNING INSTALLATION / INCINERATOR

GENERAL IDENTIFICATION AND DESCRIPTION	
1. Facility name: BAE SYSTEMS Ordnance Systems Inc. Holston Army Ammunition Plant	2. Stack ID or flow diagram point identification(s): See flow diagram
3. Process emission source / Fuel burning installation / Incinerator (identify): Building [REDACTED] Milling [REDACTED]. See Appendix B for emissions calculations.	

EMISSIONS SUMMARY TABLE – CRITERIA AND FUGITIVE EMISSIONS

4. Complete the following emissions summary for regulated air pollutants. Fugitive emissions shall be included. Attach calculations and emission factor references.

Air Pollutant	Maximum Allowable Emissions		Actual Emissions	
	Tons per Year	Reserved for State use (Pounds per Hour - Item 7, APC 30)	Tons per Year	Reserved for State use (Pounds per Hour - Item 8, APC 30)
Particulate Matter (TSP)	6			
(Fugitive Emissions)				
Sulfur Dioxide				
(Fugitive Emissions)				
Volatile Organic Compounds				
(Fugitive Emissions)				
Carbon Monoxide				
(Fugitive Emissions)				
Lead				
(Fugitive Emissions)				
Nitrogen Oxides				
(Fugitive Emissions)				
Total Reduced Sulfur				
(Fugitive Emissions)				
Mercury				
(Fugitive Emissions)				

(Continued on next page)

(Continued from last page)

AIR POLLUTANT	Maximum Allowable Emissions		Actual Emissions	
	Tons per Year	Reserved for State use (Pounds per Hour - Item 7, APC 30)	Tons per Year	Reserved for State use (Pounds per Hour - Item 8, APC 30)
Asbestos				
(Fugitive Emissions)				
Beryllium				
(Fugitive Emissions)				
Vinyl Chloride				
(Fugitive Emissions)				
Fluorides				
(Fugitive Emissions)				
Gaseous Fluorides				
(Fugitive Emissions)				
Greenhouse Gases in CO ₂ Equivalents				

EMISSIONS SUMMARY TABLE – FUGITIVE HAZARDOUS AIR POLLUTANTS

5. Complete the following emissions summary for regulated air pollutants that are hazardous air pollutant(s). Fugitive emissions shall be included. Attach calculations and emission factor references.

Air Pollutant & CAS	Maximum Allowable Emissions		Actual Emissions	
	Tons per Year	Reserved for State use (Pounds per Hour - Item 7, APC 30)	Tons per Year	Reserved for State use (Pounds per Hour - Item 8, APC 30)

6. Page number: Revision number: Date of revision



**TITLE V PERMIT APPLICATION
 CURRENT EMISSIONS REQUIREMENTS AND STATUS**

GENERAL IDENTIFICATION AND DESCRIPTION

1. Facility name: BAE SYSTEMS Ordnance Systems Holston Army Ammunition Plant	2. Emission source number See Flow Diagram
3. Describe the process emission source / fuel burning installation / incinerator. Building [REDACTED] Milling [REDACTED]	

EMISSIONS AND REQUIREMENTS

4. Identify if only a part of the source is subject to this requirement	5. Pollutant	6. Applicable requirement(s): TN Air Pollution Control Regulations, 40 CFR, permit restrictions, air quality based standards	7. Limitation	8. Maximum actual emissions	9. Compliance status (In/Out)
All	PM, PM10, PM2.5	TAPCR 1200-03-06-.01(7) and application if not IEU under 1200-03-09-.04	6 tpy	6 tpy	IN
All	Opacity	TVEE Method 2	20% Opacity	NA	IN

10. Other applicable requirements (new requirements that apply to this source during the term of this permit)

11. Page number:	Revision number:	Date of revision:
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Appendix B
Emission Calculations

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Appendix C
Air Dispersion Modeling Report

APPENDIX C

AIR DISPERSION MODELING FOR THE EXPANSION PROJECT AT THE HOLSTON ARMY AMMUNITION PLANT IN KINGSFORT, TENNESSEE

The logo for BAE Systems, consisting of the words "BAE SYSTEMS" in white, bold, sans-serif capital letters, centered within a solid red rectangular background.

**Prepared for:
BAE Systems, Ordinance Systems Inc.
4509 W Stone Drive
Kingsport, TN 37660**

**Prepared by:
RTP Environmental Associates
304A West Millbrook Road
Raleigh, North Carolina 27609**

June 2018

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1.0 INTRODUCTION

This document presents the results of the air quality dispersion modeling analysis conducted for the Expansion Project at the Holston Army Ammunitions Plant (HSAAP) in Kingsport, Tennessee.

The analysis evaluated emissions of the criteria pollutants regulated under the applicable provisions of the Prevention of Significant Deterioration (“PSD”) regulations of the Tennessee Air Pollution Control Regulations Chapter 1200-03-09-.01(4). The criteria pollutant analysis was conducted to ensure that the emissions from the Expansion processes will not cause or contribute to air pollution in violation of a National Ambient Air Quality Standard (NAAQS) or increment for all criteria pollutants proposed to be emitted in excess of the PSD significant emission rates (“SERs”).

The modeling conforms with the modeling procedures outlined in the Environmental Protection Agency’s Guideline on Air Quality Models¹ (Guideline or Appendix W), associated EPA modeling policy and guidance, as well as the modeling protocol document submitted to, and approved with minor revisions, by the Tennessee Department of Environment and Conservation (TDEC)²..

2.0 PROJECT DESCRIPTION

HSAAP is the major supplier of explosive materials, primarily RDX- and HMX-based products, to the U.S. Department of Defense. The combined processes to produce RDX and HMX at HSAAP are currently at capacity to meet product demand for the U.S. Military and an increase in capacity is needed to meet the projected orders for the currently forecasted years. Consequently, HSAAP is undertaking a large portfolio of expansion projects known as the Expansion Program (“the Project”).

The Project will result in the need for new process buildings. Two other unrelated process buildings are also scheduled to be added during the same construction period. Emissions from these new process buildings and support equipment will include nitrogen oxides (“NO_x”), carbon monoxide (“CO”), particulate matter (“PM”), volatile organic compounds (“VOC”), hazardous air pollutants (“HAP’s”), and greenhouse gases (“GHG’s”). The combined emissions from these process buildings are expected to be above some SER’s. Process types include combustion for steam, chemical manufacturing, milling, distillation, coating operations, chemical storage, etc.

Project will result in increases in emissions of VOC and GHG’s, and possibly CO that are in excess of PSD SERs. Overall, NO_x emissions will decrease because HSSAP will also retire several existing coal fired boilers as part of the project.

3.0 SITE DESCRIPTION

HSAAP spans over 6,000 acres and two counties (Hawkins and Sullivan). There are over [REDACTED] buildings and storage magazines on site. The facility is owned by the Department of Defense and is operated by BAE Systems, Ordinance Systems Inc. (OSI). The approximate Universal Transverse Mercator (UTM) coordinates of HSAAP are 354,150 meters east and 4,044,500 meters north (UTM Zone 17, NAD 83). Figure 1 shows the general location of HSAAP. Figure 2 shows the specific HSAAP location on a 7.5-minute U.S. Geological Survey (USGS) topographic map.

HSAAP is classified under the regulations governing PSD and Title V as a major source. Hawkins and Sullivan Counties are classified as attainment or unclassifiable for all regulated pollutants except SO₂. There is an SO₂ non-attainment area in Sullivan County.

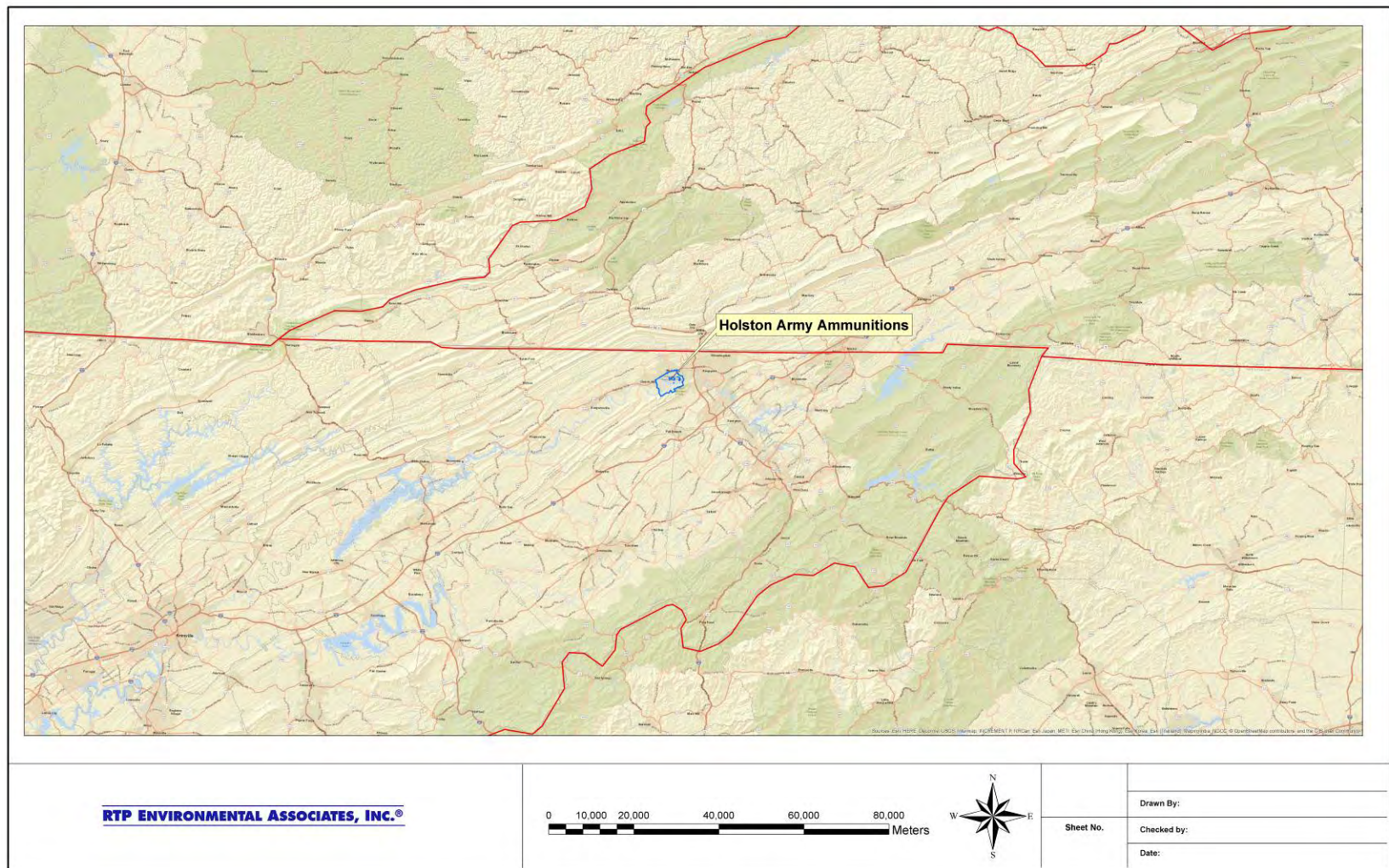


Figure 1. General Location of the Holston Army Ammunitions Plant

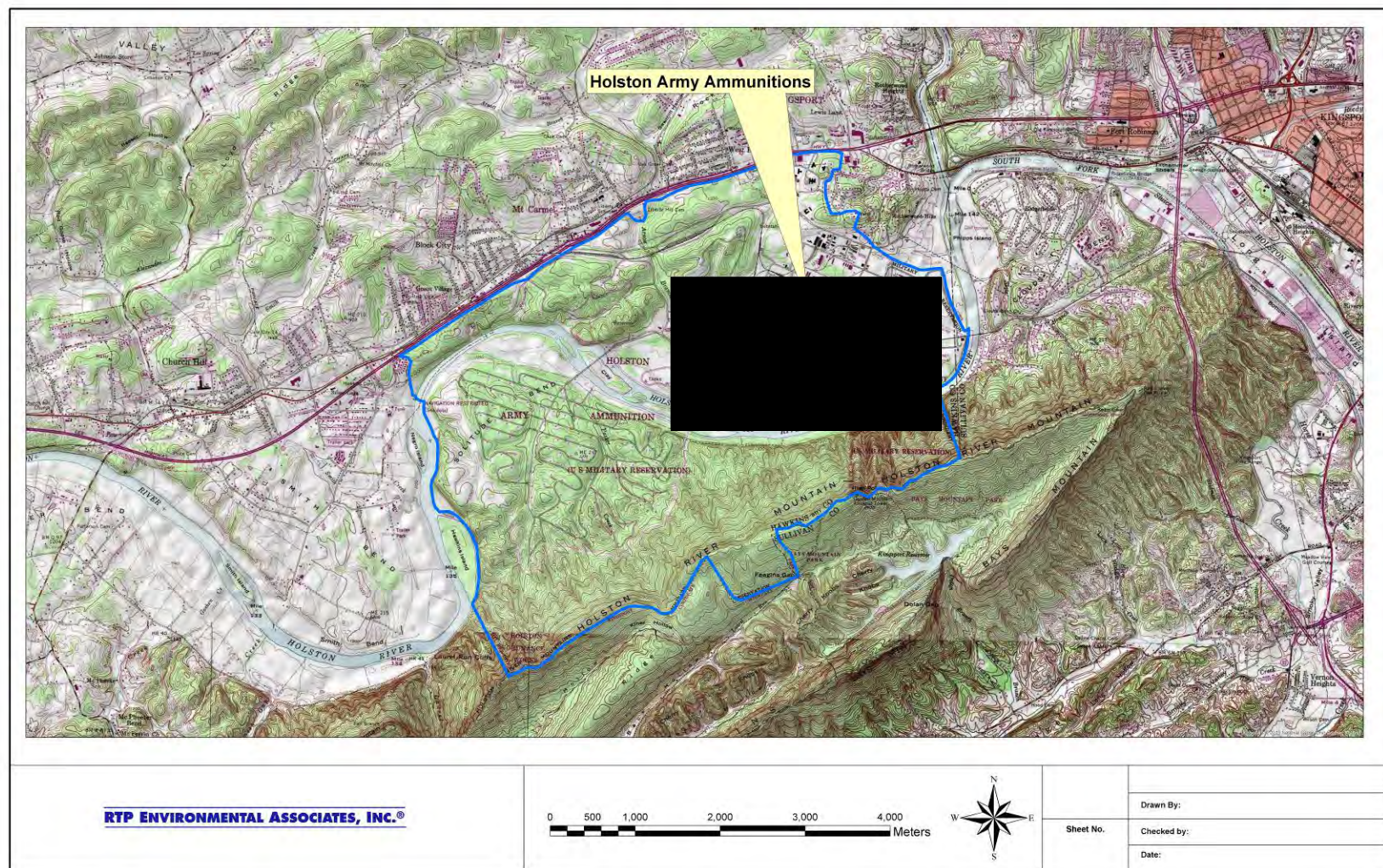


Figure 2. Specific Location of HSSAP

4.0 MODEL SELECTION AND MODEL INPUT

4.1 Model Selection

The latest version of the AMS/EPA Regulatory Model (AERMOD, Version 18081) was used to conduct the dispersion modeling analysis. AERMOD is a Gaussian plume dispersion model that is based on planetary boundary layer principals for characterizing atmospheric stability. The model evaluates the non-Gaussian vertical behavior of plumes during convective conditions with the probability density function and the superposition of several Gaussian plumes. AERMOD is a modeling system with three components: AERMAP is the terrain preprocessor program, AERMET is the meteorological data preprocessor and AERMOD includes the dispersion modeling algorithms.

AERMOD is the required default model for calculating ambient concentrations near the HSAAP based on the model's ability to incorporate multiple sources and source types. The model can also account for convective updrafts and downdrafts and meteorological data throughout the plume depth. The model also provides parameters required for use with up to date planetary boundary layer parameterization. The model also has the ability to incorporate building wake effects and to calculate concentrations within the cavity recirculation zone. All model options will be selected as recommended in the EPA Guideline on Air Quality Models.

Oris Solution's BEEST Graphical User Interface (GUI) was used to run AERMOD. The GUI uses an altered version of the AERMOD code to allow for flexibility in the file naming convention. The dispersion algorithms of AERMOD are not altered. Therefore, a model equivalency evaluation pursuant to Section 3.2 of 40 CFR 51, Appendix W is not warranted.

4.2 Model Control Options and Land Use

AERMOD was run in the regulatory default mode. The default rural dispersion

coefficients in the model were used. This is supported by the Land Use Procedure consistent with subsection 7.2.3(c) of the Guideline and Section 5.1 of the AERMOD Implementation Guide. The USGS 2006 National Land Cover Data (NLCD) within 3km of the site were converted to Auer 1978 land use types, using recommendations from the Pennsylvania Department of Environmental Protection, and evaluated.³ It was determined that the land use in the vicinity of the Project is mixed but predominantly rural as defined by Auer (less than 50% of the area is classified as urban - Figure 3). Only the red and dark red regions in the figure (NLCD categories 23 and 24) are classified as urban using this approach.

