DEPARTMENT OF ECOLOGY
State of Washington

TECHNICAL SUPPORT DOCUMENT
SGL COMPOSITES, LLC FACILITY LINES 1-6
PRELIMINARY DETERMINATION

Prepared By

Air Quality Program
Washington State Department of Ecology
Spokane, Washington

March 15, 2019

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1. EXECUTIVE SUMMARY

Below is the Technical Support Document (TSD) for the SGL Composites LLC facility 2019 Lines 1-6 Permit Revision Project. The Washington State Department of Ecology (Ecology) has determined that all regulatory requirements have been satisfied and the project complies with the requirements for New Source Review (NSR) and WAC 173-400-091 for a voluntary limitations in the state of Washington.

2. THE PROJECT

a. The Site

The existing facility is located on 110 acres in the city of Moses Lake, Washington, in Grant County. The site is within a Class II area that is in attainment or unclassified with regard to all pollutants regulated by the NAAQS and state air quality standards. The physical address is 8781 Randolph Road NE in Moses Lake, Washington. The property boarders Startford Road NE to the west, Randolph Road NE to the east, and is approximately one-half mile east of the Grant County International Airport, Township 20 N Range 28 E Section 22. The bounding Universal Transverse Mercator coordinates are NAD83 Zone 11, 326705/5231086, 327498/5231054, 327488/5230395, 326697/5230457.

A map of the facility is shown in Figure 1 below. The building on the far left is administrative and warehouse, the buildings labeled Lines 1-2, Lines 3-4, and Lines 5-6 are existing structures. Production Lines 1-5 are operational.

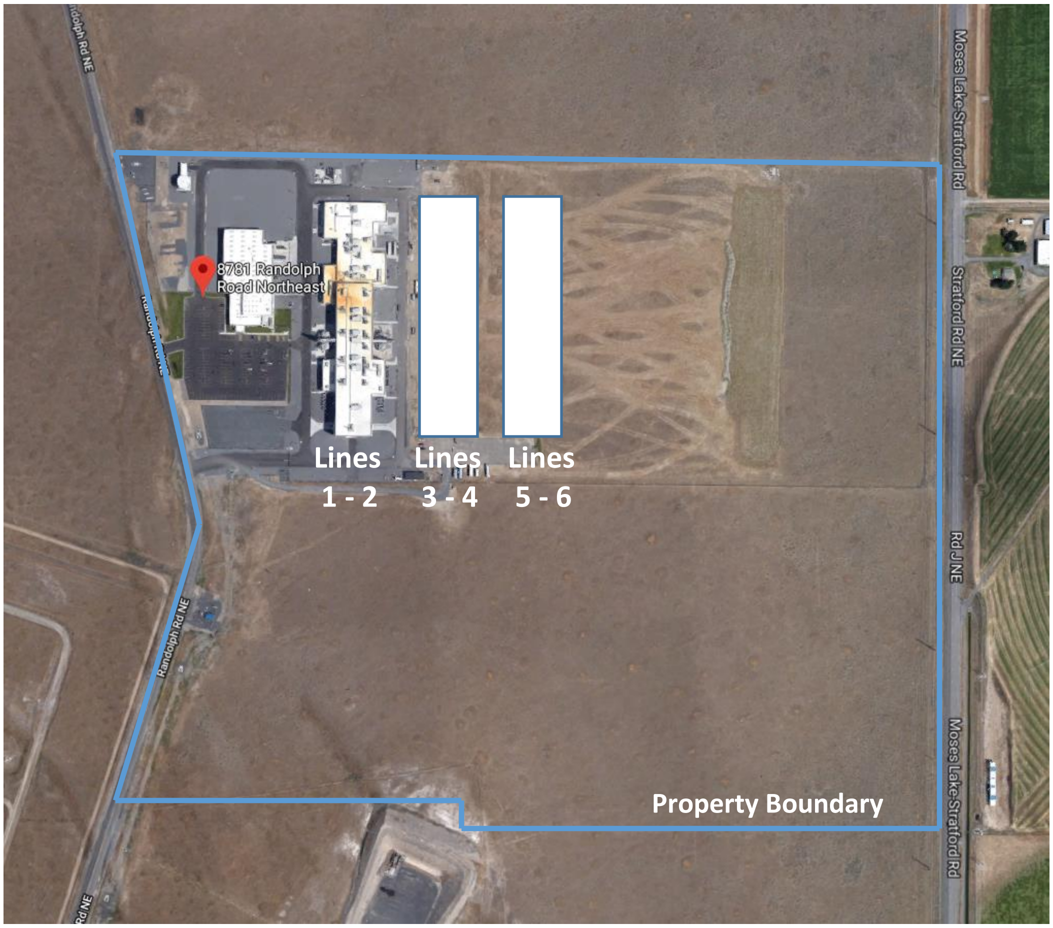

Figure 1. Facility Map

b. The Existing Facility

On March 23, 2010, SGLACF applied to install and operate two polyacrylonitrile carbon fiber production lines. Each line had the capacity to produce up to 1,500 tons of carbon fiber per year. In order to stay below 100 tons per year (tpy) limit, SGLACF requested and received a federally enforceable limit of 99 tpy on nitrogen oxides (NOx). Approval Order Number 10AQ-E362 was issued on July 13, 2010.

