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west virginia department of environmental protection

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## ENGINEERING EVALUATION/FACT SHEET

### B BACKGROUND INFORMATION

Application No.:	R13-3186
Plant ID No.:	057-00011
Applicant:	Alliant Techsystems Operations LLC (ATK)
Facility Name:	Allegany Ballistics Laboratory (ABL)
Location:	Rocket Center
NAICS Code:	3364115
Application Type:	Modification
Received Date:	April 21, 2013
Engineer Assigned:	Edward S. Andrews, P.E.
Fee Amount:	\$4500.00
Date Received:	April 29, 2014
Complete Date:	May 28, 2014
Due Date:	August 15, 2014
Applicant Ad Date:	May 17, 2014
Newspaper:	<i>News Tribune</i>
UTM's:	Easting: 686.5 km      Northing: 4,381.2 km      Zone: 17
Description:	The application is for the replacement of Steam Plant #1 with ten natural gas fired boilers that are equipped with distillate oil as back-up supply source.

### DESCRIPTION OF PROCESS

The principal operations at the Rocket Center facility consist of the fabrication of rocket motor and warhead cases; the production of propellants and explosives which are loaded into above cases; preparation of cases; and, examination of motors. Currently, steam at the facility is provided by existing boilers, which combust coal and distillate oil to indirectly transfer heat to the other processes at the facility. ATK proposes to install ten (10) new efficient natural gas-fired boilers, with distillate oil as back-up fuel; and, once the new boilers are operational, ATK proposes to decommission the existing boilers. The proposed project will also include installing one (1) new emergency generator for the new boilers and one (1) new oil storage tank.

## **Proposed New Equipment – Natural Gas-fired Boilers**

ATK proposes to install ten natural gas-fired boilers as part of the repowering project, where eight are expected to operate during the cooler months, three to operate during the warmer months, and two to operate as backup. Each boiler will have a maximum heat input capacity of up to 12 MMBtu/hr and will be designed without a continuous oxygen trim system for rapid start-up to meet three load scenarios: full, half, and none.

The ten boilers will be configured in two rows of five units and will have a shared condensing economizer. Air emissions from each boiler exhaust into ductwork and exit through one of two points: the common stack or the economizer stack. By design, all of the boiler emissions will exit year round through the economizer stack. If the economizer is down for maintenance, emissions will exit through the common stack.

ATK requires backup fuel because an unexpected natural gas curtailment or supply interruption would lead to potential material explosions as the material temperature and pressure would change without a constant steam load. As such, ATK will include the ability to combust ultra-low sulfur diesel (ULSD) in each of the new boilers during curtailment periods. ATK proposes to combust ULSD for each boiler for no more than 48 hours per calendar year during specified periods of maintenance, training, and testing.

## **Proposed New Equipment – Emergency Generator**

ATK also proposes to install an emergency engine-driven generator, which would supply emergency power for the proposed ten natural gas-fired boilers. The emergency generator will have a maximum power capacity of 750 kilowatts (kW) and will fire ULSD as fuel. ATK proposes to operate the engine without a time limit during emergency situations and to limit the number of annual hours of operation for periodic maintenance and testing.

## **Proposed New Equipment – ULSD Storage Tank**

ATK proposes to install one new ULSD storage tank to service the boilers and emergency generators, and it will have a maximum capacity of approximately 30,000 gallons.

## **Proposed Equipment to Cease Operation**

ATK currently operates one coal-fired boiler (No. 17) and two distillate oil-fired boilers (No. 15 and 16), where one of the three boilers is always in operation, another is operated for swing loads, and the other is used only as back-up during maintenance or shutdown of the other boiler(s) as Steam Plant #1. ATK also operates other associated equipment related to coal fuel and coal ash. The total nominal heat input rating for the three existing boilers is approximately 210 MMBtu/hr. Upon completion of the repowering project, all three coal- and oil-fired boilers and all associated coal-related equipment will be shut down and permanently removed from service.