4.3 Source Data

Point Sources

All Project emission sources will vent to stacks with a well defined opening. These sources were modeled as point sources in AERMOD. The modeled source input data are provided in Attachment A of this report.

Good Engineering Practice Stack Height Analysis

A Good Engineering Practice (GEP) stack height evaluation was conducted to determine appropriate building dimensions to include in the model and to calculate the GEP formula stack height used to justify stack height credit for stacks to be constructed in excess of 65m. Procedures to be used will be in accordance with those described in the EPA Guidelines for Determination of Good Engineering Practice Stack Height (Technical Support Document for the Stack Height Regulations-Revised)⁴. GEP formula stack height, as defined in 40 CFR 51, is expressed as $GEP = H_b + 1.5L$, where H_b is the building height and L is the lesser of the building height or maximum projected width. Building/structure locations will be determined from a facility plot plan. The structure locations and heights were input to the EPA's Building Profile Input Program (BPIP-PRIME) computer program to calculate the direction-specific building dimensions needed for AERMOD. The HSAAP plot plan is shown in Figure 4. The fenceline is shown as the outer blue line. All stacks and structures that are located near a stack were included in the BPIP runs.

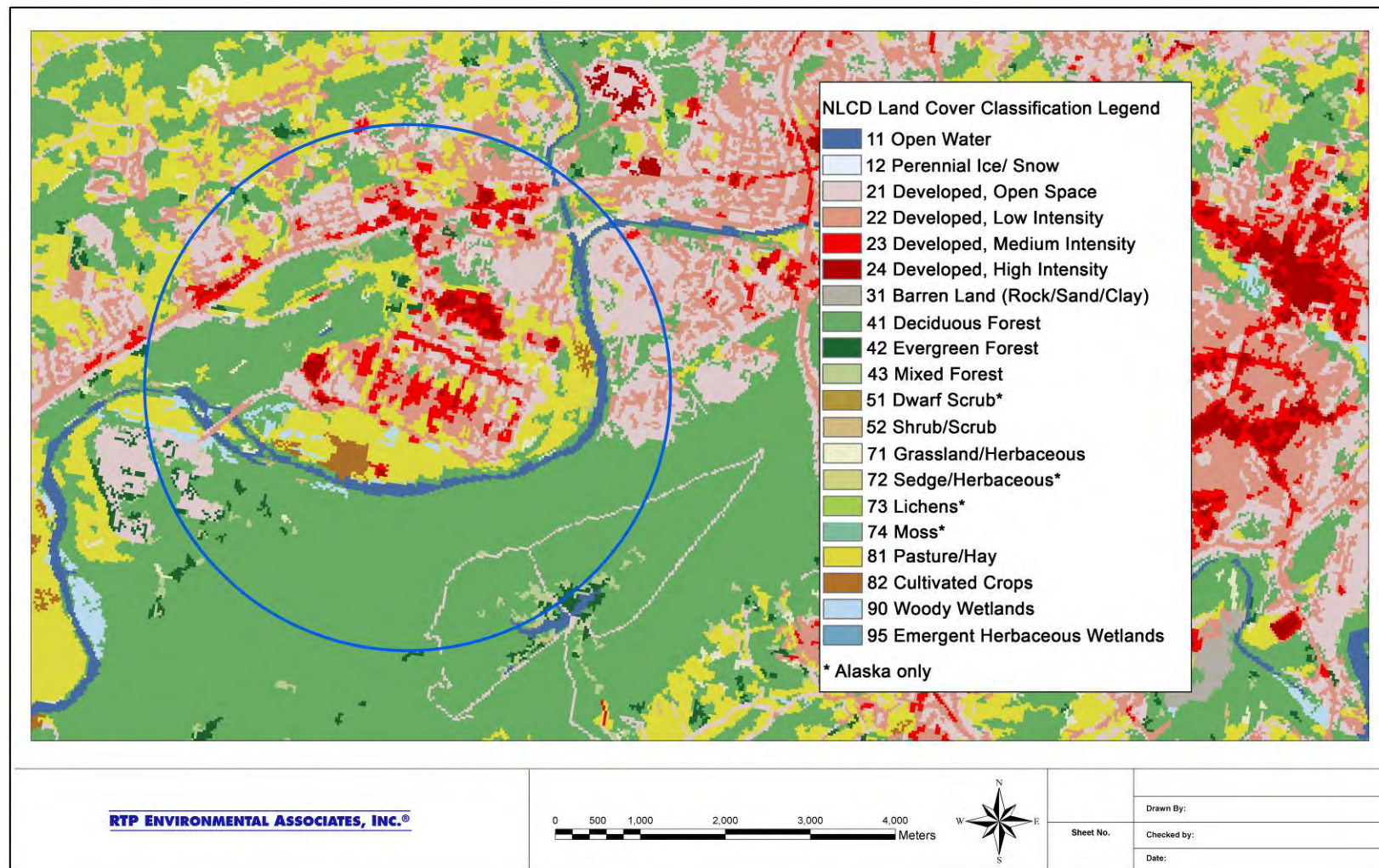


Figure 3. Land Use within Three Kilometers (Three Kilometer Radius Shown As Blue Circle)

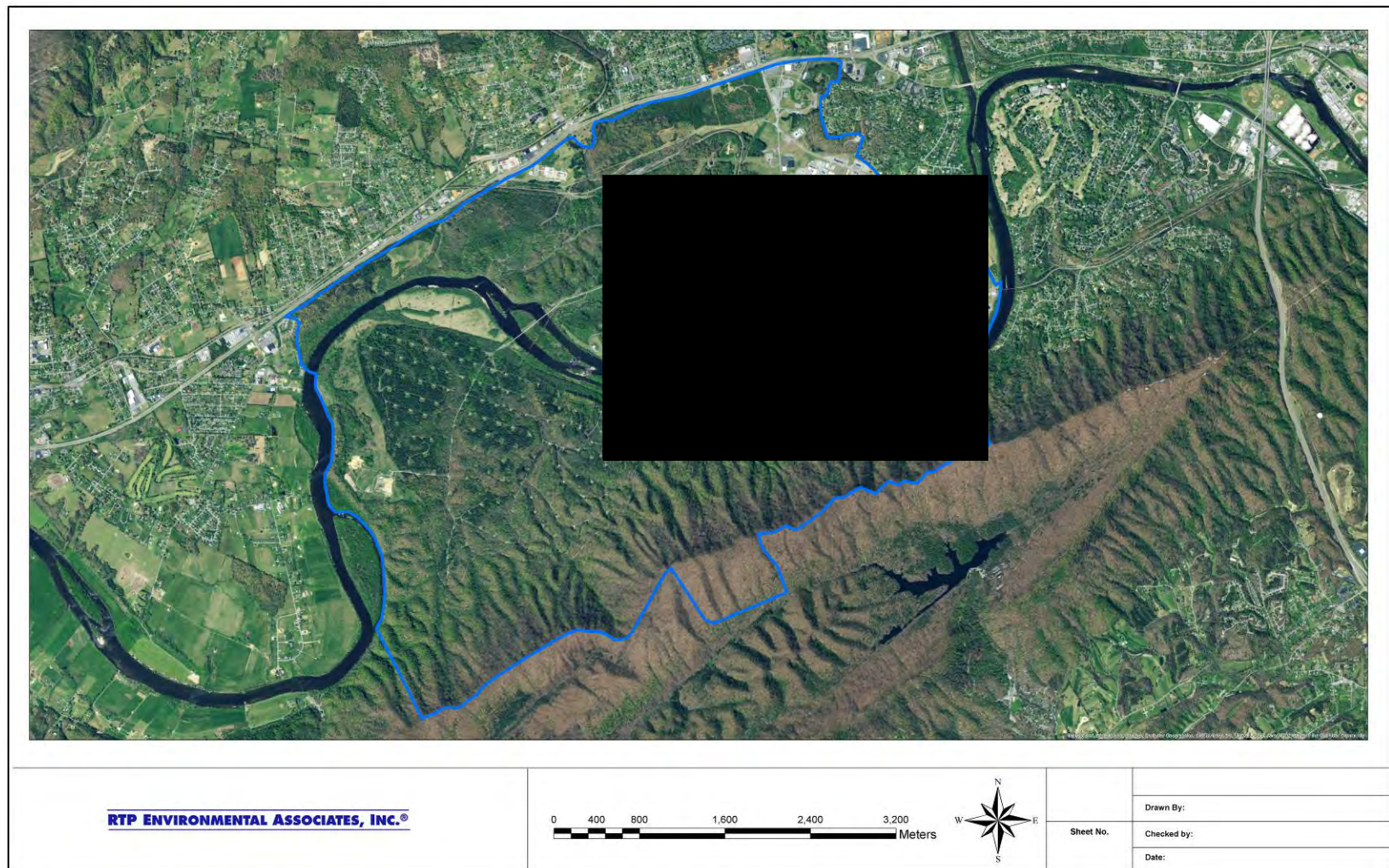


Figure 4. HSAAP Plot Plan

4.4 Monitored Background Data

Ambient, background pollutant concentrations are needed to establish a representative background concentration to complete the NAAQS portion of the *Source Impact Analysis* required by 40 CFR 52.21(k). The background concentrations are added to the modeled concentrations to assess NAAQS compliance. Ambient pollutant concentrations are also needed to fulfill the *Air Quality Analysis* requirement of 40 CFR 52.21(m).

Pursuant to 40 CFR 52.21(i)(5), requirements for ambient monitoring data may be waived by the permitting authority if projected increases in ambient concentrations due to the project are less than the Significant Monitoring Concentrations. However, in light of the decision of the D.C. Circuit Court of Appeals *Sierra Club v. EPA*,⁵ OSI has elected not to request such a waiver.

The EPA Monitoring Guidelines⁶, other EPA interpretive guidance, and EPA administrative decisions clarify that representative, existing air quality monitoring data may be used to fulfill the PSD pre-construction monitoring requirements and establish background concentrations needed for assessing NAAQS compliance, in lieu of monitoring data. EPA's Monitoring Guidelines suggest specific criteria to determine representativeness of off-site data: *quality of the data, currentness of the data, and monitor location*.

There are existing CO and ozone ambient monitors that can be used in lieu of site specific preconstruction monitoring data. Existing monitoring data have been evaluated in relation to the criteria provided in EPA's Ambient Monitoring Guidelines as being representative of the HSAAP site.

The most recent available, quality assured data (2015-2017) are presented in Table 1. The data are from the monitors in Memphis (AQS Site # 47-157-0075 for CO and AQS Site #47-163-2003 for ozone).

These monitors best represent background concentrations as they are the closest monitors with data for the pollutants of concern.

Table 1. Background Concentrations 2015-2017

Pollutant	Averaging Time	Design Value (ppb)	Basis	AQS Site No.
CO	1-hour	1500	High 2 nd High	47-157-0075
	8-hour	900	High 2 nd High	
Ozone	8-hour	66	Maximum	47-163-2003

The existing monitoring data satisfy the criteria provided in EPA's Ambient Monitoring Guidelines⁷ as being representative of the site and should therefore be allowed for use.

Monitor Location

Of the monitors available, these monitors represent background concentrations as they are the closest monitors with data for the pollutants of concern that are not also significantly influenced by the localized source impacts.

Data Quality

The monitor data were collected and quality assured by the Tennessee Department of Environment & Conservation (TDEC).

Currentness of Data

The data were collected during 2015-2017, which represents the most recent quality assured data available for use in assessing compliance.

4.5 Receptor Data

Modeled receptors were placed in all areas considered as "ambient air" pursuant to 40 CFR 50.1(e). Ambient air is defined as that portion of the atmosphere, external to buildings, to which the general public has access. The HSSAP is a tightly controlled facility due to the nature of operations. A contiguous fence which precludes public access surrounds the facility. Approximately 15,400 receptors were used in the

AERMOD significant impacts analysis. The receptor grid consists of two cartesian grids and receptors spaced at 50m intervals along the facility fenceline. The first cartesian grid extends to approximately 2km from the fence in all directions. Receptors in this region were spaced at 100m intervals. The second grid extends to 7.5km. Receptor spacing in this region was 250m. The receptor grid is designed such that maximum facility impacts fall within the 100m spacing of receptors. No refinements to the grid was needed because maximum impacts were identified in the 1000m grid. The receptor grid spacing is presented in Table 2.

Table 2. Receptor Grid Spacing

Receptor Spacing (m)	Distance from Facility Fence (m)
100	2,000
250	7,500

HSAAP is located in northeastern Tennessee. Terrain within 10km of the site is generally hilly. Receptor elevations and hill height scale factors were calculated with AERMAP (18081). The elevation data were obtained from the USGS one arc second National Elevation Data (NED). Locations were based upon a NAD83, UTM Zone 17 projection. The near-field receptor grid is presented in Figure 6.

4.6 Meteorological Data

The 2012-2016, 5-year sequential hourly surface meteorological data from the National Weather Service (NWS) Station in Bristol, TN (WBAN No. 13877) and upper air data from the NWS station in Roanoke, VA (WBAN No. 53829) were used in the analysis.

These data have been processed into a “model-ready” format using the latest version of AERMET (version 18081).

The AERMET meteorological processor requires estimates of the following surface characteristics: surface roughness length, albedo, and Bowen ratio. The surface roughness length is related to the height of obstacles to the wind flow. It is the height

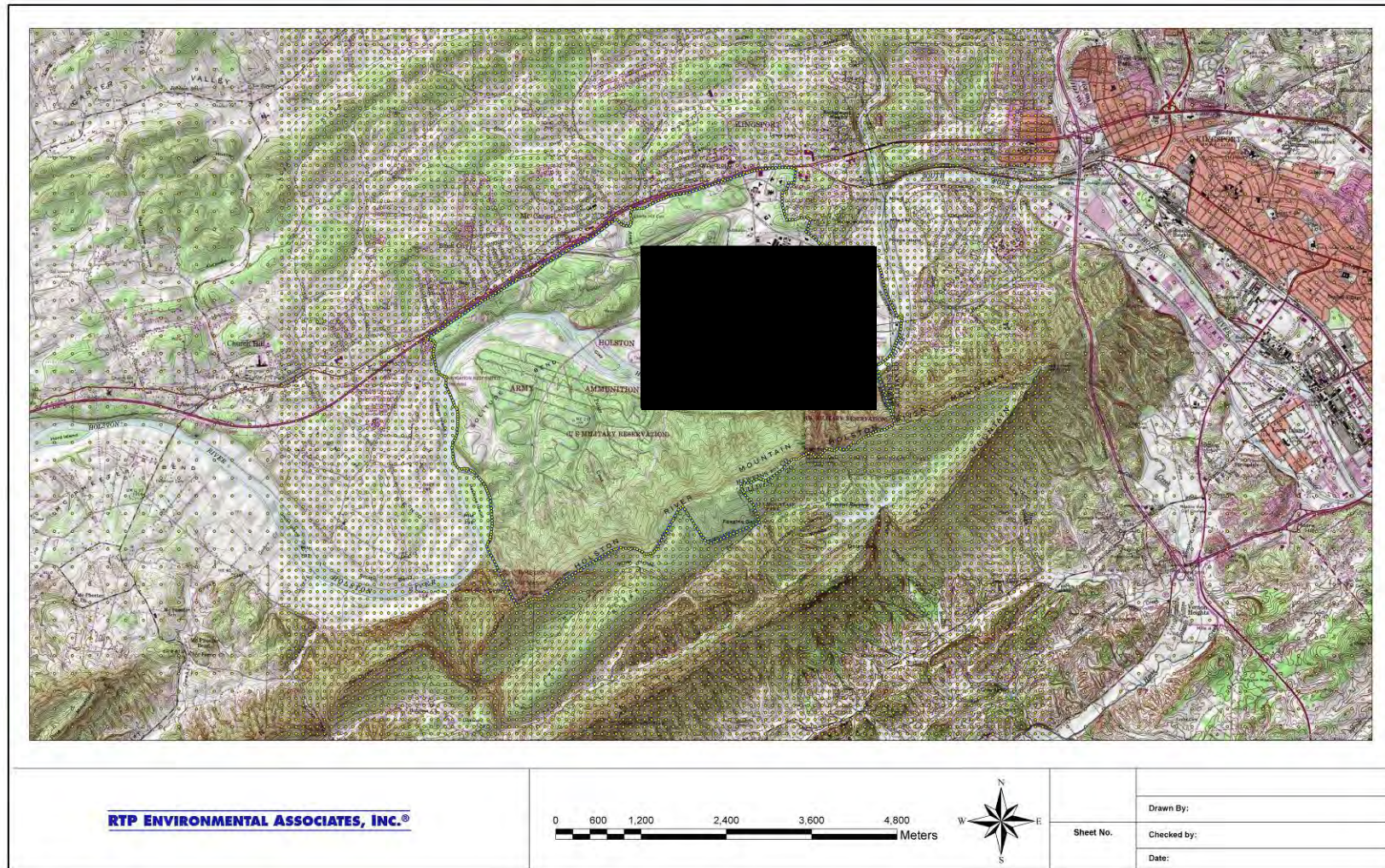


Figure 5. HSAAP Near-field Receptor Grid

above the surface where the average wind speed is zero. The smoother the surface, the lower the roughness length. The surface roughness length influences the surface shear stress and is an important factor in calculating mechanical turbulence and stability. The albedo is the fraction of the total incident solar radiation reflected by the surface back to space without absorption. The Bowen ratio is an indicator of surface moisture and is the ratio of the sensible heat flux to the latent heat flux. The albedo and Bowen ratio are used for determining the planetary boundary layer parameters for convective conditions due to the surface sensible heat flux.