On January 31, 2011, SGLACF applied to install seven natural gas-fired reciprocating engines. Six of the engines were intended to provide power to safely shut down Line 1 should a grid power failure occur. The seventh engine was to provide power to an emergency power water pump for fire suppression. Approval Order Number 10AQ-E362 was rescinded and replaced by Approval Order Number 11AQ-E408 on April 14, 2011.

On July 25, 2012, SGLACF applied to install and operate four natural gas-fired emergency power reciprocating engines. These engines were installed to provide power to safely shut down Line 2. Approval Order Number 11AQ-E408 was rescinded and replaced by Approval Order Number 12AQ-E465 on February 21, 2013.

On June 28, 2013, SGLACF applied to double the size of the facility from two lines to four lines. Each of the four lines is designed to produce up to 1,760 tons of carbon fiber per year. In order to stay below the 100 tpy limit, SGLACF installed controls to ensure NOx emissions would not exceed 100 tpy thus meeting their federally enforceable limit of 99 tpy on NOx in the original Approval Order. Approval Order Number 12AQ-E465 was rescinded and replaced by Approval Order Number 13AQ-E525 on January 24, 2014.

On March 4, 2014, SGLACF submitted an application to increase the size of the facility from four lines to eight lines. The proposed Lines 5-8 Project was identical to Lines 1-4 Project authorized by Approval Order Number 13AQ-E525 with three exceptions. SGLACF proposed to generate backup emergency power from diesel engines instead of natural gas engines, furnace emissions are no longer routed through a selective catalytic reduction (SCR) control device due to plugging problems, and a new mode of operation (Standby Mode) has been requested. The furnace emissions are still routed through a thermal oxidizer (TO) but water injection is proposed to reduce the formation of NOx. During the public comment period for the preliminary determination, EPA expressed its position that the approval process for Lines 5-8 should have been aggregated with the existing Approval Order. Under the terms of Settlement Agreement and Agreed Order No. 10768 signed June 16, 2014, Ecology acknowledged that Lines 1 and 2 were appropriately permitted as minor sources, and SGLACF agreed to submit new minor and major source permit applications addressing Lines 3-8, and Lines 5-8 Project was never approved.

On March 26, 2014, SGLACF applied to change the emergency backup power for Lines 3 and 4 allowed in Approval Order 13AQ-E525 from natural gas internal combustion engines to diesel compression ignition engines. Approval Order Number 14AQ-E558 issued on September 9, 2014.

On August 15, 2014, SGLACF applied to increase the size of the facility to 10 lines. Each of the additional lines is expected to produce 1,760 tons of carbon fiber each year and include a regenerative thermal oxidizer (RTO) and a TO to combust organic compounds in the exhaust from the oxidation ovens and carbonization furnaces, respectively. An SCR will be installed on Lines 3-6 but is not proposed for Lines 7-10. Additionally, eight diesel-fueled backup emergency power generators and a fire water pump engine will be installed. PSD 14-02 was issued April 13, 2015, for Lines 3-10 (criteria pollutants) and Order 14AQ-E586 was issued April 20, 2015, for Lines 1-10.

On September 25, 2015, SGLACF submitted an application to change the emission limits on eight 2,937 diesel –fueled emergency generators due to their inability to meet the manufacture estimated load specific emission rates. Additionally, SGLACF did not identify the portable oxidation ovens during the last permitting cycle.

Since 2011, SGLACF has used portable electric ovens in the Feed and Pretension step to splice together polyacrylonitrile from one creel box to another. Polyacrylonitrile is oxidized in these portable ovens, at temperatures similar to the main ovens, to attach the end of one box to the beginning of another so that a continuous campaign may be run.

SGLACF refers to these ovens as pre-oxidation portable electric ovens and will have up to 50 portable ovens on-site. No other changes have been proposed for the facility.

c. The Proposed Project

On January 16, 2019, SGL Composites LLC submitted a Notice of Construction application requesting to change their name and amend their existing Approval Order, 15AQ-E636, to remove sources associated with Phases 3-6 and request a synthetic minor limit with respect to the Prevention of Significant Deterioration (PSD) program to supersede their current PSD permit 14-02.

SGL is requesting to remove Lines 7-10 and all associated equipment from the current permit because these lines have not been built, and are not currently part of SGL's business plan to build. Removing Lines 7-10 associated equipment eliminates all but NOx from being above the PSD threshold. SGL is requesting a synthetic minor limit for NOx to make the facility a synthetic minor facility with respect to PSD for all pollutants. SGL has identified that the line speed on Lines 1-6 can be run at a higher speed than the previously noted nominal capacity of the lines. The increased line speed is not expected to impact any of the current SGL permit limits, and SGL is not requesting any permit limit increases.