## SITE INSPECTION

On May 22, 2014, Mr. Karl Dettinger, a Compliance Inspector assigned to the Compliance and Enforcement Section of the DAQ, conducted a part of his full-on- site inspection of the Allegany Ballistics Laboratory. At this time, Mr. Dettinger is evaluating his findings to determine if the laboratory is operating in compliance with all rules, regulations and permits. Mr. Dettinger did not see any issues related to the installation of these proposed units at the Allegany Ballistics Laboratory.

## ESTIMATE OF EMISSION BY REVIEWING ENGINEER

The applicant used pollutant specific emissions factors from Chapters 1.4 (natural gas fired) and 1.3 (oil fired) of AP-42, filterable & condensable fractions of particular mater from data published by U.S. EPA Region V, and manufacturer's data to estimate emissions from the new boilers. All ten of the proposed boilers are to be identical. The manufacturer provided carbon monoxide (CO) and oxides of nitrogen (NO<sub>x</sub>) concentrations for firing with both types of fuel corrected to 3% oxygen, which is 100 ppm for CO and 30 ppm for NO<sub>x</sub>. The potential emissions using natural gas is presented in the following table:

<b>Pollutant</b>	<b>Emission Factor</b>	<b>Hourly Rate (lb/hr)</b>	<b>Annual Rate (tpy)</b>
PM Filterable/Condensable Fractions	0.52 lb/MMcf	0.01	0.01
PM <sub>10</sub> Filterable/Condensable Fractions	0.52 lb/MMcf	0.01	0.01
PM <sub>2.5</sub> Filterable/Condensable Fractions	0.33 lb/MMcf	0.004	0.003
Sulfur Dioxide (SO <sub>2</sub> )	0.6 lb/MMcf	0.006	0.01
Oxides of Nitrogen (NO <sub>x</sub> )	0.036 lb/MMBtu	0.43	0.72
Carbon Monoxide (CO)	0.074 MMBtu	0.89	0.82
Volatile Organic Compounds (VOCs)	5.5 lb/MMcf	0.06	0.05
Total Hazardous Air Pollutants (HAPs)	1.9 lb/MMscf	0.02	0.09
Carbon Dioxide Equivalent* (CO <sub>2</sub> e)	117.098 lb/MMBtu	1,405.18	6154.69

\* Based on factors and global warming potentials from Tables A-1, C-1, and C-2 of Part 98 published on Federal Register on November 29, 2013.

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The emissions from the use of the distillate oil were estimated using emission factors from Chapters 1.3 (oil fired) of AP-42. Sulfur dioxide emissions were based on 0.0015 % sulfur content by weight.

<b>Table #2 – Emission from One of the New Boilers using Distillate Oil</b>			
<b>Pollutant</b>	<b>Emission Factor</b>	<b>Hourly Rate (lb/hr)</b>	<b>Annual Rate (tpy)</b>
PM Filterable/Condensable Fractions	3.3 lb/Mgal	0.29	0.07
PM <sub>10</sub> Filterable/Condensable Fractions	2.3 lb/Mgal	0.20	0.05
PM <sub>2.5</sub> Filterable/Condensable Fractions	1.55 lb/Mgal	0.14	0.04
Sulfur Dioxide (SO <sub>2</sub> )	0.213 lb/Mgal	0.02	0.01
Oxides of Nitrogen (NO <sub>x</sub> )	0.0384	0.46	0.12
Carbon Monoxide (CO)	0.0779 lb/MMBtu	0.93	0.23
Volatile Organic Compounds (VOCs)	0.2 lb/Mgal	0.02	0.01
Total Hazardous Air Pollutants (HAPs)	5.4E-01	0.047	0.012
Carbon Dioxide Equivalent* (CO <sub>2</sub> e)	163.61 lb/MMBtu	1,963.32	490.83

\* Based on factors and global warming potentials from Tables A-1, C-1, and C-2 of Part 98 published on Federal Register on November 29, 2013.

Annual emissions are based on continuous operation of the units. Worst case potential emissions when operating on fuel oil is based on 500 hours per year. The following table is the worst case annual potential from all ten boilers and the potential from Steam Plant #2.