Estimates of the surface characteristics were made using EPA's AERSURFACE program (Version 13016). Surface characteristics were compiled for both the Bristol tower location and the HSSAP site location. Two sets of surface characteristics were compiled due to the fact that the surface characteristics of the tower location and the site location are not similar. A 1km search radius was employed at each location. Twelve sectors of 30 degrees each and seasonal resolution were used in the AERSURFACE analysis. The "ADJ_U*" option to allow for adjustments to the friction velocity under low wind speeds was employed.

The use of NWS meteorological data for dispersion modeling can often lead to a high incidence of calms and variable wind conditions if the data are collected by Automated Surface Observing Stations (ASOS), as are in use at most NWS stations since the mid-1990's. A calm wind is defined as a wind speed less than 3 knots and is assigned a value of 0 knots. In addition, variable wind observations may include wind speeds up to 6 knots, but the wind direction is reported as missing, if the wind direction varies more than 60 degrees during the 2-minute averaging period for the observation. The AERMOD model currently cannot simulate dispersion under calm or missing wind conditions. To reduce the number of calms and missing winds in the surface data, archived 1-minute winds for the ASOS stations were used to calculate hourly average wind speeds and directions, which were used to supplement the standard archive of hourly observed winds processed in AERMET. The EPA AERMINUTE program (Version 14327) was used for these calculations. A wind rose of the 5-year meteorological dataset is provided in Figure 7.

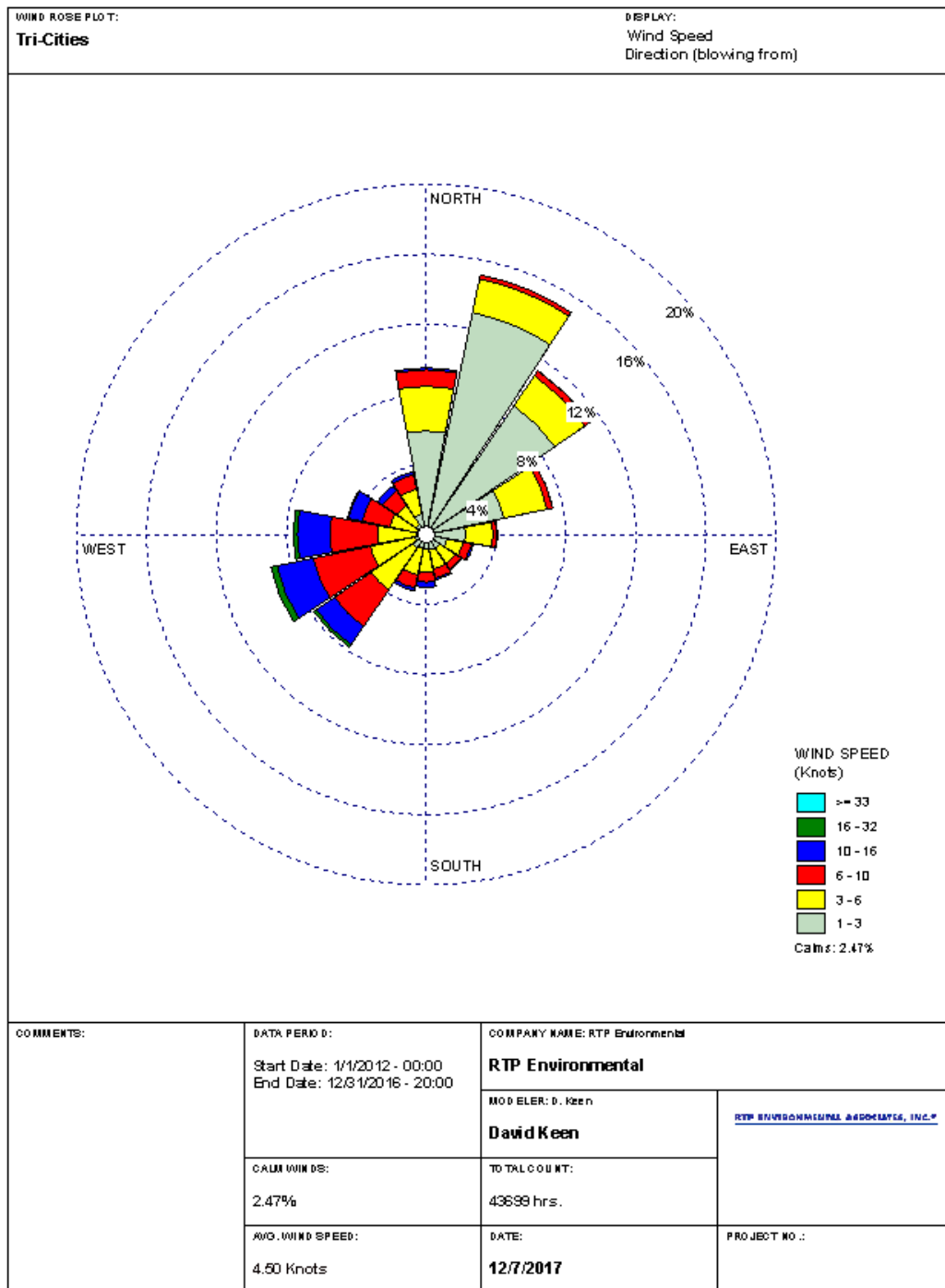


Figure 6. Tri-Cities Windrose 2012-2016.

5.0 MODELING METHODOLOGY

5.1 Pollutants Subject to Review

Only the criteria pollutants whose emissions increases exceed the PSD significance thresholds and are therefore subject to PSD review were evaluated in the modeling analysis. There are no ambient air quality standards for GHGs. These pollutants therefore do not require evaluation.

5.2 Ozone Analysis

There are currently no regulatory photochemical models available to evaluate smaller spatial scales or single-source impacts on ozone concentrations. Since ozone is formed from precursor pollutants, assessment of ambient ozone impacts is typically conducted on a regional basis using resource-intensive models such as the EPA Community Multiscale Air Quality (CMAQ) model. However, sources subject to PSD review are required to conduct a source impact analysis and demonstrate that a proposed source will not cause or contribute to a violation of any NAAQS or applicable increment. Qualitative ozone analyses have typically been performed in recent PSD applications to evaluate whether ozone precursor emissions (NO_x and VOC) will significantly impact regional ozone formation.

Potential emissions of NO₂ will decrease due to the Project; however, VOC emissions will be above 40 tons per year. The EPA and permitting authorities have historically used the 100 ton per year threshold to assess whether a detailed air quality analysis should be conducted for ozone.⁸ According to EPA, although this threshold has not been revisited since promulgation of the 8-hour ozone NAAQS, it is unlikely that a source emitting below this level would contribute to a violation of the 8-hour ozone NAAQS.

We have evaluated the project's ozone precursor emissions under the EPA's draft Modeled Emission Rates for Precursors ("MERPs") guidance⁹, as also described by the TDEC in its April 10, 2018, MERPs Guidance¹⁰, to further demonstrate that the project

will not result in quantifiable ozone formation. Under TDEC's MERPs guidance, the Project proposed VOC emissions increase of 116 tons per year is below the lowest 8-hr ozone MERP value of 1339 tons per year (see Table 2 of the TDEC MERPs guidance). Since NO_x emissions will decrease, there is no need to consider NO_x emissions in the evaluation. Based upon this assessment, ozone formation due to the Project will be assumed negligible.

5.3 Significant Impact Analysis

Since maximum CO impacts were determined to be less than the Significant Impact Levels (SIL), there was no need to conduct a more detailed NAAQS analysis (there is no increment for CO). In the significant impacts analysis, the calculated maximum impacts were determined. These impacts define the net change in air quality resulting from the proposed modification. Five years of meteorological data were used in the significant impact analysis. Maximum modeled concentrations were compared to the CO significance levels listed in Table 3.

Table 3. PSD Class II Significant Impact Levels

Pollutant	Averaging Time	PSD Class II Significant Impact Levels (µg/m³)
CO	1-hour	2000
	8-hour	500

5.4 Class II Visibility Analysis

A Class II visibility analysis was not conducted since the proposed project will not result in a significant increase in emissions of any visibility impairing pollutant (i.e., NO_x or PM₁₀). CO is not a visibility impairing pollutant that requires evaluation.

6.0 MODEL RESULTS

The results of the CO significant impact modeling analysis are presented in Table 4. As shown, the project will result in insignificant ambient impacts. A more refined NAAQS analysis was therefore not required. The meteorological data as well as model input and output have been provided electronically. Model summary results can be found in Attachment B.

Table 4. Significant Impact Results

Pollutant	Surface Characteristics	Averaging Time	Maximum CO Impact ($\mu\text{g}/\text{m}^3$)	PSD Class II Significant Impact Level ($\mu\text{g}/\text{m}^3$)
CO	Airport	1-hour	224	2000
		8-hour	38.2	500
	Site	1-hour	247	2000
		8-hour	44.6	500

7.0 CLASS I AREA IMPACTS

7.1 Class I AQRV Analysis

There are five Class I areas located within 300km of the HSAAP (please see Figure 8).^a The closest Class I area is the Linville Gorge Wilderness Area, located 95km to the southeast. CO emissions do not require evaluation by the FLM's. Therefore, no Class I AQRV analysis will be conducted.

7.2 Class I Increment Analysis

There are no PSD increments for CO. Therefore, a Class I increment analysis will not be conducted.

^a Class I areas are pristine areas (e.g., large National Parks and Wilderness Areas) that have been designated by Congress and are afforded a greater degree of air quality protection. All other areas are designated as Class II areas.

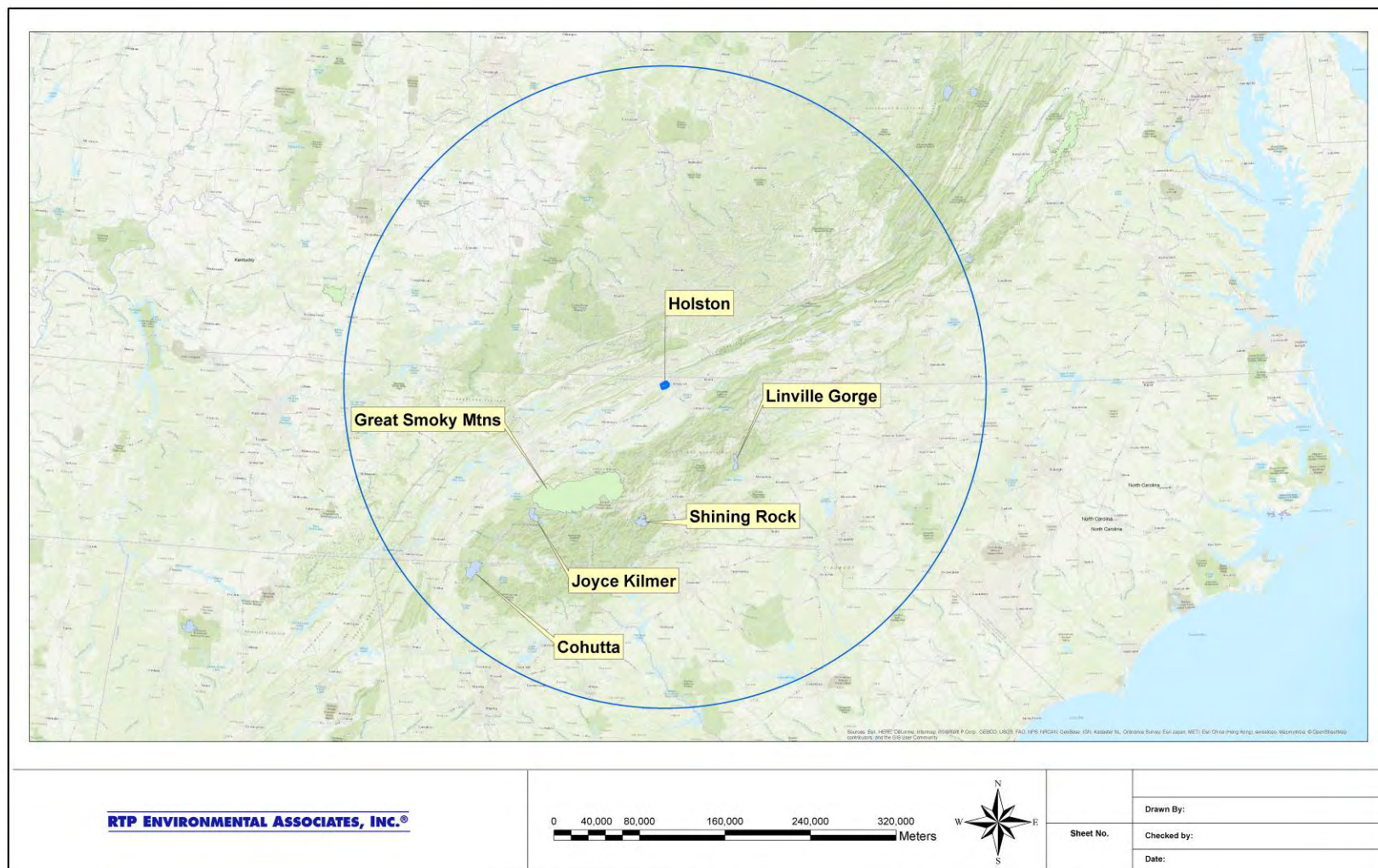


Figure 7. Class I Areas Relative to the Holston Site (300km Radius Shown)

Attachment A
MODEL INPUT DATA

Holston Inputs (NAD83, Zone 17) (5-23-18)

Source ID	Source Description	Easting (m)	Northing (m)	Base Elevation (ft)	Stack Height (ft)	Temp (F)	Exit Velocity (ft/sec)	Stack Diameter (ft)	CO (lb/hr)
7	Steam and Gas Stack 1 (NG)	353025.85	4044847.69	1217.88	75.00	300.00	127.00	5.00	6.0000
8	Steam and Gas Stack 2 (NG)	352995.49	4044848.47	1217.81	75.00	300.00	127.00	5.00	6.0000
9	Steam and Gas Stack 3 (NG)	352966.23	4044846.34	1215.39	75.00	300.00	127.00	5.00	6.0000
10	Steam and Gas Stack 4 (NG)	352932.92	4044846.00	1211.81	75.00	300.00	127.00	5.00	6.0000
13	ANSOL Tech Stack	352911.88	4044393.35	1201.25	42.00	220.00	21.00	1.00	1.1500
14	ANSOL Tech Stack	352923.20	4044334.93	1199.05	50.00	68.00	42.32	0.98	3.4200
15	A2B Train Kentene Furnace Stack	353212.62	4044685.12	1203.64	35.00	450.00	11.00	0.87	0.2000
16	A2B Train Kentene Furnace Stack	353203.84	4044687.84	1203.08	35.00	450.00	11.00	0.87	0.2000
17	A2B contribution to flare	353012.62	4044653.18	1199.54	55.00	850.00	4.30	0.30	5.0800
20	IMX production fume	354778.63	4044018.25	1205.71	40.27	68.00	42.32	0.98	5.0000
21	NAC/SAC Train 3	353069.14	4044259.47	1195.14	112.86	95.09	59.06	0.33	2.4500
23	Emergency generator (gas-fired)	352957.72	4044345.13	1199.93	40.00	350.00	32.000	1.00	2.8000
24	Emergency generator (gas-fired)	352950.04	4044342.35	1199.77	40.00	350.00	32.000	1.00	2.8000
25	Emergency generator (gas-fired)	352943.90	4044339.92	1199.61	40.00	350.00	32.000	1.00	2.8000
26	Emergency generator (gas-fired)	352938.65	4044339.14	1199.48	40.00	350.00	32.000	1.00	2.8000
27		354855.00	4044163.00	1201.41	23.00	-460.00	0.030	1.00	0.2300