There are six process steps associated with producing carbon fiber. They are:

i. Feed and Pretension: This step involves feeding filaments of polyacrylonitrile from spools or bobbins through a series of rollers to apply uniform tension. The polyacrylonitrile is spliced together by joining the end of one box to the beginning of another with heat applied by the portable electric ovens at temperatures greater than 220℃. Emissions from the feed and pretension phase of production are vented to the room and are quantified below.

ii. Oxidation: This step involves heating the fibers in electrically powered ovens up to a temperature of 200 to 300 degrees Celsius (℃). SGL indicated that it usually takes between four and five hours to complete the oxidation phase. Each line has four electrically powered ovens with two zones each.

iii. Low-Temperature Carbonization: Each line has two electrically powered furnaces: one for low-temperature carbonization and one for high-temperature carbonization. Carbonization is the conversion of an organic substance into carbon. The fiber is fed into a furnace and heated to temperatures between 700℃ and 800℃ in a nitrogen atmosphere. The material loses approximately 39 percent of its weight during this phase.

iv. High-Temperature Carbonization: The fiber is then fed into a second furnace and is heated to temperatures between 1200℃ and 1300℃ in a nitrogen atmosphere. When the fiber leaves this furnace, it has a carbon content of approximately 94 percent and is 10 to 12 percent lighter.

v. Surface Treatment: In this step, the surface of the fiber is treated by passing electricity through it. The fiber is treated as an anode in an electric cell which allows material to be bonded to the outside of the fiber. There are no measurable emissions from the surface treatment phase of production.

vi. Sizing: A resin sizing coating is applied using a double-dip roller bath and squeegee. The fiber is treated with resin to improve handling and transportation and then dried by two steam drum rollers. There are no measurable emissions from the sizing phase of production.

vii. Winding and Packaging: During this step, the finished carbon fiber is wound around cardboard spools and shrink-wrapped for shipment. There are no measurable emissions from the winding and packaging phase of production.

d. Operational Modes

Lines 1-6 each have six operational modes. Each mode is explained below.

i. Start-up Mode

Start-up mode has two periods. The first period is defined as the period of time when the ovens are heating up, but have not reached the off-gas reaction temperature of 220°C. No emissions are generated from the ovens or furnaces during this period. The second period is defined as the period of time when the ovens have exceeded the off-gas reaction temperature of 220°C, and process emissions are controlled by the RTOs, but the ovens are not yet to the process recipe temperature or speeds. Heating the ovens to the recipe temperature is a critical process that is completed in multiple increments over a five to six-hour period. Emissions during this period are less than Normal Operation Mode and are monitored by the CERMS at each mainline stack. During start-up mode, the oxidized carbon fibers from the ovens do not go through the furnaces for carbonization. These oxidized carbon fibers go into boxes as waste. There are no restrictions on operation in this mode.

ii. Normal Operation Mode

For each of the Lines 1-6, fans pull emissions from the four oxidation ovens and direct them to the RTO where the polyacrylonitrile oxidation reaction byproducts are oxidized before exhausting through a selective catalytic reduction (SCR) unit installed to reduce NOx emissions and the 115-foot main line stack. The SCR has an associated natural gas preheater with a rated capacity of 4.6 million British thermal units per hour (MMBtu/hr). CERMS are installed on the Lines 1-6 main line stacks to measure NOx emissions. The RTO has associated natural gas preheater with a rated capacity of 8.4

MMBtu/hr. Each line also has a backup RTO bed with its own 8.4 MMBtu/hr natural gas preheater.

Lines 1-6 each have two furnaces with emissions routed to a TO that uses water injection to reduce NOx formation before exhausting through the main line stack. The TO also has a 4 MMBtu/hr natural gas heater. During this mode, an online tube cleaner will operate to maintain clean heat transfer surfaces in the waste heat recovery boilers associated with each TO.

iii. Shutdown Mode

Lines 1-6, fans are used to increase air flow and reduce temperature of the oxidation ovens. For Lines 2-6, approximately 78 percent of the emissions are routed to the shutdown stacks above the oxidation ovens (one stack for each oven), bypassing the RTO (and SCR for Lines 1-6), and NOx CERMS. The remaining 22 percent of emissions are routed to the RTO and SCR (for Lines 1-6) and NOx CERMS as they would during Normal Operations Mode. Line 1 does not have shutdown stacks located above the oxidation ovens, and all of the shutdown emissions are routed to the main line stack and are measured by the NOx CERMS. Furnace emissions are the same as in Normal Operation Mode.

iv. RTO Bypass Mode

Emissions from the oxidation ovens bypass the RTO and the SCR, for Lines 1-6, and exhaust directly to the main line stack. Emissions from Lines 1-6 furnaces are the same as in Normal Operation Mode.

v. SCR Bypass Mode

For Lines 1-6, emissions from the ovens are routed through the RTO and either bypass the SCR directly into the main line stack, or continue to be routed through the SCR (when it is not functional) into the main line stack. Furnace emissions during SCR Bypass Mode will continue to be routed through the TO and pass directly to the main line stack. Furnace emissions are the same as in Normal Operation Mode. Only one line may be in SCR Bypass Mode at a time. NOx emissions from the main line stack will continue to be measured by the CERMS.

vi. Standby Mode

Emissions during Standby Mode are from the TO and RTO natural gas-fired heaters (one 4.0 MMBtu/hr and Two 8.4 MMBtu/hr, respectively) which are operated at a low firing rate to keep the TO and RTO warm. The oxidation ovens and Lines 1-6 SCRs are not operational. There are no restrictions on operation in this mode.

vii. Emergency Power Generation

SGL has been approved to install and operate four diesel-fueled 2,937 brake horsepower (bhp) engines for quick cool down fans, lighting, and conveyor engines; one for each of Lines 3-6. Each of the four emergency power generators (L3EG, L4EG, L5EG, and L6EG) is expected to operate no more than 16 hours in any 12-month rolling period.