<b>Pollutant</b>	<b>Annual Potential 10 proposed boilers (tpy)</b>	<b>Potential of Steam Plant #2 (tpy)</b>	<b>Potential Both Steam Plants(tpy)</b>
PM	1.11	0.16	1.27
PM <sub>10</sub>	0.91	0.08	0.99
PM <sub>2.5</sub>	0.57	0.07	0.64
SO <sub>2</sub>	0.35	2.61	2.96
NO <sub>x</sub>	18.96	7.73	26.69
CO	39.06	7.16	46.22
VOCs	2.58	0.47	3.05
HAPs	0.946	0.25	1.196
CO <sub>2e</sub>	62942.23	10,427	73,369.23

Potential emissions from the engine for the emergency generator set were based on a manufacturer certified engine meeting the emission standard using ultra-low sulfur diesel. Annual emissions were based on 500 hours per year of operation. These emissions are summarized in the following table:

<b>Pollutant</b>	<b>Hourly Rate (lb/hr)</b>	<b>Annual Rate (tpy)</b>
PM Filterable/Condensable Fractions	0.34	0.09
PM <sub>10</sub> Filterable/Condensable Fractions	0.34	0.09
PM <sub>2.5</sub> Filterable/Condensable Fractions	0.34	0.09
Sulfur Dioxide (SO <sub>2</sub> )	1.11E-4	<0.01
Oxides of Nitrogen (NO <sub>x</sub> )	11.02	2.76
Carbon Monoxide (CO)	6.03	1.51
Volatile Organic Compounds (VOCs)	0.66	0.01
Total Hazardous Air Pollutants (HAPs)	1.14E-02	0.17
Carbon Dioxide Equivalent* (CO <sub>2e</sub> )	1,197.63	299.41

The VOC emissions from the storage tank working and breathing losses were predicted to be 1.77 pounds per year using TANKS 4.09d.

The emissions from Steam Plant #1 were not estimated as part of this evaluation. As discussed in the following section, the potential emission increase of this project and the recent changes made in Steam Plant #2 does not exceed the significance threshold of a major modification of a major source for any of the New Source Review Pollutants.

## REGULATORY APPLICABILITY

The Allegany Ballistics Laboratory is a major source under Title V (45CSR30) and currently possesses a valid Title V Operating Permit. The facility is currently classified as a major source under Prevention of Significant Deterioration (PSD) and for HAPs.

### *Major Modification Test of the Project*

The first step in determining major modification applicability is to determine which pollutants that the project is major for, which is illustrated in the following table.

Pollutant	Increase in Potential from the proposed project (tpy)	Significance Threshold (tpy)	Significance Trigger (Yes/No)
PM	1.11	25	No
PM <sub>10</sub>	0.91	15	No
PM <sub>2.5</sub> Direct	0.57	10	No
SO <sub>2</sub>	0.35	40	No
NO <sub>x</sub> (precursor of Ozone and PM <sub>2.5</sub> )	18.96	40	No
CO	39.06	100	No
VOCs	2.58	40	No
CO <sub>2</sub> equivalent (CO <sub>2e</sub> )	62942.23	75,000	No

This project does not represent a “significant emission increase” (45CSR§14-2.75) for any NSR pollutant. Thus, no further review is required.

With regards to the National Ambient Air Quality Standards, Mineral County is classified as attainment for all pollutants. Thus, no further review of this application with regards to 45 CSR 19, West Virginia Non-Attainment Permitting Rule is required.

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## *Boilers*

The new boilers are subject to Rules 2 & 10 (WV State Rules on PM and SO<sub>2</sub>). Under 45 CSR §2-4.1, the proposed ten boilers, i.e. Type “b” fuel burning units, are subject to a weight emission standard in pounds per hour (lb/hr) of PM, calculated as the product of 0.09 lb of PM per MMBtu and the total heat inputs for such units in MMBtu/hr (i.e.  $0.09 \times 120 = 10.8$ ), where no more than 600 lb/hr may be discharged into the open air from all such units. The hourly potential from all 10 boilers using distillate oil would only be 2.9 pounds per hour and 0.1 pounds per hour using natural gas. During the worst case operation (distillate oil firing mode), the potential from all 10 boilers would only be 27% of the applicable limit under Rule 2. The distillate oil firing mode will be limited to 48 hours per year and the duration of any natural gas curtailments.