Attachment B
MODEL SUMMARY RESULTS

Model Summary Output

Holston CO SIL Analysis Results (5-29-18)													
Model	File	Pollutant	Average	Group	Rank	Conc/Dep	East (X)	North (Y)	Elev	Hill	Flag	Time	Met File
AERMOD 18081	Holston SIL_5yrs_CO.SUM	CO	1-HR	ALL	1ST	224.3012	351800	4045600	390.97	410.16	0	12020108	BRS-RNK_2012_2016.SFC
AERMOD 18081	Holston SIL_5yrs_CO.SUM	CO	8-HR	ALL	1ST	38.20424	352650	4037450	400.87	676.98	0	13010508	BRS-RNK_2012_2016.SFC
AERMOD 18081	Holston SIL_5yrs_CO_SS.SUM	CO	1-HR	ALL	1ST	247.2037	352115	4045745	391.75	458.3	0	14113008	BRS-RNK_2012_2016_SS.SFC
AERMOD 18081	Holston SIL_5yrs_CO_SS.SUM	CO	8-HR	ALL	1ST	44.63241	353077	4046068	392.88	392.88	0	15052708	BRS-RNK_2012_2016_SS.SFC
		Holston CO SIL Analysis Results (5-29-18)											
		Pollutant	Average	Group	Rank	Conc (ug/m3)	SIL (ug/m3)	% SIL	Surface Characteristics				
		CO	1-HR	ALL	1ST	224.30	2000	11%	Airport				
			8-HR	ALL	1ST	38.20	500	8%					
		CO	1-HR	ALL	1ST	247.20	2000	12%	Site				
			8-HR	ALL	1ST	44.63	500	9%					

REFERENCES

1. Guidelines on Air Quality Models, (Revised). Appendix W of 40 CFR Part 51, 82 FR 5182, January 17, 2017.
2. Air Dispersion Modeling Protocol for the Expansion Project at the Holston Army Ammunition Plant in Kingsport, TN, May 2018, submitted to TDEC May 17, 2018. Approved with requested revision to upper air meteorological data by Mr. Haidar Al-Rawi, May 18, 2018.
3. Auer, Jr., A.H. "Correlation of Land Use and Cover with Meteorological Anomalies." Journal of Applied Meteorology, 17:636-643, 1978.
4. Guideline for Determination of Good Engineering Practice Stack Height (Technical Support Document for Stack Height Regulations (Revised)). EPA-450/4-80-023R, U.S. Environmental Protection Agency, June 1985.
5. *Sierra Club v. EPA*, No. 10-1413, 2013 WL 216018 (Jan. 22, 2013).
6. Ambient Monitor Guidelines for Prevention of Significant Deterioration, EPA-450/4-87-007, USEPA, May 1987.
7. Ambient Monitor Guidelines for Prevention of Significant Deterioration, EPA-450/4-87-007, USEPA, May 1987.
8. See footnote 1 to 40 CFR 51.166(i)(5)(i)(f) and USEPA's 1990 NSR Workshop Manual, page C.28., footnote b.
9. Guidance on the Development of Modeled Emission Rates for Precursors (MERPs) as a Tier 1 Demonstration Tool for Ozone and PM2.5 under the PSD Permitting Program, USEPA, December 2, 2016.
10. Guidance on the Use of EPA's MERPs to Account for Secondary Ozone and Fine Particulate Formation in Tennessee, Permit Modeling Unit, TDEC, April 10, 2018.

Appendix D
Federal Land Manager Consultation

From: [Rick Bolton](#)
To: andrea_stacy@nps.gov
Cc: susan_johnson@nps.gov; john_notar@nps.gov; bob_carson@nps.gov; jim_renfro@nps.gov; bjackson02@fs.fed.us; [Haidar Alrawi \(Haidar.Alrawi@tn.gov\)](mailto:Haidar.Alrawi@tn.gov); [David Keen](mailto:David.Keen@baesystems.com); bob.winstead@baesystems.com; [Shelton, William \(US SSA\) \(william.shelton@baesystems.com\)](mailto:Shelton.William@us.ssa); [Jimmy Ogle \(james.ogle@baesystems.com\)](mailto:Jimmy.Ogle@baesystems.com); amy.crawford@baesystems.com; [John Shipp](mailto:John.Shipp@baesystems.com); [Julie Verissimo](mailto:Julie.Verissimo@baesystems.com)
Subject: FEDERAL LAND MANAGER - NATIONAL PARK SERVICE NOTIFICATION OF PSD APPLICATION FOR BAE-HOLSTON, TN PROJECT
Date: Friday, May 18, 2018 10:16:02 AM
Attachments: [image001.png](#)
Importance: High

Andrea,

I am working for BAE Systems who operates the Holston Army Ammunitions Plant (HSAAP) in Kingsport, Tennessee. HSAAP is the major supplier of explosive materials, primarily RDX- and HMX-based products, to the U.S. Department of Defense. The combined processes to produce RDX and HMX at HSAAP are currently at capacity to meet product demand for the U.S. Military and a significant increase in capacity is needed to meet the projected orders for the currently forecasted years. Consequently, HSAAP is undertaking a large portfolio of expansion projects known as the Expansion Program ("the Project").

The Project will result in the need for new process buildings. Two other unrelated process buildings are also scheduled to be added during the same construction period. Emissions from these new process buildings and support equipment will include nitrogen oxides ("NO_x"), carbon monoxide ("CO"), particulate matter ("PM"), volatile organic compounds ("VOC"), hazardous air pollutants ("HAP's"), and greenhouse gases ("GHG's"). The combined emissions from these new process buildings are expected to be above some PSD significant emission rates. Process types include combustion for steam, chemical manufacturing, milling, distillation, coating operations, chemical storage, etc. HSAAP spans over 6,000 acres and two counties (Hawkins and Sullivan). There are over [REDACTED] buildings and storage magazines on site. The approximate Universal Transverse Mercator (UTM) coordinates of HSAAP are 354,150 meters east and 4,044,500 meters north (UTM Zone 17, NAD 83). The facility is owned by the Department of Defense and is operated by BAE Systems (BAE). HSAAP is classified under the regulations governing PSD and Title V as a major source. Hawkins and Sullivan Counties are classified as attainment or unclassifiable for all regulated pollutants

While the emission calculations for the Project are not final, preliminary calculations indicate that the Project will result in increases in emissions of VOC (116 TPY) and GHG's (600,000 TPY), and possibly CO (73 TPY), that are in excess of PSD significant emission rates. The Army and BAE have developed this expansion project that includes retirement of the existing coal-fired boilers. This retirement of the existing coal-fired boilers will result in a reduction of 334 tons per year (TPY) of NO_x, 152 TPY of CO, 58 TPY of PM₁₀ & 58 TPY of PM_{2.5}, 7 TPY of VOCs

and 1,732 TPY of SO₂.

The following table provides a summary of the Project accounting of emissions, including the retirement of the coal-fired boilers. The nearest Class I Area is 95 km. As you can see, Q/D will actually be negative.

Pollutant	Project Increase in Emissions
	(TPY)
PM	(3)
PM ₁₀	(3)
PM _{2.5}	(3)
SO ₂	(1,719)
NO _x	(35)
CO	73
VOC	116

We are targeting May 31, 2018, to submit the formal PSD application to TDEC/APC and we have had two pre-application meetings with TDEC/APC to discuss the project details in the recent weeks. The modeling protocol has been sent to Haidar Alrawi, TDEC/APC. If you need further information please let me know.

Best Regards,

Rick Bolton, Sr., PM

(615) 483 9559 *cell*

(615) 255 9300 *main*

(615) 252 2835 *direct*

220 Athens Way, Suite 410

Nashville, TN 37228



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Appendix E
Confidential Business Information Request



DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF AIR POLLUTION CONTROL

REQUEST FOR PROTECTION ORDER FOR CONFIDENTIAL
INFORMATION

The Tennessee Air Quality Act, TCA 68-201-105(b)(2), grants the Department the authority to issue a protection order to prevent public dissemination of any secret formula, processes, or methods used in any manufacturing operation. The composition of air contaminants shall not be considered secret unless so declared by the Division of Air Pollution Control. Only information submitted on or as an attachment to this form will be considered for confidential treatment. Entire applications or similar documents will not be approved in total unless otherwise determined. Specific items of applications should be submitted as attachments for consideration. Information submitted on or attached to this form will be considered as confidential if approved. All disapproved information will be treated as confidential until 45 days from the date signed by the Director. If an appeal is received, information will be treated as confidential throughout the appeal period. For sources subject to the major source operating permit provisions at Division Rule 1200-3-9-.02(11), the confidential information provisions of subpart 1200-3-9-.02(11)(d)(iii) shall apply in reviewing the request for treatment of information as confidential.

1. Company Name BAE SYSTEMS Ordnance Systems Inc.
2. Company Address Holston Army Ammunition Plant
4509 West Stone Drive
Kingsport, Tennessee 37660

3. Brief Description of Material Requested for Coverage Under the Protection Order
The enclosed copy of the complete permit application that contains confidential
information and all documents and files contained in the cd accompanying.
A complete redacted copy of the application is provided for public viewing.

4. List Requested Confidential Information: (List form number, item number, and information. Items may be attached and identified by reference.)

Complete OSI HSAAP Expansion Project 31 MAY 2018 - PSD Application CONFIDENTIAL
Version

5. Authorized Signature 

Signer's Name (Type or Print) Robert E. Winstead

Title BAE Systems HSAAP Director EHSS Date 31 MAY 2018

(continued on reverse)

For Division Use Only:

This request for a Protection Order is:

☐ Approved ☐ Disapproved ☐ Granted in part as detailed below

Should you wish to appeal this administrative decision, your appeal will be handled in accordance with the provisions of the Tennessee Air Quality Act at TCA 68-201-108(a) and the contested case hearing provisions of the Uniform Administrative Procedures Act compiled in title 4, chapter 5, part 3. Your petition for appeal must be received within 45 days of the date below and must be addressed to the Director, Tennessee Division of Air Pollution Control, 9th Floor, L & C Annex, 401 Church Street, Nashville, Tennessee 37243-1531.

Date

Director
Division of Air Pollution Control

ORDNANCE SYSTEMS INC.
4509 West Stone Drive
Kingsport, Tennessee 37660-9982
Telephone (423) 578-8010
Fax (423) 578-8054

In Reply Reference 6307RO
Federal Express Tracking Number: 7729 6287 4943

August 13, 2018

Ms. Michelle Walker Owenby, Director
Tennessee Department of Environment and Conservation
Division of Air Pollution Control
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 15th Floor
Nashville, TN 37243

Reference: BAE Systems Ordnance Systems Inc., Holston Army Ammunition Plant, Supplemental Information for 31 MAY 2018 HSAAP Expansion Project PSD Permit Application for source 37-0028. This supplemental submission includes revisions specific pages pertaining to Vent E to clarify emissions for coating operations.

Dear Ms. Owenby:

BAE Systems Ordnance Systems Inc. (OSI), operating contractor for Holston Army Ammunition Plant (HSAAP) in Kingsport (Emission Source Reference Number 37-0028), respectfully submits the enclosed supplemental information for the 31 MAY 2018 Prevention of Significant Deterioration (PSD) construction permit application for sources to be located at the Area B facility in Hawkins County, Tennessee. The application was previously submitted and there is minor variations in these pages. The submitted information is to ensure all information is adequately understood specifically for the emissions from Vent E for the coating operation.

The coating process was included with the original application however there are two types of products coated in one of the stills. The pages included in this submission intends to clarify the emissions for these two products. There are no requested changes to any monitoring method or additional requirements. Changes are noted in the enclosed pages 44-51 from the BACT analysis, page A-57 from Appendix A, and pages B-22 and B-24 from the Appendix B calculations pages. This only affects the coating still in Building [REDACTED] identified as Vent E. Emissions from this vent are volatile organic compounds (VOCs). Again there are no changes to the total VOC emission associated with this clarification.

A portion of the information provided in this supplemental packet are considered confidential business information (CBI). Only information previously approved as CBI is marked so in the redacted version. A hard copy of this document is being sent by FedEx to the division today marked as CBI. OSI requests that this entire submittal be considered confidential and not for public distribution in accordance with

**13 AUG 2018 REVISION 1
REDACTED COPY**

**OSI HSAAP 31 MAY 2018
EXPANSION PROJECT PSD
APPLICATION**



TDEC-DAPC rule 1200-03-09-.02(11)(d)(iii). A separate redacted version suitable for public viewing will be submitted electronically today.

These documents provide information consistent with the requirements of Rules 1200-03-09-.01(4) of the Tennessee Department of Environment and Conservation, Division of Air Pollution Control Regulations. Pursuant to Tennessee Air Pollution Control regulation 1200-03-09 and 40 CFR 52.21, I have reviewed the information contained in this May 31, 2018 PSD Construction Permit Application supplemental marked as Revision 1 and dated 13 AUG 2018, in its entirety. To the best of my knowledge, and based on information and belief formed after reasonable inquiry, the statements and information contained in this application are true, accurate, and complete.

Mr. James Ogle serves as OSI's primary contact for air program issues and may be reached at (423) 578-6231 or by email at james.ogle@baesystems.com. Please do not hesitate to contact Mr. Ogle should questions arise or additional information be needed.

Sincerely,

BAE SYSTEMS Ordnance Systems Inc.



Robert E. Winstead
Director EHSS

cc Environmental Affairs/Ogle
HSAAP/Vestal
Environmental Affairs Files 1305/2018

Enclosure: OSI HSAAP Expansion Project 31 MAY 2018 – PSD Application Revision 1 CONFIDENTIAL
sent by FedEx number 7729 6287 4943

OSI HSAAP Expansion Project 31 MAY 2018 – PSD Application Revision 1 REDACTED sent
electronically

the two tanks as fixed roof, external floating roof, and internal floating roof are provided in Appendix B.) Therefore, a flare, thermal oxidation, a condenser, catalytic oxidation, carbon adsorption, a scrubber, internal floating roof, and external floating roof are eliminated from further consideration.

Step 5: Select BACT

There are no applicable NSPS or NESHAP rules that would establish a baseline VOC emission rate for the fuel oil storage tanks.

BACT is proposed as white/light color, submerged fill, and good maintenance practices and a combined VOC emission rate of 0.2 tpy.

4.5 BACT Analysis for [REDACTED], Recrystallization and Coating

4.5.1. Process Description

HSAAP proposes to install process equipment in Building [REDACTED] for the recrystallization and coating of explosives. The equipment in Building [REDACTED] will be used for four separate batch processes, two recrystallization and two coating. The recrystallization of [REDACTED] will result in emissions of VOCs while the recrystallization of [REDACTED] does not. VOC emissions result from the use of cyclohexanone to dissolve the [REDACTED]. The majority of the cyclohexanone is recovered for reuse by boiling and condensation. VOC emissions from this process are vented to the atmosphere, controlled by primary condensers in series with a vent condenser (Vent A). When coating [REDACTED], water and [REDACTED] are charged to a still and heated. [REDACTED]

[REDACTED] The [REDACTED] may be dissolved in solvent (n-octane or dioctyl adipate). For these batches, the solvent is recovered through use of a vent condenser (Vent E) when the batch is heated and collected in a storage tank for reuse. In addition to these batch process, [REDACTED] tanks containing solvent or a solvent/water mixture will have small volumes of uncontrolled VOC emissions (less than 0.2 tpy for all four tanks combined). Because the VOC emissions from the tanks are each well below 5 tpy, the four tanks are considered insignificant emission units.

4.5.2 BACT Analysis for VOC Emissions from [REDACTED], Recrystallization Tanks Step

1 : Identify All Control Technologies

Potential VOC control technologies for the [REDACTED] tanks include:

- Flare
- Thermal oxidation
- Condenser
- Catalytic oxidation
- Carbon adsorption
- Scrubber
- Internal floating roof
- External floating roof
- Submerged fill
- White colored tank
- Good maintenance

Flare

Flares can be used to control almost any VOC stream, and can typically handle large fluctuations in VOC concentration, flow rate, heating value, and inert species content. The primary use of flares is that of a safety device used to control a large volume of a pollutant resulting from upset conditions. The majority of chemical plants and refineries have existing flare systems designed to relieve emergency process upsets that release large volumes of gas. Flares can reduce VOC emissions by 98% or more.

Thermal Oxidation

Thermal oxidation can be used to reduce emissions from almost all VOC sources, including reactor vents, distillation vents, solvent operations, and operations performed by ovens, dryers, and kilns. Fuel consumption is high, so thermal units are best suited for smaller process applications with moderate to high VOC loadings. Thermal oxidation can reduce VOC emissions by 98-99%.

Condenser

A condenser is a control device that is used to cool an emission stream having organic vapors in it and to change the vapors to a liquid. Condensed organic vapors can be recovered, refined, and might be reused, preventing their release to the ambient air. Condensers can reduce VOC emissions by 99% or more.

Catalytic Oxidation

Catalytic oxidation, like thermal oxidation, can be used to reduce emissions from a variety of sources. Catalytic oxidation is widely used to control VOC emissions from solvent evaporation processes associated with surface coating and printing operations. Catalytic oxidation can reduce VOC emissions by 95% or more depending on the volume of catalyst used.

Carbon Adsorption

With carbon adsorption, VOC vapors condense on the surface of the adsorbent, usually activated carbon. When the surface has adsorbed nearly as much as it can, the VOC is either desorbed as part of regenerating the adsorbent or the carbon, with VOC, is disposed of. If the VOC is desorbed, the VOC vapors are usually at a higher concentration, after which the VOC is either recovered or has to be destroyed. Carbon adsorption can reduce VOC emissions by 95% or more.