The 16 hours of operation are based upon four 2-hour reliability tests and one 8-hr emergency operational period. However, the permit will not differentiate between testing and emergency operation. It takes approximately 10 minutes to start-up the CO, NOx, and VOC control equipment (SCR). Therefore, the engines will be in Start-up Mode approximately one hr/yr and in normal operation the other 15 hr/yr. In addition, the permit requires performance testing of a representative engine within 12 months of start-up and every five years thereafter. Therefore, annual engine emissions calculations account for a single engine to operate for one 8-hr performance test in addition to the 16 hr/yr discussed above.

Source testing demonstrated that the emergency power generators did not meet the manufacture estimated load specific emission rates for diesel engine exhaust particulate (DEEP). Therefore, SGL has requested the emission limits in the Approval Order be revised to reflect the manufactures guarantees for emissions of NOx, particulate matter smaller than 10 microns in diameter (PM_{10}), PM smaller than 2.5 microns in diameter ($PM_{2.5}$), CO, VOC's and DEEP from the four diesel-fueled emergency generators in the two approvals. No other emission factors for the emergency power generators are being changed.

3. LAWS AND RULES

In the spring of 2015, the state of Washington received approval from the U.S. Environmental Protection Agency Region 10 to operate our own PSD program. Once the state rules (WAC 173-400-700 through 750) were included into the state of Washington SIP, Ecology no longer used the federal rules as the basis for issuing and modifying PSD permits. Ecology, however, continues to follow EPA policy and guidance when issuing PSD permits.

The Washington State Clean Air Act (Chapter 70.94 RCW) grants Ecology the authority to issue NSR Orders of Approval. The implementing regulation (Chapter 173-400 WAC), describes a set of procedures to use when performing NSR. The majority of the requirements are contained in, but not limited to, WAC 173-400-091, WAC 173-400-110, WAC 173-400-111, WAC 173-400-113, and WAC 173-400-114. There are several general requirements or emission standards that apply to this source. One emission standard is a grain loading standard from combustion units of 0.1 grains/dry standard cubic foot (g/dscf) (see WAC 173-400-050(1)). There is also a maximum opacity standard of 20 percent listed in WAC 173-400-040(1).

a. WAC 173-400-091

This section of the rule addresses voluntary limits on emissions. SGL is taking a limit on NOx of 90 tons per year to stay out of PSD and Title V for that pollutant. SGL will remain Title V for Hydrogen Cyanide (HCN), a hazardous air pollutant that will be emitted in excess of the 10 ton per year Title V threshold.

b. WAC 173-400-110

This section of the rule addresses applicability of NSR to new and modified sources. The new proposed limits and reduction of facility equipment will be treated as a facility modification and require an updated Approval Order.

c. WAC 173-400-111

This section of the rule addresses the processing of NOC application for sources, stationary sources, and portable sources. Approval Order 15AQ-E636 and PSD 14-02, Amendment 1 will be consolidated in a new Approval Order 19AQ-E003. All references to Lines 7-10 will be removed per SGL request.

d. WAC 173-400-113

This section of the rule requires a proposed source of modification in an attainment or unclassifiable area to comply with the federal rules, employ BACT for new or modified units, and ensure that the project does not cause or contribute to a violation of ambient air quality standards.

e. New Source Performance Standards (NSPS) and National Emission Standards for Hazardous Air Pollutants (NESHAP)

NSPS applies to certain types of equipment that are newly constructed, modified, or reconstructed after a given applicability date. NESHAP applies to categories of equipment with hazardous air pollutant (HAP) emissions. The applicability of the following NSPS and NESHAPs are presented below:

- New Source Performance Standard 40 CFR 60, Subpart A
- New Source Performance Standard 40 CFR 60, Subpart IIII
- New Source Performance Standard 40 CFR 60, Subpart JJJJ
- National Emission Standards for Hazardous Air Pollutants 40 CFR 63, Subpart A
- National Emission Standards for Hazardous Air Pollutants 40 CFR 63, Subpart FFFF
- National Emission Standards for Hazardous Air Pollutants 40 CFR 63, Subpart ZZZZ

i. NSPS

A. NSPS Subpart A (General Provisions)

40 CFR 60.1 through 30.19, otherwise known as Subpart A, sets forth the general provisions that a stationary source must comply with. Most notable are the notification, monitoring, and performance testing requirements.

B. NSPS Subpart IIII (Standards of Performance for Compression Ignition Internal Combustion Engines)

40 CFR 60.4200 through 60.4219, otherwise known as Subpart IIII, sets forth standards that owners and operators of stationary compression ignition engines must comply with. Including non-emergency engines, emergency (non-fire pump) engines, emergency (fire pump) engines, and reconstructed engines. In order to be considered emergency engines per Subpart IIII, the engines must operate in accordance to the following requirements as specified in Section 60.4211(f).

There are several other provisions that allow for additional use of the emergency engines but SGL proposed using their Reciprocating Internal Combustion Engines (RICE) only for readiness testing, during power outages and emergencies, and for performance testing due to permit requirements.