These units will be subject to the 10% visible emission standard of 45 CSR §2-3.1. Both of the proposed fuels are fairly clean (low ash content) fuel and typically exhibit little to no visible emissions when burned in a properly operated and maintained boiler. Without the use of an add-on-control device, the proposed boilers should easily meet the requirements of Rule 2.

The proposed boilers are over 10 MMBtu and thus are subject to Subpart Dc of Part 60. The sulfur dioxide limitations of Subpart Dc are more stringent than Rule 10. Therefore, no further discussion of Rule 10 is needed.

The proposed boilers will burn distillate oil, which Subpart Dc established sulfur dioxide limitations for such units in 40 CFR §60.42c(d). §60.42c(d) established a sulfur dioxide emission limit of 0.50 lb per MMBtu and an alternative sulfur content limit of 0.50 percent by weight for the oil consumed. ATK proposed to use ultra-low sulfur diesel as the distillate oil, which has a maximum concentration of sulfur of 15 ppm ( 0.0015 % by wt.). Thus, the proposed boilers will be capable of complying with this standard.

The established emission standards in Subpart Dc exclude units using natural gas. However, the fuel recordkeeping requirement in §60.48c(g)(2) is applicable for both fuels.

The facility is currently classified as a major source of HAPs, which means the facility has the potential to emit 10 tons per year of a single HAP, or 25 tpy of total HAPs. Within the application, ATK has not elected to determine if this project would change the facility’s major source status for HAPs. Thus, these boilers are subject to 40 CFR 63, Subpart DDDDD – National Emission Standard for Hazardous Air Pollutants (NESHAP) for Major Sources: Industrial Commercial, and Institutional Boilers and Process Heaters.

Because ATK has elected to only use distillate as a back-up fuel to the natural gas for these boilers, the proposed boilers fall under the “Gas 1” category unit. These units will be limited to operate for only 48 hours per year on distillate oil for the purpose of conducting testing and readiness checks. During periods of natural gas curtailments or supply shortages, the units can be operated on distillate oil for the entire period of the curtailment or until supplies have been restored.

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This regulation establishes work practices as a means to comply with the emission standards (see Item 2 of Table 3 to Subpart DDDDD of Part 63). This tune-up requirement is applicable to the replacement boiler and must be conducted in accordance with 40 CFR §63.7540 and be conducted annually. According to 40 CFR §63.7510(g) and §63.7515(d), the initial tune-up for these new units must be completed within 13 months after initial start-up. ATK will be required to conduct subsequent tune-ups every 13 months from the previous tune-up.

### *Emergency Generator*

The proposed emergency generator is subject to Subpart IIII of Part 60 because it is a stationary compression ignition (CI) reciprocating internal combustion engine (RICE), will be manufactured after April 1, 2006, and is not a fire pump engine.

Subpart IIII has specific requirements based on several criteria, including model years and engine displacements. Because the generator is a 2014 model year emergency generator CI ICE10 with a displacement less than 30 liters per cylinder, per 40 CFR §60.4205(b) and 40 CFR §60.4202(a)(2), the generator must meet the emission standards for Tier 2 engines in 40 CFR §89.112 and the opacity standards in 40 CFR §89.113. In keeping with 40 CFR §60.4211(c), the generator meets these requirements based on manufacturer specifications indicating EPA certification for Tier 2 engines.

Per 40 CFR §60.4207(b), the generator must use non-road diesel fuel with a maximum sulfur content of 15 parts per million (ppm) per gallon. Because the emergency generator will fire only ultra-low sulfur diesel ULSD, which by definition must meet the requirements of 40 CFR 810(c), i.e. 15 ppm of sulfur content, the generator meets this requirement.