Scrubber

The use of a scrubber to control VOC emissions is an absorption process (as opposed to carbon adsorption, which is an adsorption process). With a scrubber, an absorbent chemical is used to **remove VOC's. The absorbent chemical is chosen based on its ability to absorb the chemical or** chemicals which compose the VOC waste gas stream. In a scrubber the sorbent is intimately mixed with the VOC waste gas stream to give the sorbent the opportunity to absorb as much of the VOC as possible. Scrubbers can reduce VOC emissions by 95% or more.

Internal Floating Roof

An internal floating roof tank has both a permanent fixed roof and a floating roof inside. There are two basic types of internal floating roof tanks: tanks in which the fixed roof is supported by vertical columns within the tank, and tanks with a self-supporting fixed roof and no internal support columns. An internal floating roof minimizes evaporative losses of the stored liquid.

Evaporative losses from floating roofs may come from deck fittings, nonwelded deck seams, and the annular space between the deck and tank wall. Internal floating roofs can reduce VOC emissions due to breathing losses by 75-80%.

External Floating Roof

A typical external floating roof tank consists of an open- topped cylindrical steel shell equipped with a roof that floats on the surface of the stored liquid. The floating roof consists of a deck, fittings, and rim seal system. Floating decks are of two general types: pontoon or double-deck. The purpose of the floating roof and rim seal system is to reduce evaporative loss of the stored liquid. Some annular space remains between the seal system and the tank wall. The external floating roof design is such that evaporative losses from the stored liquid are limited to losses from the rim seal system and deck fittings (breathing loss) and any exposed liquid on the tank walls (withdrawal loss). External floating roofs can reduce VOC emissions by 75-80%.

Submerged Fill

With submerged fill the fill pipe extends almost to the bottom of the tank. During most of submerged filling of the tank the fill pipe opening is below the liquid surface level. Liquid turbulence is controlled significantly, resulting in much lower vapor generation than encountered during filling without submerged fill. Submerged fill can reduce VOC emissions by 10-25%.

White Colored Tank

White or light-colored tanks do not absorb as much energy from the sun, thus they stay cooler. Since vapor pressures normally increase with increasing temperatures, cooler tanks result in lower breathing losses.

Good Tank Maintenance

Good maintenance of tanks and vents will reduce emissions from both working and breathing losses.

Twenty-five permits were found during a search of the RBLC for VOC controls for liquid storage tanks. In those 25 permits, the following was found:

Control	Number of Permits Where Control Was Required
White or Light-Colored Tank	8
Submerged Fill	7
External Floating Roof	5
Scrubber	5
Thermal Oxidation	3
Good Maintenance	3
Flare	2
Internal Floating Roof	1
Carbon Adsorption	1
Condenser	0
Catalytic Oxidation	0

Step 2 : Eliminate Technically Infeasible Options

All of the control technologies listed above are considered technically feasible and most have been required in permits found during the RBLC search.

Step 3: Rank Remaining Control Technologies by Effectiveness

The control technology options are ranked in order of their approximate effectiveness in Step 1, above.

Step 4: Evaluate Most Effective Controls and Document Results

As mentioned above, the four tanks will have combined uncontrolled VOC emissions of less than 0.2 tpy. Consequently, it is not considered economically feasible to apply any add-on controls to the tanks. Therefore, a flare, thermal oxidation, a condenser, catalytic oxidation, carbon adsorption, and a scrubber are eliminated from further consideration.

With regard to both internal and external floating roofs, because there is the chance that trace amounts of explosives can be present in the tanks, a floating roof tank cannot be used due to explosive design standard 11507. Therefore, floating roofs are eliminated from further consideration.

With regard to white or light-colored tanks, a white or light-colored tank would impede tank surface inspections for mechanical integrity. In addition, because the explosives are light-colored, a tank color similar to the color of the explosives would complicate leak detection. Also, there are potential issues with paint compatibility with explosives. For these reasons, white or lightcolored tanks are eliminated from further consideration.

Step 5: Select BACT

There are no applicable NSPS or NESHAP rules that would establish a baseline VOC emission rate for the [REDACTED], Recrystallization tanks.

BACT is proposed as submerged fill with good maintenance practices and a combined VOC emission rate of 0.18 tpy.

4.5.3 BACT Analysis for VOC Emissions from [REDACTED], Recrystallization Process Vent Step 1 : Identify All Control Technologies

Potential VOC control technologies for the [REDACTED] process vent include:

- Flare
- Thermal oxidation
- Condenser
- Catalytic oxidation
- Carbon adsorption
- Scrubber

Flare

Flares can be used to control almost any VOC stream, and can typically handle large fluctuations in VOC concentration, flow rate, heating value, and inert species content. The primary use of

flares is that of a safety device used to control a large volume of a pollutant resulting from upset conditions. The majority of chemical plants and refineries have existing flare systems designed to relieve emergency process upsets that release large volumes of gas. Flares can reduce VOC emissions by 98% or more.

Thermal Oxidation

Thermal oxidation can be used to reduce emissions from almost all VOC sources, including reactor vents, distillation vents, solvent operations, and operations performed by ovens, dryers, and kilns. Fuel consumption is high, so thermal units are best suited for smaller process applications with moderate to high VOC loadings. Thermal oxidation can reduce VOC emissions by 98-99%

Condenser

A condenser is a control device that is used to cool an emission stream having organic vapors in it and to change the vapors to a liquid. Condensed organic vapors can be recovered, refined, and might be reused, preventing their release to the ambient air. Condensers can reduce VOC emissions by 99% or more.

Catalytic Oxidation

Catalytic oxidation, like thermal oxidation, can be used to reduce emissions from a variety of sources. Catalytic oxidation is widely used to control VOC emissions from solvent evaporation processes associated with surface coating and printing operations. Catalytic oxidation can reduce VOC emissions by 95% or more depending on the volume of catalyst used.

Carbon Adsorption

With carbon adsorption, VOC vapors condense on the surface of the adsorbent, usually activated carbon. When the surface has adsorbed nearly as much as it can, the VOC is either desorbed as part of regenerating the adsorbent or the carbon, with VOC, is disposed of. If the VOC is desorbed, the VOC vapors are usually at a higher concentration, after which the VOC is either recovered or has to be destroyed. Carbon adsorption can reduce VOC emissions by 95% or more.

Scrubber

The use of a scrubber to control VOC emissions is an absorption process (as opposed to carbon adsorption, which is an adsorption process). With a scrubber, an absorbent chemical is used to **remove VOC's. The absorbent chemical is chosen based on its ability to absorb the chemical or** chemicals which compose the VOC waste gas stream. In a scrubber the sorbent is intimately mixed with the VOC waste gas stream to give the sorbent the opportunity to absorb as much of the VOC as possible. Scrubbers can reduce VOC emissions by 95% or more.

HSAAP is the only facility in the US that produces the explosives RDX, HMX, and IMX. Consequently, there are no permits in the RBLC for the explosives recrystallization process. As described earlier, however, the VOC emissions produced during the batch process to recrystallize RDX result from the distillation and condensation of cyclohexanone. A search of the RBLC for VOC emissions from distillation processes resulted in the identification of nine (9) permitted VOC emission sources. Table 4-8 summarizes the control technologies and control efficiencies found during that RBLC search. Of the 9 permitted VOC emission sources, four are controlled by flares, **three are controlled by routing the VOC's to the fuel gas system for energy recovery, one is**

controlled by thermal oxidation, and one is controlled by a scrubber. The control efficiency for all the sources, for which a control efficiency was specified, is 98%.

Table 4-8
Summary of RBLC Search for VOC Controls for the Distillation Process

Facility Name	State	Process	Control	VOC Control Efficiency
				(%)
Highlands Ethanol Facility	FL	Distillation	Scrubber	98
Grain Processing Corporation	IN	Distillation Heads Loadout	Enclosed Flare	98
Cardinal Ethanol	IN	Solids Distillation System	Enclosed Flare	98
Tradebe Treatment and Recycling, LLC	IN	Solids Distillation System	Flare	98
Central Indiana Ethanol	IN	Distillation Tower	Flare	98
Lake Charles Chemical	LA	Distillation Tower and Vacuum Distillation Tower	Flare or Route to Fuel Gas System	NA ¹
Lake Charles Chemical	LA	Distillation Units	Route to Fuel Gas System	NA ¹
Lake Charles Chemical	LA	Distillation and Drying	Route to Fuel Gas System	NA ¹
Lake Charles Chemical	LA	Distillation and Drying	Thermal Oxidation	NA ¹

Note:

1. Control efficiency not given.

Step 2 : Eliminate Technically Infeasible Options

Because the processes in [REDACTED] involve the recrystallization of [REDACTED], it is not technically feasible, from a safety standpoint, to employ any control technology that involves a flame. Consequently, flares, catalytic oxidation, and thermal oxidation are considered not technically feasible.

Step 3: Rank Remaining Control Technologies by Effectiveness

The control technology options are ranked in order of their approximate effectiveness in Step 1, above. After elimination of flares, catalytic oxidation, and thermal oxidation, the remaining control technologies in order of effectiveness are condenser, carbon adsorption, and scrubber.

Step 4: Evaluate Most Effective Controls and Document Results

With the exception of catalytic oxidation, the remaining control technologies provide the opportunity to recover the cyclohexanone and n-octane for reuse. Cyclohexanone and n-octane recovery by the emission control equipment is considered beneficial to the recrystallization and coating processes.

Recovery of the cyclohexanone and n-octane by either carbon adsorption or scrubber would require extra steps to separate the cyclohexanone from either the carbon or the scrubbant. Recovery of the cyclohexanone and n-octane by condensation would not require those extra steps. All three of the control technologies that provide for cyclohexanone and n-octane recovery are capable of control efficiencies of 98%.

Step 5: Select BACT

There are no applicable NSPS or NESHAP rules that would establish a baseline VOC emission rate for the [REDACTED], recrystallization and coating process vents. BACT is proposed as condensation for both Vent A and Vent E.

During the first 25% of the batch process inert materials used to fill process equipment between batches for safety purposes will be purged from the system. During that time condenser control efficiencies will be slightly reduced. Consequently, BACT for Vent A is proposed as the use of two condensers in series with a control efficiency during 25% of the batch process (approximately [REDACTED]) of 95% and a control efficiency during 75% of the batch process (approximately [REDACTED]) of 98%. These proposed efficiencies will result in an average hourly VOC emission rate for the batch of 0.42 lb/hr and an annual emission rate of 6.0 tpy. BACT for Vent E is proposed as the use of one condenser with a control efficiency during 25% of the batch process ([REDACTED]) of 95% and a control efficiency during 75% of the batch process ([REDACTED]) of 98%. These proposed efficiencies will result in an average hourly VOC emission rate for the batch of 0.42 lb/hr and an annual emission rate of 1.8 tpy.

4.6 BACT for Emergency Generators

In the event of the loss of electrical power, it is proposed that the facility be equipped with three emergency diesel generators. The engines will be certified by the manufacturer to the standards in 40 CFR 60, Subpart IIII. The emissions from the three proposed emergency generators will be below 5 tpy, therefore they will qualify as insignificant emission units.

4.6.1 BACT Analysis for VOC, CO, and GHG Emissions from the Emergency Generators Step 1: Identify All Control Technologies

Potential VOC, CO, and GHG control technologies for the emergency generators include: Good Engine Design or GCP

Good Engine Design

The diesel-fired emergency engines will be certified to meet the required US EPA emission standards based on their model year and size. In order to achieve this certification, the engine is optimized to perform at its best design capacity.

Good Combustion Practices

Good combustion practices are used to reduce emissions of VOC, CO, and GHG by optimizing conditions in the combustion zone of a fuel burning source. Good combustion practices typically entail introducing the proper ratio of combustion air to the fuel, maintaining a minimum temperature in the firebox of the combustor, or a minimum residence time of fuel and air in the combustion zone.

Step 2: Eliminate Technically Infeasible Options

The control technologies are technically feasible.

Step 3: Rank Remaining Control Technologies by Effectiveness

1. Good engine design.
2. Good combustion practices.

Step 4: Evaluate Most Effective Controls and Document Results

The current BACT guidelines for diesel-fired emergency generators and generally accepted emissions limits meet the NSPS requirements for Stationary Compression Ignition Internal Combustion Engines (40 CFR 60 Subpart IIII). Therefore, the use of a certified engine with good combustion practices can be considered BACT for emissions from diesel-fired emergency generators and fire pumps.

Step 5: Select BACT

BACT for the emergency generators is proposed as good engine design (NSPS Subpart IIII) and GCP with no add-on controls. Emissions from the engines will be minimal because of limited operating hours. As a result, the addition of control devices cannot be cost effective. The engines will meet BACT through EPA emission standards for NO_x+NMHC and CO and compliance with NSPS Subpart IIII as follows:

NO _x +NMHC	6.4 g/kW-hr
CO	3.5 g/kW-hr

GHG emissions are based on calculated using emission factors from 40 CFR Part 98, Subpart C, Tables C-1 and C-2.

4.7 Summary of Proposed BACT

Table 4.9 summarizes the emission limits and control technologies proposed as BACT for VOC, CO, and GHG.

Table 4-9
Summary of Proposed BACT

Emission Unit	Pollutant	Proposed Emission Limit	Proposed Control Technology
Boilers	VOC	0.004 lb/MMBtu	Catalytic oxidation
	CO	0.035 lb/MMBtu on NG 0.040 lb/MMBtu on FO	Use of clean fuel and GCP
	GHG	675,343 TPY as CO ₂ e	Use of NG and fuel efficiency
Fuel Oil Storage Tanks	VOC	0.2 TPY ¹	White/Light color, submerged fill, and good maintenance
Process Tanks	VOC	0.18 TPY ²	Submerged fill
Process Vent A	VOC	0.42 lb/hr ³ 4.2 TPY	Condensation
Process Vent E	VOC	0.42 lb/hr ³ 1.8 TPY	Condensation
Emergency Generators	VOC	NO _x +NMHC of 6.4 g/kW-hr ⁴	Good engine design and GCP
	CO	3.5 g/kW-hr ⁴	Good engine design and GCP
	GHG	644 TPY as CO ₂ e per generator	Good engine design and GCP

Notes:

1. Total of both tanks.
2. Total of all four tanks.

3. Average emission rate for the batch
4. NSPS rate for emergency generators (Tier 2).



**TITLE V PERMIT APPLICATION
CURRENT EMISSIONS REQUIREMENTS AND STATUS**

GENERAL IDENTIFICATION AND DESCRIPTION

1. Facility name: BAE Systems OSI, Holston Army Ammunition Plant	2. Emission source number See process flow diagram
3. Describe the process emission source / fuel burning installation / incinerator. Building [REDACTED] Recrystallization and Coating Processes	

EMISSIONS AND REQUIREMENTS

4. Identify if only a part of the source is subject to this requirement	5. Pollutant	6. Applicable requirement(s): TN Air Pollution Control Regulations, 40 CFR, permit restrictions, air quality based standards	7. Limitation	8. Maximum actual emissions	9. Compliance status (In/Out)
All	VOC	TVEE Method 2	20% Opacity	N/A	IN
Recrystallization	VOC	TAPCR 1200-03-09-.01(4)(j)	0.42 lb/hr	N/A	IN
Recrystallization	VOC	TAPCR 1200-03-09-.01(4)(j)	4.2 TPY	N/A	IN
Coating	VOC	TAPCR 1200-03-09-.01(4)(j)	0.42 lb/hr	N/A	IN
Coating	VOC	TAPCR 1200-03-09-.01(4)(j)	1.8 TPY	N/A	IN
Tanks	VOC	TAPCR 1200-03-09-.01(4)(j)	0.2 TP	N/A	IN

10. Other applicable requirements (new requirements that apply to this source during the term of this permit)

11. Page number:	Revision number:	Date of revision:
------------------	------------------	-------------------

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This information is considered
CONFIDENTIAL BUSINESS INFORMATION

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CONFIDENTIAL BUSINESS INFORMATION



DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF AIR POLLUTION CONTROL

REQUEST FOR PROTECTION ORDER FOR CONFIDENTIAL
INFORMATION

The Tennessee Air Quality Act, TCA 68-201-105(b)(2), grants the Department the authority to issue a protection order to prevent public dissemination of any secret formula, processes, or methods used in any manufacturing operation. The composition of air contaminants shall not be considered secret unless so declared by the Division of Air Pollution Control. Only information submitted on or as an attachment to this form will be considered for confidential treatment. Entire applications or similar documents will not be approved in total unless otherwise determined. Specific items of applications should be submitted as attachments for consideration. Information submitted on or attached to this form will be considered as confidential if approved. All disapproved information will be treated as confidential until 45 days from the date signed by the Director. If an appeal is received, information will be treated as confidential throughout the appeal period. For sources subject to the major source operating permit provisions at Division Rule 1200-3-9-.02(11), the confidential information provisions of subpart 1200-3-9-.02(11)(d)(ii) shall apply in reviewing the request for treatment of information as confidential.