Pursuant to Sections 60.4205(b), 60.4202(a)(2), and 60.4211(c), SGL must comply with the subpart by purchasing engines certified to the applicable emission standards in Table 1 copied from 40 CFR 89.112 below:

Table 1. Subpart IIII Emission Standards

Rated Power (kW)	Tier	Model Year	Emission Standards		
			NMHC + NOx	CO	PM
kW > 560	Tier 2	2006	6.4 g/kW-hr	3.5 g/kW-hr	0.2 g/kW-hr
			4.8 g/hp-hr	2.62 g/hp-hr	0.15 g/hp-hr

Additionally, SGL must use diesel fuel with a sulfur content of 15 parts per million maximum and a maximum cetane index of 40 or aromatic content of 35 volume percent. Emissions from the emergency generators will continue to meet the emissions limits contained in Subpart IIII.

C. NSPS Subpart JJJJ (Standards of Performance for Stationary Spark Ignition Internal Combustion Engines)

40 CFR 60.4230 through 60.4248, otherwise known as Subpart A, sets forth the general provisions that manufacturers, owners, and operators of spark ignition internal combustion engines must comply with. SGL installed two natural gas-fired reciprocating engines to power firewater pumps for fire suppression and ten emergency engines to supply backup power to Lines 1 and 2 during power outages. The reciprocating engines are subject to Subpart JJJJ because they are emergency engines manufactured after January 1, 2009.

The emission standards are listed in Table 2.

Table 2. Subpart JJJJ Emission Standards							
Engine Type and Fuel	**Maximum Power**	**Emission Standards**					
		g/Hp-hr			**ppmvd @ 15% O_2**		
		NOx	**CO**	**VOC**	**NOx**	**CO**	**VOC**
Emergency, Natural Gas	>130 Hp	2	4	1	160	540	86

SGL will comply with the subpart by installing a certified engines that meet the emission standards listed above. SGL will operate and maintain the engine according to the manufacturer's emission-related written instructions, and will keep records of the engine certifications and conducted maintenance to demonstrate compliance. No performance testing, notification, or reporting is required by Subpart JJJJ.

ii. NESHAP

A. NESHAP Subpart A (General Provisions)

The provisions of Subpart A apply to each affected facility under any Part 63 NESHAP rule. Subpart A contains general requirements for notifications, monitoring, performance testing, reporting, recordkeeping, and operation and maintenance. These general requirements will apply to the proposed project as referenced in the applicable NESHAP subparts.

B. NESHAP Subpart FFFF (NESHAP for Miscellaneous Organic Chemical Manufacturing)

40 CFR 63.2430 through 40 CFR 63.550, otherwise known as Subpart FFFF, applies to Miscellaneous Organic Chemical Manufacturing Process Units (MCPU) that are located at, or are part of, a major source of HAPs. An MCPU includes equipment necessary to operate a miscellaneous organic chemical manufacturing process.

In order to be subject to Subpart FFFF, the MCPU must process, use, or generate any of the organic HAPs listed in Section 112(b) of the CAA or hydrogen halide and halogen HAP, and must not be subject to another subpart under 40 CFR Part 63. Additionally, the MCPU must produce material of family of materials described by the following:

- An organic chemical(s) classified using the 1987 version of SIC code 282, 283, 284, 285, 286, 287, 289, or 386, except as provided in paragraph (c)(5) of this section.

- An organic chemical(s) classified using the 1997 version of NAICS code 325, except as provided in paragraph (c)(5) of this section.
- Quaternary ammonium compounds and ammonium sulfate produced with caprolactam.
- Hydrazine.
- Organic solvents classified in any of the SIC or NAICS codes listed in paragraph (b)(1)(i) or (ii) of this section that are recovered using non-dedicated solvent recovery operations.

Subpart FFFF requires pollution prevention through product recovery from process vents. SGL performed a Total Resource Effectiveness (TRE) analysis of the total organic HAPs from the ovens and furnaces. SGL presented the following analysis of the TRE as presented in Table 3.

Table 3. TRE Index

Unit	TRE Index Value			
	Flare	Thermal Incinerator 0% Heat Recovery	Thermal Incinerator 70% Heat Recovery	Lowest Calculated TRE Value
Furnaces	54	12	9.5	9.5
Ovens	1458	254	55	55

The lowest calculated TRE index values for the two continuous process vents are above the NESHAP Subpart FFFF threshold value of five. Therefore, there are no substantive portions of this NESHAP that apply to this project.

C. NESHAP Subpart ZZZZ (National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines)

40 CFR 63.6580 through 63.6675, otherwise known as Subpart ZZZZ, sets forth emission standards for stationary RICE located at major and area sources of HAP emissions.

The diesel-fired reciprocating engines proposed to operate oven fans in case of grid power failure are considered new RICE located at a major source under this regulation because the engines will be constructed after December 19, 2002. The natural gas-fired reciprocating engines proposed to power a fire water pump for fire suppression and backup emergency power are considered new RICE located at a major source under this regulation because the engine will be constructed after June 12, 2006.

4. EMISSIONS

a. Allowable Emissions

The following tables 4 and 5 show the reduction in the allowable emissions from Approval Order 15AQ-E636 and PSD 14-02, Amendment 1 to the proposed Order.