Per 40 CFR 60.4209, the emergency generator must have installed a non-resettable hour meter prior to startup of the engine. As part of the proposed project, the generator will have the meter installed prior to startup.

To maintain the emergency stationary RICE classification for the emergency generator, the RICE must meet the operational requirements of 40 CFR 60.4211(f), summarized below.

- There is no time limit on the use of the RICE during emergency situations.
- The emergency RICE may not operate more than 100 hours per year in non-emergency situations for maintenance checks and readiness testing, as long as such testing is recommended by the government, the manufacturer, the vendor, or the insurance company associated with the engine.

The engine for the generator is also subject to Subpart ZZZZ of Part 63. The emission standards under this subpart applies to stationary CI and spark-ignition RICE based on size, source HAP classification (major or area), and RICE status (new or existing). The proposed project will include one (1) ULSD-fired emergency generator, with a rated capacity of 1,046 hp.

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Because the generator is a RICE, is located at a HAP major source, and has a rated capacity greater than 500 hp, the generator is subject to NESHAP Subpart ZZZZ.

ATK proposes to operate the generator for emergency purposes only. As an emergency stationary RICE that will be constructed after December 19, 2002, per 40 CFR 63.6590(b)(1) and (b)(1)(ii), the generator does not have to meet the requirements of 40 CFR 63 Subpart ZZZZ or Subpart A except for the initial notification requirements of 40 CFR 63.6645(f) if the RICE is not operated or is not contractually obligated to be available for more than 15 hours per calendar for emergency demand response.

ATK prepared and submitted a complete application, paid the filing fee, and published a Class I Legal ad in *News Tribune* on May 17, 2014, which is required under Rule 13 for a modification permit. The facility currently holds a valid Title V Operating Permit and included Attachment S of the application for a minor modification of this operating permit. This proposed project will not change the facility's status with regards to any other applicable rules or regulations.

#### TOXICITY OF NON-CRITERIA REGULATED POLLUTANTS

The proposed boilers will not emit any pollutants that aren't already being emitted by another emission source at the Allegany Ballistics Laboratory. Therefore, no information about the toxicity of the hazardous air pollutants (HAPs) is presented in this evaluation.

#### AIR QUALITY IMPACT ANALYSIS

The writer deemed that an air dispersion modeling study or analysis was not necessary, because the proposed modification does not meet the definition of a major modification of a major source as defined in 45CSR14.

#### MONITORING OF OPERATIONS

As noted earlier, the modified boilers are subject to the Boiler MACT which requires annual tune-ups for each boiler. The permit will require that the tune-up verify that the optimization of CO must be consistent with the manufacturer's specifications and that the NO<sub>x</sub> concentrations or settings are at or within the manufacturer's specifications. The facility will be required to prove the site is using pipeline quality natural gas and distillate oil with less than 0.0015 percent sulfur through fuel records or other supplier requirements. Because these boilers can use two different types of fuels, there is an annual heat input limit. ATK will have to track the fuel usage on a monthly basis and then use it to calculate the total heat energy input into the units from the previous 12 months. Other monitoring is tracking the length of time distillate oil is used and for what purpose to prove the units remain a "Gas 1 Unit" under Subpart DDDDD. When one of the boilers has operated for more than 30 consecutive days on distillate oil, the

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permit will require a demonstration that the unit is achieving the visible emission standard of Rule 2 (10 % opacity limit).

The generator will be required to only use ultra-low sulfur diesel and install a non-resettable hour meter. ATK will be required to records hours of non-emergency operation to prove the engine does not exceed the 100 hours of non-emergency operating limit.

#### RECOMMENDATION TO DIRECTOR

The information provided in the permit application indicates the proposed modification of the Allegany Ballistics Laboratory for a new steam plant will meet all the requirements of the application rules and regulations when operated in accordance to the permit application. Therefore, the writer recommends granting ATK a Rule 13 modification permit for their new steam plant at the Allegany Ballistics Laboratory located near Rocket Center, WV.

Edward S. Andrews, P.E.  
Engineer

July 3, 2014  
Date

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