1. Company Name BAE SYSTEMS Ordnance Systems Inc.
2. Company Address Holston Army Ammunition Plant
4509 West Stone Drive
Kingsport, Tennessee 37660

3. Brief Description of Material Requested for Coverage Under the Protection Order
The enclosed copy of Revision 1 provides supplemental information for Vent E at the
Recrystallization and coating operation. These pages contain confidential information.
A complete redacted copy of Revision 1 pages is provided for public viewing.

4. List Requested Confidential Information: (List form number, item number, and information. Items may be attached and identified by reference.)

OSI HSAAP Expansion Project 31 MAY 2018 - PSD Application CONFIDENTIAL

Version - Revision 1 to clarify emission for Vent E - Pages 44-51, A-57, B-22, and B-24.

5. Authorized Signature 

Signer's Name (Type or Print) Robert E. Winstead

Title BAE Systems HSAAP Director EHSS Date 13 August 2018

(continued on reverse)

CN-1060

RDA 1298

13 AUG 2018 REVISION 1
REDACTED COPY

OSI HSAAP 31 MAY 2018
EXPANSION PROJECT PSD
APPLICATION

For Division Use Only:

This request for a Protection Order is:

☐ Approved ☐ Disapproved ☐ Granted in part as detailed below

Should you wish to appeal this administrative decision, your appeal will be handled in accordance with the provisions of the Tennessee Air Quality Act at TCA 68-201-108(a) and the contested case hearing provisions of the Uniform Administrative Procedures Act compiled in title 4, chapter 5, part 3. Your petition for appeal must be received within 45 days of the date below and must be addressed to the Director, Tennessee Division of Air Pollution Control, 9th Floor, L & C Annex, 401 Church Street, Nashville, Tennessee 37243-1531.

Date

Director
Division of Air Pollution Control

Appendix C - Public Notice

PUBLIC NOTICE

BAE Systems Ordnance Systems Inc. (BAE) has applied to the Tennessee Department of Environment & Conservation, Division of Air Pollution Control for approval to construct and operate new emission sources at the **Holston Army Ammunition Plant**. The modification consists of new natural gas and oil-fired boilers, emergency engines, and process emission sources used in the manufacture of explosives. The project is subject to review under the State rule for Prevention of Significant Deterioration of Air Quality (PSD), Paragraph 1200-03-09-.01(4) of the Tennessee Air Pollution Control Regulations, which requires a public notification and thirty (30) day public comment period.

The Division of Air Pollution Control has reviewed the application with respect to the above-mentioned PSD regulations and has determined that construction can be approved if certain conditions are met. A copy of the PSD application materials, a copy of the PSD preliminary determination, and a copy of the draft construction permit are available for public inspection during normal business hours at the following locations:

Mt. Carmel Public Library
100 1/2 Main Street
Mt. Carmel TN 37645

TDEC Division of Air Pollution Control
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 15th Floor
Nashville, Tennessee 37243

Electronic copies of the draft permit and supporting materials are available by accessing the TDEC internet site located at:

<https://www.tn.gov/environment/ppo-public-participation/ppo-public-participation/ppo-air.html>

Interested parties are invited to review these materials and comment on the proposed modifications.

The Division of Air Pollution Control will hold a public hearing on September 20, 2018, to accept written or oral comments on the proposed project. The public hearing will be held at 5:00 PM Eastern Time on Monday, September 20, 2018, at ETSU Allandale Campus, 1501 University Boulevard, Kingsport, TN 37660. Written comments will be accepted until the end of the public hearing. Comments should be addressed to **Director, Division of Air Pollution Control, William R. Snodgrass Tennessee Tower, 312 Rosa L. Parks Avenue 15th Floor, Nashville, Tennessee 37243**. Written comments may also be submitted electronically to air.pollution.control@tn.gov. A final determination will be made after consideration of all relevant comments and other available information. Questions concerning the source may be addressed to Mr. Travis Blake at the address shown above, or by calling (615) 532-0554 or (615) 532-0617.

Individuals with disabilities who wish to review information maintained at the above-mentioned depositories should contact the Tennessee Department of Environment and Conservation to discuss any auxiliary aids or services needed to facilitate such review. Such contact may be in person, by writing, telephone, or other means, and should be made no less than ten days prior to the end of the public comment period to allow time to provide such aid or services. Contact the Tennessee Department of Environment and Conservation ADA Coordinator, William R. Snodgrass Tennessee Tower, 312 Rosa L. Parks Avenue 2nd Floor, Nashville, TN 37243, 1-(866)-253-5827. Hearing impaired callers may use the Tennessee Relay Service, 1-(800)-848-0298.

(Publish only the text which appears above this line)

For the *Kingsport Times-News* – publish once on or before August 17, 2018.

Air Pollution Control

DATE: August 8, 2018

Assigned to – Travis Blake

No alterations to the above are allowed:

BAE must pay for publication of this notice in the newspaper shown.

The Division of Air Pollution Control must be furnished with an affidavit from the newspaper stating that the ad was run and the date of the ad or one complete sheet from the newspaper showing this advertisement, the name of the newspaper and the date of publication. Mail to Travis Blake, Division of Air Pollution Control, William R. Snodgrass Tennessee Tower, 312 Rosa L. Parks Avenue 15th Floor, Nashville, Tennessee 37243.

Appendix D – Correspondence

Travis Blake

From: Travis Blake
Sent: Monday, June 04, 2018 7:56 AM
To: ceron.heather@epa.gov; Bill McCabe; andrea_stacy@nps.gov; susan_johnson@nps.gov; john_notar@nps.gov; bob_carson@nps.gov; Meredith_Bond@fws.gov; bjackson02@fs.fed.us
Cc: Haidar Alrawi; Moe Baghernejad; Lacey Hardin; Olga Jacobsen
Subject: PSD Application for BAE Ordnance Systems, Inc. (Holston Army Ammunition Plant)
Attachments: 974192-Application (redacted) received 2018-0601.pdf

A PSD application for BAE Ordnance Systems, Inc. (Holston Army Ammunition Plant) is enclosed for your review. This application is submitted pursuant to Rule 1200-03-09-.01(4)(n) of the Tennessee Air Pollution Control Regulations. If you have any questions concerning this correspondence, please contact me.



Travis J. Blake | TDEC Environmental Consultant 3
Division of Air Pollution Control
William R. Snodgrass Tennessee Tower, 15th Floor
312 Rosa L. Parks Avenue, Nashville, TN 37243
p. (615) 532-0617
travis.blake@tn.gov
tn.gov/environment

We value your opinion. Please take a few minutes to complete our [customer satisfaction survey](#).

Travis Blake

From: Land, Eva <Land.Eva@epa.gov>
Sent: Tuesday, June 05, 2018 9:37 AM
To: Travis Blake
Cc: Ceron, Heather; Shepherd, Lorinda
Subject: RE: PSD Application for BAE Ordnance Systems, Inc. (Holston Army Ammunition Plant)

Follow Up Flag: Follow up
Flag Status: Flagged

***** This is an EXTERNAL email. Please exercise caution. DO NOT open attachments or click links from unknown senders or unexpected email - STS-Security. *****

Travis,

Thank you for sending EPA the PSD application for BAE Ordnance Systems, Inc. As we begin review the application we will need to see the emissions calculations. I am not sure if an unredacted version is on its way, but given the information that is absent from the redacted version, we will need to see the full application.

Thank you again.

Eva

From: Travis Blake [<mailto:Travis.Blake@tn.gov>]
Sent: Monday, June 4, 2018 8:57 AM
To: Ceron, Heather <Ceron.Heather@epa.gov>; Bill McCabe <Bill.McCabe@tn.gov>; andrea_stacy@nps.gov; susan_johnson@nps.gov; john_notar@nps.gov; bob_carson@nps.gov; Meredith_Bond@fws.gov; bjackson02@fs.fed.us
Cc: Haidar Alrawi <Haidar.Alrawi@tn.gov>; Moe Baghernejad <Moe.Baghernejad@tn.gov>; lacey.hardin@tn.gov; Olga Jacobsen <Olga.Jacobsen@tn.gov>
Subject: PSD Application for BAE Ordnance Systems, Inc. (Holston Army Ammunition Plant)

A PSD application for BAE Ordnance Systems, Inc. (Holston Army Ammunition Plant) is enclosed for your review. This application is submitted pursuant to Rule 1200-03-09-.01(4)(n) of the Tennessee Air Pollution Control Regulations. If you have any questions concerning this correspondence, please contact me.



Travis J. Blake | TDEC Environmental Consultant 3
Division of Air Pollution Control
William R. Snodgrass Tennessee Tower, 15th Floor
312 Rosa L. Parks Avenue, Nashville, TN 37243
p. (615) 532-0617
travis.blake@tn.gov
tn.gov/environment

We value your opinion. Please take a few minutes to complete our [customer satisfaction survey](#).

Travis Blake

From: Travis Blake
Sent: Tuesday, August 14, 2018 7:48 AM
To: 'NSRSubmittals@epa.gov'; 'andrea_stacy@nps.gov'; 'susan_johnson@nps.gov'; john_notar@nps.gov; bob_carson@nps.gov; 'Meredith_Bond@fws.gov'; bjackson02@fs.fed.us
Cc: Haidar Alrawi; Moe Baghernejad; Lacey Hardin; Olga Jacobsen
Subject: PSD Application Revision for BAE Ordnance Systems, Inc. (Holston Army Ammunition Plant)
Attachments: 974192-Application Revision (redacted) received 2018-0813.pdf

A PSD application revision for BAE Ordnance Systems, Inc. (Holston Army Ammunition Plant) is enclosed for your review. This revision updates the application dated May 31, 2018, which was transmitted to EPA and FLMs on June 1. This application is submitted pursuant to Rule 1200-03-09-.01(4)(n) of the Tennessee Air Pollution Control Regulations. If you have any questions concerning this correspondence, please contact me.



Travis J. Blake | TDEC Environmental Consultant 3
Division of Air Pollution Control
William R. Snodgrass Tennessee Tower, 15th Floor
312 Rosa L. Parks Avenue, Nashville, TN 37243
p. (615) 532-0617
travis.blake@tn.gov
tn.gov/environment

We value your opinion. Please take a few minutes to complete our [customer satisfaction survey](#).

Appendix E – Modeling Comments and Division Responses

The following comments were received from EPA's Region 4 Office on 5/24/2018 with regard to the modeling protocol:

From: Walther, Katherine
To: [Haidar, Alrawi](#)
Cc: [Binck, Todd](#); [Howard, Chris](#); [Gillam, Rick](#)
Subject: Comments on Modeling Protocol for Holston Army (BAE Systems), Kingsport, TN
Date: Thursday, May 24, 2018 9:40:15 AM

Hi Haidar,

I hope you're doing well! I was assigned to review the modeling protocol that you sent us last Friday for the Holston Army (BAE Systems) facility. I have completed my review and have the following comments:

- **Section 3.0 Site Description** indicates that Hawkins and Sullivan Counties are classified as attainment or unclassifiable for all regulated pollutants. Please note that while it isn't germane to this application because of the pollutants that the project triggers PSD for, that there is an SO₂ nonattainment area in Sullivan County.
 - **Section 4.4 Monitored Background Data** indicates that the following CO monitor will be used to represent background concentration: AQS ID: 47-163-0007. Please note that this monitor is an industrial monitor that is not comparable to the NAAQS. Please select an alternative monitor that meets Part 58 requirements and has complete data to use as a background site for this modeling demonstration. EPA modeling staff are available to discuss other potential background monitor options with the State of Tennessee if needed.
 - **Section 4.5 Receptor Data** of the modeling protocol indicates that the receptor grid will contain receptors spaced at 50m intervals along the facility "fenceline". The final modeling report should clearly demonstrate that the general public does not have access to all areas within the facility fenceline that have been excluded from the modeling (i.e., that a fence or some other security measures are in place to preclude access from the public).
 - **Section 4.5 Receptor Data** indicates that the version of AERMAP that will be used is version 11103. Please note that the current version is 18081.
 - **Section 4.6 Meteorological Data** indicates that 5-year sequential hourly surface meteorological data from the National Weather Service Station in Bristol, TN will be used in the analysis. Given the complexity of the terrain in the area, the final modeling report should contain additional justification that the surface meteorological data from this station is representative of the area around the Holston facility.
 - **Section 4.6 Meteorological Data** indicates that the version of AERMINUTE that will be used is version 14327. Please note that the current version of AERMINUTE is 15272.
 - **Section 5.2 Ozone Analysis** indicates that potential emissions of NO₂ will decrease due to the project. However, **Section 2.0 Project Description** indicates that emissions from the new process buildings and support equipment will include nitrogen oxides. These statements appear to contradict each other. Please note that if NO_x emissions increase, even if they are below the
-

SER, these emissions should be included in the MERPs analysis.

- **Section 5.4 NAAQS Analysis – NAAQS Compliance Assessment** indicates that Table 8-2 of Appendix W – Guideline on Air Quality Models may be used for calculating emissions from the off-site nearby emissions sources using actual operating levels and actual operating factors in assessing compliance with the annual NAAQS. For nearby background sources, Table 8-2 was revised in the most recent revisions to Appendix W to allow the use of an actual operating level in computation of the emission rate to be modeled. Specifically, a temporally representative operating level when the facility is operating, reflective of the most recent 2 years, may be used. The calculations and data used to develop the emission rate using this approach should be well documented in the final modeling report. Also, given that the revised approach allowed under Table 8-2 of Appendix W is a relatively new concept and has not yet been applied in our region, EPA Region 4 is available for consultation with the State of Tennessee if needed.

Please let me know if you have any questions. We are available for a call to discuss these with you if needed. Just to let you know-I will be out of the office tomorrow, Friday, May 25th, through Friday, June 1st and then I will be in Boston June 4th-7th for the Modelers Workshop. I will be in the office the rest of the day today though if there is anything you would like to discuss. Chris is also familiar with my comments and will be in the office next week if you want to reach out to him while I'm out. Otherwise, I would be happy to discuss these with you either in Boston, if you're planning on attending the workshop, or when I return.

Thank you!

Sincerely,
Katie

Katie Walther
U.S. Environmental Protection Agency, Region 4
Air, Pesticides & Toxics Management Division
Air Data & Analysis Section
PH: (404) 562-9110

The following comments were received from EPA R4 on 7/12/2018 with regard to the modeling report:

From: Walther, Katherine
To: [Haidar Alrawi](#)
Cc: [Howard, Chris](#); [Rinck, Todd](#); [Land, Eva](#); [Gillam, Rick](#)
Subject: RE: PSD Application for BAE Ordnance Systems, Inc. (Holston Army Ammunition Plant)
Date: Thursday, July 12, 2018 9:59:15 AM
Attachments:

Hi Haidar,
I hope you are doing well!

I wanted to let you know that I have completed my review of the PSD application for the Holston Army Ammunition Plant. While Phase I and Phases I-III combined (Project Total) do not trigger for CO as indicated in Table 3-6, I still reviewed the CO modeling that accompanied the PSD application. Below are my comments on the modeling submission. Please note that at this time, these comments do not need to be addressed since CO was below the SER for Phase I of the project, which is in the phase of the project that is in the process of being permitted. Please note for future phases of this application though, that if CO modeling needs to be conducted at that time, the following comments should be addressed. Please let me know if you have any questions or concerns!

- **Section 4.6 Meteorological Data** indicates that 5-year sequential hourly surface meteorological data from the National Weather Service Station in Bristol, TN will be used in the analysis. We acknowledge the surface characteristic comparison that the application provides between the Bristol airport station and the Holston facility location. We request that given the complexity of the terrain in the area, additional justification be provided that the surface meteorological data from the Bristol station is representative of the area around the Holston facility, particularly in regards to wind flows.
- **In Attachment A Model Input Data**, Source ID 27 has a negative temperature listed (-460.00°F). Please provide additional information for this source to account for the negative temperature listed in the table.
- Please provide additional information detailing how the lb/hr emission rates in **Attachment A Model Input Data** are calculated/derived. It is unclear from the PSD Application how these emission rates are related to/derived from the Expansion Project Emissions that are indicated in Table 2-14 and Table 3-5.

Please don't hesitate to reach out if you have any questions on the above comments/requests for additional information. Please note that these comments are specific to the modeling portion of the application.

Sincerely,
Katie

Katie Walther
U.S. Environmental Protection Agency, Region
4 Air, Pesticides & Toxics Management Division
Air Data & Analysis Section – (404) 562-9110

DIVISION RESPONSE TO MODELING COMMENTS

The following are the Division's responses to EPA R4 comments dated 5/24/2018 on the modeling protocol:

1. **Section 3.0 Site Description** indicates that Hawkins and Sullivan Counties are classified as attainment or unclassifiable for all regulated pollutants. Please note that while it isn't germane to this application because of the pollutants that the project triggers PSD for, that there is an SO₂ nonattainment area in Sullivan County.