Table 4. Criteria Pollutant Emissions		
Pollutant	**Allowable Emissions (tpy) 15AQ-E636, 14-02**	**Allowable Emissions (tpy) 19AQ-E003**
Carbon Monoxide, CO	59.0	37.0
Nitrogen Oxides, NOx	543.0	90.0
Particulate Matter, PM_{10}	117.0	80.0
Particulate Matter, $PM_{2.5}$	117.0	80.0
Sulfur Dioxide, SO_2	32.0	19.0
Volatile Organic Compounds, VOC	75.0	45.0

Table 5. Toxic Air Pollutants (lbs/year)		
Pollutant	**Allowable Emissions 15AQ-E636 + PSD 14-02**	**Allowable Emissions 19AQ-E003**
Acetaldehyde	2.940	2.905
Acenaphthene	0.013	0.006
Acenaphthylene	0.025	0.013
Acrolein	2.728	2.717
Acrylonitrile	510.5	306.2
Ammonia	266449	160069
Ammonium Bisulfate	262800	157680
Ammonium Sulfate	262800	157680
Anthracene	0.003	0.002
Arsenic	0.327	0.196
Benzene	18.514	11.542
Benz(a)anthracene	0.005	0.003
Benzo(a)pyrene	0.003	0.002
Benzo(b)fluoranthene	0.006	0.003
Benzo(g,h,i)perylene	0.002	0.001
Benzo(k)fluoranthene	0.004	0.002
Beryllium	0.020	0.012
Bromomethane	15.348	9.208
1,3-Butadiene	0.682	0.682
Cadmium	1.800	1.080
Carbon Disulfide	247.60	147.60

Table 5. Toxic Air Pollutants (lbs/year)		
Pollutant	**Allowable Emissions 15AQ-E636 + PSD 14-02**	**Allowable Emissions 19AQ-E003**
Carbon Tetrachloride	0.018	0.018
Chlorobenzene	0.013	0.013
Chloroform	0.014	0.014
Chloromethane	5.400	3.240
Chromium VI	0.092	0.055
Chrysene	0.007	0.004
Cobalt	0.137	0.082
Copper	1.390	0.834
Dichlorobenzene	1.960	1.176
Dibenzo(a,h) anthrancene	0.003	0.002
1,1-Dichloroethane	0.012	0.012
1,2-Dichloroethane	0.012	0.012
Dichloromethane	0.094	0.073
1,2-Dichloropropane	0.013	0.013
1,3-Dichloropropene	0.013	0.013
Diesel Engine Particulate	14.120	7.060
7,12-Dimethylbenz[a]anthracene	0.026	0.016
Ethylbenzene	0.026	0.026
Eythylene Dibromide	0.022	0.022
Fluoranthene	0.011	0.006
Fluorene	0.035	0.018
Formaldehyde	125.84	85.73
Hexane	2480.02	1480.02
Hydrogen Cyanide	123327.40	73987.40
Indeno(1,2,3-cd)pyrene	0.004	0.002
Manganese	0.620	0.372
Mercury	0.425	0.255
Methanol	3.152	3.152
3-Methylcholanthrene	0.003	0.002
Naphthalene	1.482	0.891
Nickel	3.436	2.062
Phenanthrene	0.113	0.056
Propylene	17.216	9.556
Pyrene	0.010	0.005
Selenium	0.039	0.024
Styrene	0.012	0.012

Table 5. Toxic Air Pollutants (lbs/year)		
Pollutant	**Allowable Emissions 15AQ-E636 + PSD 14-02**	**Allowable Emissions 19AQ-E003**
1,1,2,2 - Tetrachloroethane	0.026	0.026
Toluene	23.909	14.501
1,1,2-Trichloroethane	0.016	0.016
Vanadium	3.760	2.256
Vinyl Acetate	440.005	260.005
Vinyl Chloride	0.007	0.007
Xylenes	0.733	0.467

b. Operational Limitations

SGLACF has estimated its operational hours in each mode. Those limits are:

- RTO Bypass Mode limited to aggregate 1½ hr/day for Lines 3–10 and 4½ hr/line/yr.
- Shutdown Mode will be limited to 365 ninety-second events per year for a total of 9.13 hours for each line.
- SCR Bypass Mode limited to 100 hr/yr for each line.
- Operation of the eight 2,937 bhp emergency generators is limited to aggregate 136 hours of operation per year. The 136 hours of operation is expected to consist of eight hours of maintenance and testing and eight hours of emergency operation, per engine, as well as an additional eight hr/yr for performance/source testing of one representative engine. This approval however will not restrict how the engines are operated only the total hours of operation.
- Operation of the fire water pump engine is limited to 38 hr/yr. Originally, there was a plan to use 30 hours for maintenance and testing and eight hr/yr for emergency operation, but there will be no restriction on how the fire water pump engine is operated, just the total hours of operation.

5. NSR APPLICABILITY

SGL's request to take a limit on NOx, to bring it out of PSD and Title V for NOx requires reductions to emission limits in the facility's Approval Order and a rescission of the PSD permit (WAC 173-400-091). This project does not trigger New Source Review as it is a reduction in emissions for the facility.

a. The Application

The pre-application meeting for this project was held on November 13, 2018. The NOC application was submitted on January 16, 2019. The application was determined to be complete on February 15, 2019. This TSD and Order of Approval are based upon the information submitted by the applicant, SGL, and its consultant, Trinity Consultants.

6. DETERMINATION OF BACT

BACT means an emission limitation based on the maximum degree of reduction for each air pollutant subject to regulation under Chapter 70.94 RCW emitted from or which results from any new or modified stationary source, which the permitting authority, 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 and available methods, systems, and techniques, including fuel cleaning, clean fuels, or treatment or innovative fuel combustion techniques for control of each such pollutant. In no event shall application of the "best available control technology" result in emissions of any pollutants which will exceed the emissions allowed by any applicable standard under 40 CFR Parts 60 and 61. Emissions from any source utilizing clean fuels, or any other means, to comply with this paragraph shall not be allowed to increase above levels that would have been required under the definition of BACT in the Federal Clean Air Act as it existed prior to enactment of the Clean Air Act Amendments of 1990.