Division Response to Comment #1:

Reference of the Sullivan County SO₂ partial nonattainment area is addressed in the submitted Holston Army modeling report and in this document.

2. **Section 4.4 Monitored Background Data** indicates that the following CO monitor will be used to represent background concentration: AQS ID: 47-163-0007. Please note that this monitor is an industrial monitor that is not comparable to the NAAQS. Please select an alternative monitor that meets Part 58 requirements and has complete data to use as a background site for this modeling demonstration. EPA modeling staff is available to discuss other potential background monitor options with the State of Tennessee if needed.

Division Response to Comment #2:

The Division has selected a different representative monitor for background CO concentrations (Appendix B). This monitor, AQS ID: 47-157-0075 is located at 6388 Haley Road (Shelby Farms Nucor Site) in Memphis, TN, with similar rural/suburban setting as the source location and it meets Part 58 requirements. It has a complete 3-year, 2015-2017 design values. The background monitoring analysis is adequately addressed in this document.

3. **Section 4.5 Receptor Data** of the modeling protocol indicates that the receptor grid will contain receptors spaced at 50m intervals along the facility "fenceline". The final modeling report should clearly demonstrate that the general public does not have access to all areas within the facility fenceline

that have been excluded from the modeling (i.e., that a fence or some other security measures are in place to preclude access from the public).

Division Response to Comment #3:

This is a top security federal facility and the general public is excluded from entering its premises.

4. **Section 4.5 Receptor Data** indicates that the version of AERMAP that will be used is version 11103. Please note that the current version is 18081.

Division Response to Comment #4:

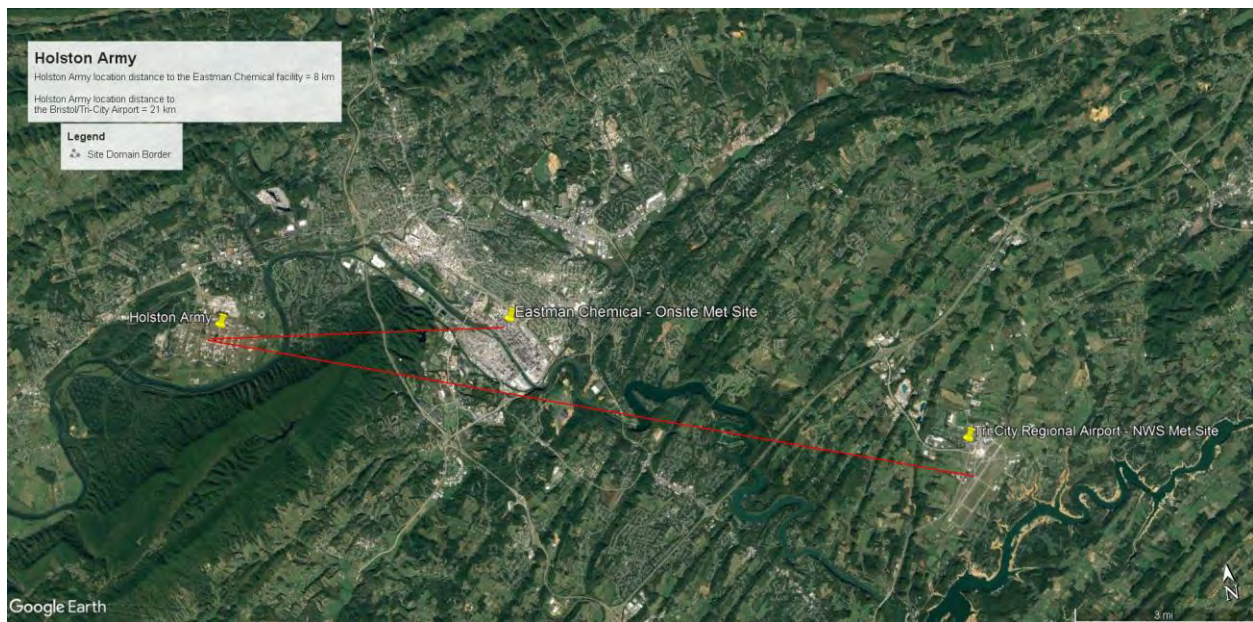
AERMAP version 18081 was applied and processed accordingly with the submitted facility modeling report and in the Division review of the PSD application.

5. **Section 4.6 Meteorological Data** indicates that 5-year sequential hourly surface meteorological data from the National Weather Service Station in Bristol, TN will be used in the analysis. Given the complexity of the terrain in the area, the final modeling report should contain additional justification that the surface meteorological data from this station is representative of the area around the Holston facility.

Division Response to Comment #5:

The special representation of the meteorological site is at 21km NE of the Holston site location as shown in Figure A-1. This is the closest NWS met tower to the Holston source. However, due to the complex terrain around the facility and the met site, the Holston facility elected to demonstrate the worst case surface characteristics at both the NWS met tower site and the source site even though current EPA guidance requires those measurements be selected at the met tower site. The Division further conducted a modeling analysis for CO impacts utilizing the onsite met data (2012-2013) that was processed recently for the nearby (8km due East) Eastman Chemical facility in both for a PSD application and also for the SO₂ partial nonattainment SIP for Eastman.

Figure A-1: Holston location relative to Eastman and the NWS Airport site



Highest impacts from the three modeling scenarios were selected for the 1-hour and 8-hour averages in comparison to the CO SILs.

6. **Section 4.6 Meteorological Data** indicates that the version of AERMINUTE that will be used is version 14327. Please note that the current version of AERMINUTE is 15272.

Division Response to Comment #6:

AERMINUTE version 15272 was applied and processed accordingly with the submitted facility modeling report and in the Division review of the PSD application.

7. **Section 5.2 Ozone Analysis** indicates that potential emissions of NO₂ will decrease due to the project. However, **Section 2.0 Project Description** indicates that emissions from the new process buildings and support equipment will include nitrogen oxides. These statements appear to contradict each other. Please note that if NO_x emissions increase, even if they are below the SER, these emissions should be included in the MERPs analysis.

Division Response to Comment #7:

Total project net NO_x emissions will decrease to a (negative) -49.2 tpy as shown in Tables 2-14 and 3-5 of the application. The MERPS ozone analysis accounted for a conservative zero tpy NO_x emissions from the project.

8. **Section 5.4 NAAQS Analysis – NAAQS Compliance Assessment** indicates that Table 8-2 of Appendix W – Guideline on Air Quality Models may be used for calculating emissions from the off-site nearby emissions sources using actual operating levels and actual operating factors in assessing compliance with the annual NAAQS. For nearby background sources, Table 8-2 was revised in the most recent revisions to Appendix W to allow the use of an actual operating level in computation of the emission rate to be modeled. Specifically, a temporally representative operating level when the facility is operating, reflective of the most recent 2 years, may be used. The calculations and data used to develop the emission rate using this approach should be well documented in the final modeling report. Also, given that the revised approach allowed under Table 8-2 of Appendix W is a relatively new concept and has not yet been applied in our region, EPA Region 4 is available for consultation with the State of Tennessee if needed.

Division Response to Comment #8:

The Holston modeling approach agrees with Appendix W Table 8-2 guidance for the actual emissions assessment of nearby sources in the NAAQS

demonstration. However, the facility did not trigger such emissions assessment as the maximum CO projected impacts were below the SILs and therefore no need for a NAAQS comprehensive modeling demonstration inclusive of nearby source impacts.

The following are the Division's responses to EPA R4 comments dated 7/12/2018 on the modeling report:

9. **Section 4.6 Meteorological Data** indicates that 5-year sequential hourly surface meteorological data from the National Weather Service Station in Bristol, TN will be used in the analysis. We acknowledge the surface characteristic comparison that the application provides between the Bristol airport station and the Holston facility location. We request that given the complexity of the terrain in the area, additional justification be provided that the surface meteorological data from the Bristol station is representative of the area around the Holston facility, particularly in regards to wind flows.

Division Response to Comment #9:

Please see the Division response to Comment #5 with regard to the surface characteristics comparison between the NWS site and the source location. For variations in wind flows, a comparison between the wind roses from the NWS Bristol/Tri-City profile data (or surface) and the Eastman Onsite profile data for the same periods (4/1/2012-3/31/2013) are shown in Figures A-1 and A-2. The predominant wind directions vary for both sites. For the NWS site, the predominant wind is blowing from the Northeast direction and for the Onsite (Eastman) site, the predominant wind is blowing from the South. The Eastman Chemical facility location is close to the Holston facility, which is about 8km east of the Holston site. Taking this finding into account, we have conducted a CO modeling analysis using the Eastman Onsite meteorology in addition to the NWS data for the two different surface characteristics at the airport and at the Holston site and selecting the most conservative CO impacts from the three modeling scenarios runs.

Figure A-2: NWS Profile Data Wind Rose Plot

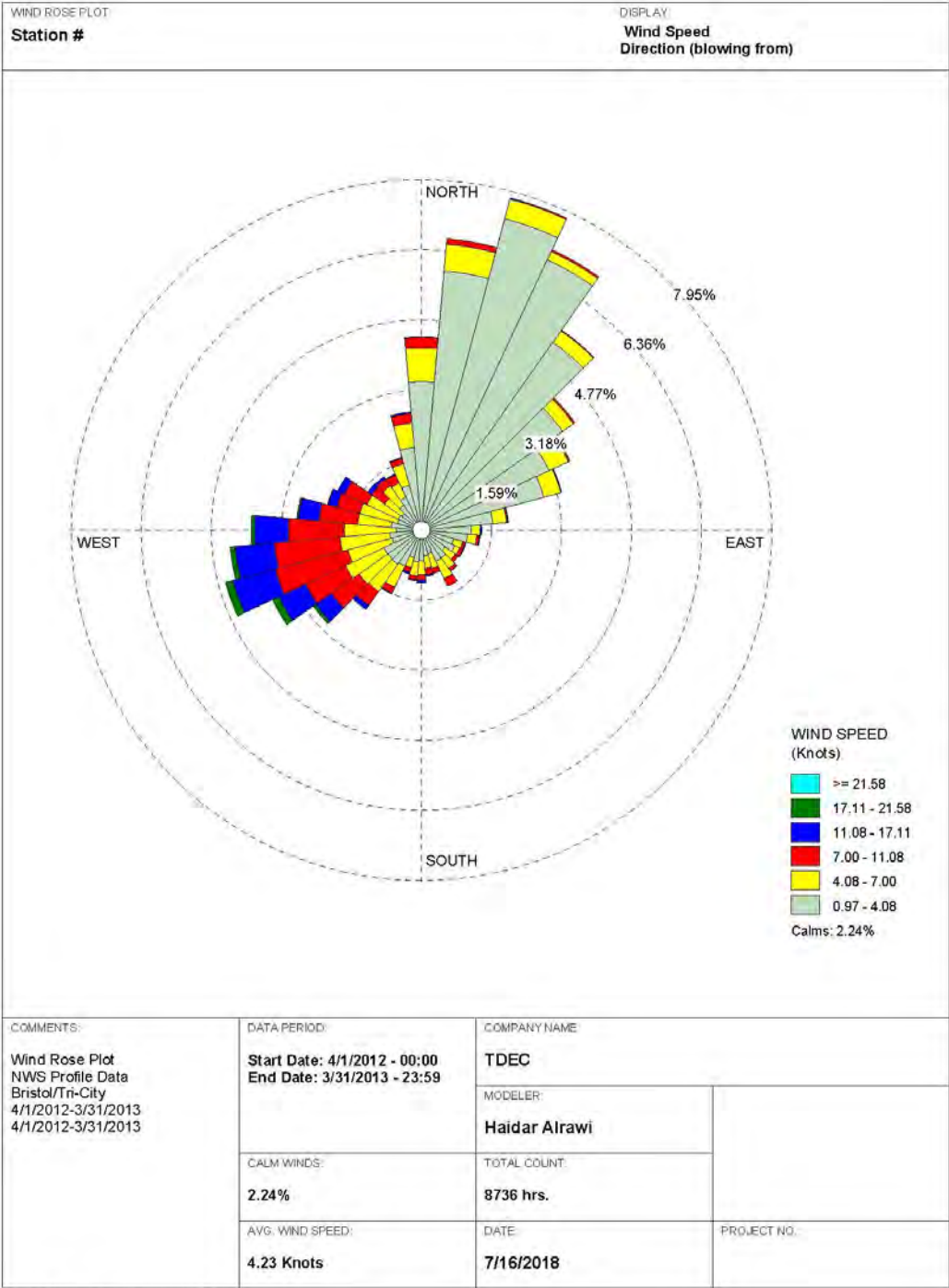
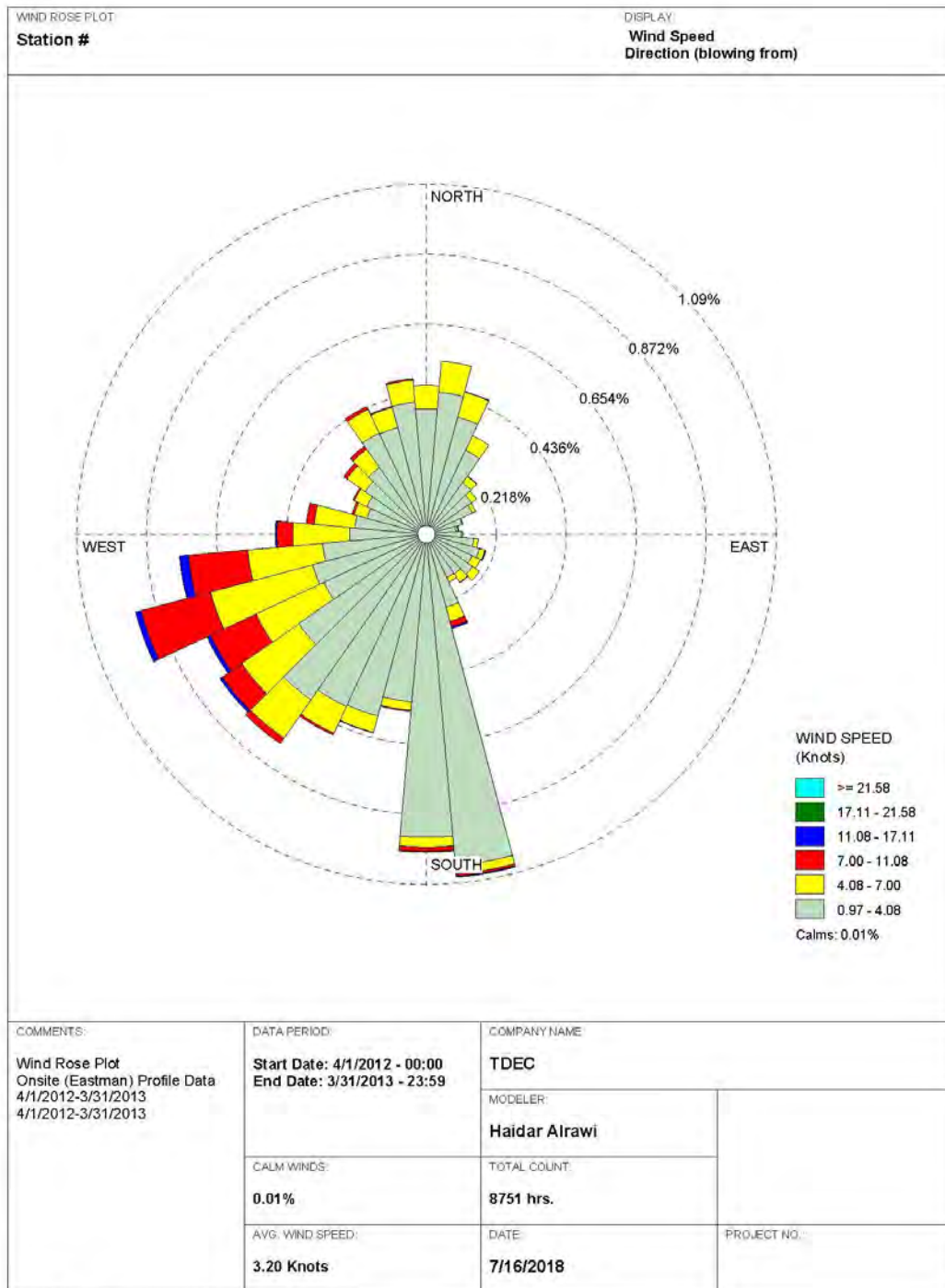


Figure A-3: Onsite (Eastman) Profile Data Wind Rose Plot



10. In Attachment A Model Input Data, Source ID 27 has a negative temperature listed (-460.00°F). Please provide additional information for this source to account for the negative temperature listed in the table.

Division Response to Comment #10:

The modeled negative stack exhaust temperature emission rate of -460F is equal to 0 Kelvin. A value of 0 Kelvin instructs the model to vary the release temperature with ambient (See the AERMOD User's Guide at page 3-83) for calculating hourly ambient temperature from the surface met file for each hour even though the ambient fluctuations should not be with much difference on an hourly basis.