This BACT analysis is consistent with general EPA guidance (EPA, 1990). The steps involved are briefly described below. The EPA BACT guidance document details a "top-down" approach for selecting the appropriate control technology. The steps are as follows:

Step 1. Identify all available control alternatives with practical potential for application to the specific emission unit for the regulated pollutant under evaluation.

Step 2. Eliminate all technically infeasible alternatives. If any of the control techniques identified in Step 1 cannot be successfully used on the emission units due to technical difficulties, such techniques are removed from further consideration.

Step 3. Rank the remaining alternatives by control effectiveness. Assess the performance of each technically feasible control technique, and rank them beginning with the most effective.

Step 4. Evaluate the cost-effectiveness, energy impacts, and environmental impacts of the most cost-effective control alternative.

Step 5. Select BACT, which will be the most effective alternative not rejected based on economic, energy, and/or environmental impacts.

a. Regulatory Requirements

BACT is required at each emission point for each pollutant subject to regulation. Best Available Control Technology was not triggered for this Order. Please refer to the April 13, 2015, Lines 3-10 TSD and the March 17, 2016, Lines 1-10 TSD for discussions of BACT for existing emission units.

b. Summary of BACT and tBACT for Lines 1-6

i. **NOx control:** Selective Catalytic Reduction (SCR) for RTO exhaust from oxidation processes and water injection to the TOs from carbonization processes. Emission limits are specified for each operation mode for each line on hourly basis and annual emission limits are specified:

- Normal Operation: 8.5 lb/hr for Lines 1-6;
- SCR Bypass: 17.9 lb/hr for Lines 1-6;
- RTO Bypass: 8.5 lb/hr for Lines 1-6; and
- Shutdown: 8.5 lb/hr.
- 76 tons per 12 month rolling period for Lines 1-2 and 467 tons per 12-month rolling period for Lines 3-10. SGL requests a synthetic minor limit at 90 tons per 12-month rolling period.

ii. **$PM_{10}/PM_{2.5}$:** proper operation from oxidation and carbonization processes. Emission limits are specified:

- Normal Operation: 3.0 lb/hr for $PM_{10}/PM_{2.5}$ for Lines 1-6;
- SCR Bypass: 2.0 lb/hr for $PM_{10}/PM_{2.5}$ for Lines 1-6;
- RTO Bypass: 2.0 lb/hr for $PM_{10}/PM_{2.5}$ for Lines 1-6; and
- Shutdown: 3.0 lb/hr for $PM_{10}/PM_{2.5}$ for Lines 1-6.
- 27 tons $PM_{10}/PM_{2.5}$ per 12-month rolling period for Lines 1-2 and 90 tons $PM_{10}/PM_{2.5}$ per 12-month rolling period for Lines 3-10. SGL requests a limit of 53 tons $PM_{10}/PM_{2.5}$ per 12-month rolling period for Lines 3-6.
- Limits for PM were in the original orders. Total PM is comprised of PM_{10} and $PM_{2.5}$ and that was not reflected in the PM (filterable) limits. Filterable PM is captured in the $PM_{10}/PM_{2.5}$ limits.

iii. **VOC**: RTO for oxidation processes and TO for carbonization processes. Emission limits are specified for each operation mode for each line on hourly basis and annual emission limits are specified:

- Normal Operation: 1.7 lb/hr for Lines 1-6;
- SCR Bypass: 1.7 lb/hr for Lines 1-6;
- RTO Bypass: 8.6 lb/hr for Lines 1-6; and
- Shutdown: 7.1 lb/hr for Lines 1-6.

- 15 tons per 12-month rolling period for Lines 1-2 and 60 tons per 12-month rolling period for Lines 3-10. SGL requests a limit of 30 tons VOC per 12-month rolling period for Lines 3-6.

iv. **Acrylonitrile**: proper operation. Annual limits are specified:

a. 102 lbs per 12-month rolling period for Lines 1-2;
b. 408.5 lbs per 12-month rolling period for Lines 3-10. SGL requests a limit of 204.2 lbs per 12-month rolling period for Lines 3-6.

v. **Ammonia**: proper operation. Daily limits are specified:

c. 156 lbs per day for Lines 1-2;
d. 595 lbs per day for Lines 3-10. SGL requests a limit of 302 lbs per day for Lines 3-6.

vi. **Hydrogen Cyanide**: proper operation. Daily limits are specified:

e. 110 lbs per day for Lines 1-2;
f. 310 lbs per day for Lines 3-10. SGL requests a limit of 177 lbs per day for Lines 3-6.