In Table A-1, sources 14 and 20 were assigned an exhaust temperature of 68 °F (or 293.15 °K) annual average and different from source 27. The reason for assigning this procedure for Source 27 is that sources 14 and 20 originate from inside a building where the temperature is controlled and the release temperature will not be at ambient temperature. Source 27 is outside where the release temperature is not controlled and will vary with the ambient temperature.

Table A-1: AERMOD Modeled CO Sources

Source ID	Base_Elev	Height	Diameter	Exit_Vel	Exit_Temp	Emission_Rate	Emission_Rate	X1	Y1
Point	[m]	[m]	[m]	[m/s]	[K]	gsm/sec	lb/hour	[m]	[m]
7	371.21	22.86	1.524	38.7096	422.0389	0.755987	5.999899	353025.9	4044848
8	371.19	22.86	1.524	38.7096	422.0389	0.755987	5.999899	352995.5	4044848
9	370.45	22.86	1.524	38.7096	422.0389	0.755987	5.999899	352966.2	4044846
10	369.36	22.86	1.524	38.7096	422.0389	0.755987	5.999899	352932.9	4044846
13	366.14	12.8016	0.3048	6.4008	377.5944	0.144898	1.149981	352911.9	4044393

14	365.4 7	15.24	0.29 87	12.8 991	293.15	0.430913	3.419942	35292 3.2	4044 335
15	366.8 7	10.66 8	0.26 52	3.35 28	505.37 22	0.0252	0.199997	35321 2.6	4044 685
16	366.7	10.66 8	0.26 52	3.35 28	505.37 22	0.0252	0.199997	35320 3.8	4044 688
17	365.6 2	16.76 4	0.09 14	1.31 064	727.59 44	0.640069	5.079915	35301 2.6	4044 653
20	367.5	12.27 43	0.29 87	12.8 991	293.15	0.629989	4.999916	35477 8.6	4044 018
21	364.2 8	34.39 973	0.10 06	18.0 015	308.2	0.308695	2.449959	35306 9.1	4044 259
23	365.7 4	12.19 2	0.30 48	9.75 36	449.81 67	0.352794	2.799953	35295 7.7	4044 345
24	365.6 9	12.19 2	0.30 48	9.75 36	449.81 67	0.352794	2.799953	35295 0	4044 342
25	365.6 4	12.19 2	0.30 48	9.75 36	449.81 67	0.352794	2.799953	35294 3.9	4044 340
26	365.6	12.19 2	0.30 48	9.75 36	449.81 67	0.352794	2.799953	35293 8.7	4044 339
27	366.1 9	7.010 4	0.30 48	0.00 914	- 0.1833 3	0.02898	0.229996	35485 5	4044 163
					Total	6.669068	52.92911		
							231.83 TPY		

11. Please provide additional information detailing how the lb/hr emission rates in *Attachment A Model Input Data* are calculated/derived. It is unclear from the PSD Application how these emission rates are related to/derived from the Expansion Project Emissions that are indicated in Tables 2-14 and Table 3-5.

Division Response to Comment #11:

The difference is that in Tables 2-14 and 3-5 of the application, the 71.4 tpy is net emissions (i.e., emission increases due to Phases I – III of the Expansion Program minus emission reductions due to the retirement of the coal boilers). The math calculation is provided in Table A-2.

Table A-2: Expansion Program Emissions

Source	CO
	(tpy)
Existing Sources Increased Utilization (Open Burning)	38.2
Natural Gas Boilers	100.6
Fuel Oil Fired Internal Combustion Engines	5.8
3 rd Train Acetyl Processing	33.1
ANSOL Treatment	20.6
G-9 (Insensitive Products Nitration)	13.8
E-9 (Spent Nitric Acid Tank Farm)	1
3 rd Train NAC/SAC (Acid Concentration)	10.3
Totals	223.4

The retirement of the coal-fired boilers is a minus 152.0 tpy. So, this difference is 71.4 tpy. The Holston facility conservatively modeled CO emissions of 231.8 tpy, which is (71.4 +152 tpy) and rounding up from 223.4 tpy, which makes the source subject to PSD review as it is greater than the 100 tpy SER for this pollutant. Regardless, the two annual emission rates (total from above table and modeled) are very close and the modeled rate is a little higher, thus conservative.

Additionally, the CO net emissions increase for the whole expansion project is 71.4 tpy and is below the SER and technically there is no requirement to conduct a modeling demonstration for CO at this rate. However, until Holston actually retires the coal-fired boilers then it will be able to take credit for the reduction of 152 tpy. The coal-fired boilers will retire by the construction and operation of Phase I emission units.

Appendix F – Ambient Background Monitoring Data for CO and Ozone

B-1 CO Concentrations (2015-2017):

Monitor Values Report

Geographic Area: Tennessee

Pollutant: CO

Year: 2015

Exceptional Events: Excluded (if any)

Obs	First Max 8hr	Second Max 8hr	Days 8hr Max >STD	First Max 1hr	Second Max 1hr	Days 1hr Max >STD	Exc. Events	Monitor Number	Site ID	Address	City	County	State	EPA Region
8136	0.3	0.3	0	0.3	0.3	0	None	1	470090101	Great Smoky Mountains Np Look Rock	Not in a City	Blount	TN	04
8371	1.6	1.4	0	1.8	1.7	0	None	1	470370040	1113 Elm Hill Pike	Nashville-Davidson (Remainder)	Davidson	TN	04
8164	1.7	1.5	0	1.9	1.9	0	None	1	471570024	416 Alabama Avenue	Memphis	Shelby	TN	04
8434	1.3	0.9	0	1.6	1.5	0	None	1	471570075	6388 Haley Rd. (Shelby Farms Ncore Site)	Memphis	Shelby	TN	04
8011	3.6	2	0	7.7	4.4	0	None	1	471570100	5767 Macon Cove (Near Road Site)	Memphis	Shelby	TN	04

Get detailed information about this report, including column descriptions, at <https://www.epa.gov/outdoor-air-quality-data/about-air-data-reports#mon>

AirData reports are produced from a direct query of the AQS Data Mart. The data represent the best and most recent information available to EPA from state agencies. However, some values may be absent due to incomplete reporting, and some values may change due to quality assurance activities. The AQS database is updated by state, local, and tribal organizations who own and submit the data.

Readers are cautioned not to rank order geographic areas based on AirData reports. Air pollution levels measured at a particular monitoring site are not necessarily representative of the air quality for an entire county or urban area.

This report is based on monitor-level summary statistics. Air quality standards for some pollutants (PM2.5 and Pb) allow for combining data from multiple monitors into a site-level summary statistic that can be compared to the standard. In those cases, the site-level statistics may differ from the monitor-level statistics upon which this report is based.

Source: U.S. EPA AirData <<https://www.epa.gov/air-data>>
Generated: May 24, 2018

Monitor Values Report

Geographic Area: Tennessee

Pollutant: CO

Year: 2016

Exceptional Events: Excluded (if any)

Obs	First Max 8hr	Second Max 8hr	Days 8hr Max >STD	First Max 1hr	Second Max 1hr	Days 1hr Max >STD	Exc Events	Monitor Number	Site ID	Address	City	County	State	EPA Region
7661	1.4	1.2	0	2.3	2.2	0	None	1	470090101	Great Smoky Mountains Np Look Rock	Not in a City	Blount	TN	04
8555	1.6	1.5	0	1.8	1.7	0	None	1	470370040	1113 Elm Hill Pike	Nashville-Davidson (Remainder)	Davidson	TN	04
8233	1.2	1.2	0	1.5	1.4	0	None	1	471570024	416 Alabama Avenue	Memphis	Shelby	TN	04
8553	0.7	0.7	0	1	0.8	0	None	1	471570075	6388 Halsey Rd. (Shelby Farms Ncore Site)	Memphis	Shelby	TN	04
8023	0.8	0.7	0	1.7	1	0	None	1	471570100	5767 Macon Cove (Near Road Site)	Memphis	Shelby	TN	04
2747	1	0.9	0	1.3	1.3	0	None	1	471630007	Eastman Ross N Robinson	Kingsport	Sullivan	TN	04

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Source: U.S. EPA AirData <<https://www.epa.gov/air-data>>
Generated: May 24, 2018

Monitor Values Report

Geographic Area: Tennessee

Pollutant: CO

Year: 2017

Exceptional Events: Excluded (if any)

Obs	First Max 8hr	Second Max 8hr	Days 8hr Max >STD	First Max 1hr	Second Max 1hr	Days 1hr Max >STD	Exc Events	Monitor Number	Site ID	Address	City	County	State	EPA Region
7863	0.3	0.2	0	0.3	0.3	0	None	1	470090101	Great Smoky Mountains Np Look Rock	Not in a City	Blount	TN	04
8066	1.7	1.5	0	1.9	1.9	0	None	1	470370040	1113 Elm Hill Pike	Nashville-Davidson (Remainder)	Davidson	TN	04
8624	0.7	0.7	0	1.4	0.9	0	None	1	471570075	6388 Haley Rd. (Shelby Farms Ncore Site)	Memphis	Shelby	TN	04
8200	0.9	0.7	0	1.4	1.1	0	None	1	471570100	5767 Macon Cove (Near Road Site)	Memphis	Shelby	TN	04

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Source: U.S. EPA AirData <<https://www.epa.gov/air-data>>
Generated: May 24, 2018

B-2 Ozone Concentrations (2015-2017):

Monitor Values Report

Geographic Area: Tennessee

Pollutant: Ozone

Year: 2015

Exceptional Events: Excluded (if any)

First Max 8hr	Second Max 8hr	Third Max 8hr	Fourth Max 8hr	Days Max >STD	Required Days 8hr	Valid Days 8hr	Percent Days 8hr	First Max 1hr	Second Max 1hr	Days Max >STD	Est. Days Max >STD	Required Days 1hr	Valid Days 1hr	Misang Days 1hr
0.07	0.069	0.067	0.066	0	245	243	99	0.08	0.078	0	0	245	245	0
0.074	0.07	0.067	0.067	1	245	244	100	0.082	0.077	0	0	245	244	1
0.065	0.064	0.063	0.061	0	245	240	98	0.073	0.072	0	0	245	241	1
0.068	0.062	0.061	0.061	0	245	241	98	0.077	0.074	0	0	245	244	1

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Source: U.S. EPA AirData <<https://www.epa.gov/air-data>>

Generated: May 29, 2018

Monitor Values Report

Geographic Area: Tennessee

Pollutant: Ozone

Year: 2015

Exceptional Events: Excluded (if any)

Exc. Events	Monitor Number	Site ID	Address	City	County	State	EPA Region
None	1	471632003	3301 Bloomingdale Rd. Kingsport Tn 37660	Bloomingdale	Sullivan	TN	04
None	1	471650007	Rockland Recreation Area-Old Hickory Dam Army Corp Of Engineer Property	Hendersonville	Sumner	TN	04
None	1	471870106	Fairview Middle School Crow Cut Road Fairview Tn 37062	Fairview	Williamson	TN	04
None	1	471890103	Cedars Of Lebanon State Park	Not in a City	Wilson	TN	04

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Source: U.S. EPA AirData <<https://www.epa.gov/air-data>>
Generated: May 29, 2018

Monitor Values Report

Geographic Area: Tennessee

Pollutant: Ozone

Year: 2016

Exceptional Events: Excluded (if any)

First Max 8hr	Second Max 8hr	Third Max 8hr	Fourth Max 8hr	Days 8hr Max >STO	Required Days 8hr	Valid Days 8hr	Percent Days 8hr	First Max 1hr	Second Max 1hr	Days 1hr Max >STO	Ed Days 1hr Max >STO	Required Days 1hr	Valid Days 1hr	Missing Days 1hr	Exc Events	Monitor Number	Site ID	Address	City	County	State	EPA Region
0.083	0.075	0.074	0.073	7	245	233	95	0.096	0.083	0	0	245	236	0	None	1	471050108	130 Webb Drive Loudon Tn 37774	Loudon	Loudon	TN	04
0.073	0.072	0.071	0.07	3	245	234	96	0.084	0.081	0	0	245	237	3	None	1	471550101	Great Smoky Mountain Np Cove Mountain	Not in a city	Sevier	TN	04
0.07	0.07	0.069	0.066	0	245	179	73	0.093	0.084	0	0	245	180	0	None	1	471550102	Clingsmans Dome, Great Smoky Mtns. Np	Not in a City	Sevier	TN	04
0.081	0.073	0.072	0.071	4	245	241	98	0.09	0.088	0	0	245	243	0	None	1	471570021	1330 Frayser Blvd	Memphis	Shelby	TN	04
0.075	0.07	0.068	0.068	1	245	244	100	0.091	0.078	0	0	245	244	1	None	1	471570075	6388 Haley Rd. (Shelby Farms Ncore Site)	Memphis	Shelby	TN	04
0.074	0.071	0.069	0.067	2	245	243	99	0.08	0.078	0	0	245	244	1	None	1	471571004	6855 Mudville Rd.	Millington	Shelby	TN	04
0.071	0.07	0.07	0.068	1	245	240	98	0.088	0.08	0	0	245	241	1	None	1	471632002	Indian Springs School Shawnee Dr Blountville Tn	Not in a City	Sullivan	TN	04
0.072	0.07	0.067	0.067	1	245	243	99	0.081	0.078	0	0	245	244	1	None	1	471632003	3301 Bloomingdale Rd. Kingsport Tn 37660	Bloomingdale	Sullivan	TN	04
0.072	0.07	0.07	0.068	1	245	242	99	0.09	0.081	0	0	245	245	0	None	1	471650007	Rockland Recreation Area-Old Hickory Dam Army Corp Of Engineer Property	Hendersonville	Sumner	TN	04
0.073	0.068	0.062	0.061	1	245	243	99	0.077	0.077	0	0	245	244	1	None	1	471870106	Fairview Middle School Crow Cut Road Fairview Tn 37062	Fairview	Williamson	TN	04
0.069	0.068	0.068	0.067	0	245	223	91	0.08	0.075	0	0	245	225	1	None	1	471890103	Cedars Of Lebanon State Park	Not in a City	Wilson	TN	04

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Generated: May 29, 2018

Monitor Values Report

Geographic Area: Tennessee

Pollutant: Ozone

Year: 2017

Exceptional Events: Excluded (if any)

First Max 8hr	Second Max 8hr	Third Max 8hr	Fourth Max 8hr	Days 8hr Max >STO	Required Days 8hr	Valid Days 8hr	Percent Days 8hr	First Max 1hr	Second Max 1hr	Days 1hr Max >STO	Ed Days 1hr Max >STO	Required Days 1hr	Valid Days 1hr	Missing Days 1hr	Exc Events	Monitor Number	Site ID	Address	City	County	State	EPA Region
0.066	0.066	0.064	0.063	0	245	227	93	0.078	0.077	0	0	245	230	0	None	1	471050109	2175 Roberts Rd Loudon Tn 37774	Loudon	Loudon	TN	04
0.067	0.067	0.066	0.065	0	245	238	97	0.084	0.075	0	0	245	241	2	None	1	471550101	Great Smoky Mountain Np Cove Mountain	Not in a city	Sevier	TN	04
0.066	0.062	0.061	0.06	0	184	170	92	0.078	0.076	0	0	184	172	2	None	1	471550102	Clingsmans Dome, Great Smoky Mtns. Np	Not in a City	Sevier	TN	04
0.09	0.071	0.064	0.064	2	245	229	93	0.098	0.079	0	0	245	234	1	None	1	471570021	1330 Frayser Blvd	Memphis	Shelby	TN	04
0.071	0.071	0.068	0.068	2	365	359	98	0.091	0.077	0	0	365	362	3	None	1	471570075	6388 Haley Rd. (Shelby Farms Ncore Site)	Memphis	Shelby	TN	04
0.068	0.068	0.065	0.064	0	245	238	97	0.086	0.075	0	0	245	240	0	None	1	471571004	6855 Mudville Rd.	Millington	Shelby	TN	04
0.068	0.066	0.066	0.065	0	245	234	96	0.08	0.079	0	0	245	235	1	None	1	471632002	Indian Springs School Shawnee Dr Blountville Tn	Not in a City	Sullivan	TN	04
0.066	0.065	0.064	0.064	0	245	240	98	0.082	0.074	0	0	245	241	0	None	1	471632003	3301 Bloomingdale Rd. Kingsport Tn 37660	Bloomingdale	Sullivan	TN	04
0.07	0.065	0.065	0.064	0	245	243	99	0.08	0.077	0	0	245	244	1	None	1	471650007	Rockland Recreation Area-Old Hickory Dam Army Corp Of Engineer Property	Hendersonville	Sumner	TN	04
0.064	0.062	0.06	0.058	0	245	214	87	0.071	0.069	0	0	245	216	0	None	1	471870106	Fairview Middle School Crow Cut Road Fairview Tn 37062	Fairview	Williamson	TN	04
0.065	0.065	0.062	0.061	0	245	235	96	0.083	0.072	0	0	245	236	2	None	1	471890103	Cedars Of Lebanon State Park	Not in a City	Wilson	TN	04

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