7. AMBIENT AIR QUALITY ANALYSIS

a. Modeling Methodology

As this project did not require additional modeling, the following is a summary of modeling that was done for the previous permitting effort. SGL's consultant, Ramboll Environ, used the EPA recommended AERMOD (Version 15181) air dispersion model. AERMET (Version 15181) was based upon the meteorological data available from the National Weather Service (NWS) surface station located at the Grant County International Airport and a NWS upper air station located in Spokane, Washington. The dispersion modeling techniques used to simulate transport and diffusion require an hourly meteorological database. Therefore, in addition to using the hourly NWS meteorological data, 1-minute wind speed and wind direction data from the Grant County International Airport, Ramboll Environ used using the AERMINUTE preprocessor (Version 11325) to resolve calm and variable wind conditions.

b. NAAQS Analysis

Facility-wide modeling results and background concentrations presented in Table 8 indicate NO_2, PM_{10}, and $PM_{2.5}$ design concentrations plus background concentrations are below the applicable NAAQS at all receptor locations.

Table 6. NAAQS Analysis					
Criteria Pollutant	**Avg. Period**	**Maximum Concentration (Facility) ($\mu g/m^3$)**	**Background ($\mu g/m^3$)**	**Total ($\mu g/m^3$)**	**Standard ($\mu g/m^3$)**
NO_2	1-hr	151.1	16.0	167.1	188
	annual	6.4	2.8	9.2	100
PM_{10}	24-hr	10.2	92	102.2	150
$PM_{2.5}$	24-hr	8.1	19.4	27.5	35
	annual	2.2	6.5	8.7	12

Emissions of all pollutants are below their NAAQs and no further analysis is necessary.

c. TAP Analysis

i. SQER Analysis

An SQER analysis was not performed. However, based upon the April 13, 2015, Lines 1–8 TSD emissions of SO_2, NO_2, acrolein, acrylonitrile, ammonia, ammonium sulfate, ammonium bisulfate, arsenic, benzene, cadmium, chromiumVI, DEEP, formaldehyde, and hydrogen cyanide exceed the SQER. Therefore, they were modeled and evaluated against their ASILs below.

ii. ASIL Analysis

Table 9 compares the pollutants that exceeded the SQER to their ASILs.

Table 7. ASIL Analysis				
Pollutant	**Avg. Period**	**Max Modeled Concentration ($\mu g/m^3$)**	**ASIL ($\mu g/m^3$)**	**Emissions Above ASIL (Yes or No?)**
SO_2	1-hr	6.69	660	No
NO_2	1-hr	145.70	470	No
Acrolein	24-hr	0.02	0.06	No
Acrylonitrile	lb/yr	0.00436	0.00345	Yes
Ammonia	24-hr	13.7	70.8	No
Ammonium sulfate	1-hr	16.17	120	No
Ammonium bisulfate	1-hr	16.17	120	No
Arsenic	annual	$2.73x10^{-6}$	$3.03x10^{-4}$	No
Benzene	annual	$2.40x10^{-4}$	0.0345	No
Cadmium	annual	$2.00x10^{-5}$	0.000238	No
Chromium VI	annual	$7.65x10^{-7}$	$6.67x10^{-6}$	No
DEEP	annual	0.00152	0.0033	No
Formaldehyde	annual	0.0011	0.167	No
Hydrogen cyanide	24-hr	8.05	9	No
7,12 dimethylbenz(a)anthrecene	annual	$2.19x10^{-7}$	$1.41x10^{-5}$	No

All toxics except acrylonitrile are below their appropriate ASILs. If the project were only to include Lines 3–7, the maximum model-predicted concentration of acrylonitrile would be 0.00314 $\mu g/m^3$, which is below the 0.00345 $\mu g/m^3$ ASIL. The exceedance of acrylonitrile will occur once Line 8 is operational. **SGL is no longer planning to expand past Line 6 so no additional analysis is necessary.**

8. CONCLUSION

Ecology has determined the applicant, SGL Composites, has satisfied all of the requirements of WAC 173-400-091 to take limits on NOx, $PM_{10}/PM_{2.5}$, VOC and TAPs at the existing facility in Moses Lake, WA. The operation of this facility shall be subject to the conditions of the attached proposed Approval Order No. 19AQ-E003.

9. LIST OF ACRONYMS AND ABBREVIATIONS

°C	degrees Celsius
μg/m^3	micrograms per cubic meter
ASIL	Acceptable Source Impact Level
BACT	Best Available Control Technology
bhp	brake horsepower
CO	carbon monoxide
DEEP	diesel engine exhaust particulate
Ecology	Washington State Department of Ecology
EPA	United States Environmental Protection Agency
g/dscf	grains per dry standard cubic foot
HAP	hazardous air pollutant
HCN	hydrogen cyanide
hp	horsepower
hr	hour(s)
lb	pound(s)
NAAQS	National Ambient Air Quality Standard
NESHAP	National Emission Standards for Hazardous Air Pollutants
NOC	Notice of Construction
NO_2	nitrogen dioxide
NO_X	nitrogen oxides
NSPS	New Source Performance Standards
NSR	New Source Review
NWS	National Weather Service
PM	particulate matter
PM_{10}	particulate matter smaller than 10 microns in diameter
$PM_{2.5}$	particulate matter smaller than 2.5 microns in diameter
PSD	Prevention of Significant Deterioration
RCW	Revised Code of Washington
RICE	Reciprocating Internal Combustion Engines
RTO	regenerative thermal oxidizer
SCR	selective catalytic reduction
SIL	Significant Impact Level
SGLACF	SGL Automotive Carbon Fiber
SO_2	sulfur dioxide
TAP	toxic air pollutant
TO	thermal oxidizer
tpy	tons per year
TSD	Technical Support Document
WAC	Washington Administrative Code