State of Washington
Department of Ecology
Technical Support Document (TSD)

Source Name:	**Schweitzer Engineering** **Schweitzer Engineering Labs**
Source Location:	**46º75'51.89"N - 119º29'89.605"W**
Legal Description:	**Whitman County –**The SE ¼ of Section 29 and the SW ¼ of Section 28, Township 15 North, Range 45 East, Willamette Meridian.
Mailing Address:	**2350 NE Hopkins Court, Pullman, WA 99163**
Approval Order No.:	**18AQ-E041**
Permit Reviewer:	**Andy Kruse**

Source Background and Description for Preliminary Determination issued 8/16/2019
The ERO Air Quality Program has reviewed the application and supplemental information submitted by Schweitzer Engineering Laboratories for their electronics manufacturing process.

History
This company operated for years without required permits for a paint booth and several engine-generators. Ecology issued a permit for these activities and Schweitzer appealed the limitations imposed in the permit. After a settlement meeting, Ecology and Schweitzer agreed to a schedule where Ecology would receive a revised NOC application by February 1, 2016. As new Schweitzer staff worked on air issues, they discovered other sources on-site with quantities of emissions (TAPs) requiring pollution control and of course permit by Ecology.
A new NOC application was received in December 2016 which included additional equipment such as an evaporator and wave solder machines that were not present on the previous NOC. This also included 4 new caterpillar emergency engines that were installed in late 2015, early 2016.
The application and project from 2016 was postponed and revisited in July 2018 with an updated application and supplemental data for additional equipment.

Permitted Emission Units

Schweitzer Engineering Laboratories Equipment List					
Equipment	**Manufacturer**	**Model**	**Maxiumum Rating**	**Location**	**Pollutants/Category**
Generators					
15kW Natural Gas-Fired Generator	Generac Power Systems	SG015	15kW	Building 1800 when in use, Building 2450 when stored	Diesel/Criteria and TAPS
Generator #1	Generac Power Systems	SD180	180kW	Located N of building 2270	Diesel/Criteria and TAPS
Generator #2	Generac Power Systems	SD180	180kW	Located E of building 2350	Diesel/Criteria and TAPS
Generator #3	Generac Power Systems	SD180	180kW	Located N of building 2535	Diesel/Criteria and TAPS
Generator #4	Generac Power Systems	SD180	180kW	Located N of building 2390	Diesel/Criteria and TAPS
Generator #5	Generac Power Systems	SD180	180kW	Located NE of building 2440	Diesel/Criteria and TAPS
Generator #6	Generac Power Systems	SD500	500kW	Located NE of building 2440	Diesel/Criteria and TAPS
Generator #7	Caterpillar	C18-600kW	600kW	2420	Diesel/Criteria and TAPS
Generator #8	Caterpillar	C18-600kW	600kW	Building One	Diesel/Criteria and TAPS
Generator #9	Caterpillar	C7.1-125kW	125kW	1825 (Event Center)	Diesel/Criteria and TAPS
Generator #10	Caterpillar	C18-600kW	600kW	1800 (Zocholl)	Diesel/Criteria and TAPS
Evaporators					
Evaporator #1	Water Eater	375G	400,000 BTU/hr, 40 gal/hr evaporation rate	Building 2440	Natural Gas/Criteria and TAPS
Evaporator #2	Water Eater	375G	400,000 BTU/hr, 40 gal/hr evaporation rate	Building 2440	Natural Gas/Criteria and TAPS
Evaporator #3	Water Eater	240G	343,000 BTU/hr, 22 gal/hr evaporation rate	Building 2440	Natural Gas/Criteria and TAPS
Gas Burner (Qty. 3)	Blue Angel Plus	HSG400	400,000 BTU/hr, 35,048 therms/yr fuel consumption		

Solder Machines					
Wave Solder Machine A	Speedline	VectraElite		Building 2440	Solder and Solder Flux/Lead and TAPS
Wave Solder Machine B	Speedline	VectraElite		Building 2440	Solder and Solder Flux/Lead and TAPS
Wave Solder Machine C	Speedline	VectraElite		Building 2440	Solder and Solder Flux/Lead and TAPS
Wave Solder Machine D	Speedline	VectraElite		Building 2440	Solder and Solder Flux/TAPS
Wave Solder Machine E	Speedline	VectraElite		Building 2440	Solder and Solder Flux/TAPS
Wave Solder Machine F	Speedline	VectraElite		Building 2440	Solder and Solder Flux/Lead and TAPS
Wave Solder Machine G	Speedline	Electra EC-4		Building 2440	Solder and Solder Flux/TAPS
Wave Solder Machine	Speedline	Electra EC-4		Not Currently Installed	Solder and Solder Flux/ TAPS
Vapor Phase Solder Machine	R&D VaporTech	RD3-0723	6 heat pipe assemblies per batch, 10 batches/hr	Building 2440	Galden Vapor Fluid, Indalloy Solder/none
Selective Solder Machine (Proposed)	Ace Production	ACE KFPHILx2/KISS-103IL		Proposed installation in building 2440	Solder and Solder Flux/Lead and TAPS

Miscellaneous Equipment					
Gas-Fired Humidifier (Qty. 3)	Nortec	GSTC-200	280,000 BTU/hr, 73,602 therms/yr (All Units)	Building 2440	Natural Gas/Criteria and TAPS
Speedy Packer (Qty. 6)	Sealed Air	SpeedyPacker	21 bags/min.	5 in building 2440, 1 in building 2420	Isocyanates/TAPS
Stencil Wash	Kolb	PSB700-V90		Building 2440	Stencil Wash Fluid/none
Varnishing Line	Thermal Product Solutions	Blue M Oven	86 transformers/hr	Building 2440	Water-based Varnish/none
Aquastorm Board Washer (Qty. 4)	Speedline Technologies	Aquastorm 50		Building 2440	Boardwashing Fluid/none
Conformal Coating Line (Qty. 4)	Specialty Coating Systems	Precision Coat V	17 units/hr total (4 lines)	Building 2440	Humiseal 40 Protective Coating/none
Reflow Oven (Qty. 6)	BTU International	Pramax X5 150N	120 Boards/hr	Building 2440	Solder Paste/none

Unpermitted Existing Emission Units and Pollution Control Equipment

Rescinded Approval Orders

15AQ-E638: Included paint booth, 2 evaporators, and 6 emergency generators. Replaced by 18AQ-E041

Stack Summary

See Appendix F in the SEL application submitted on 12/5/2016 for stack parameters.

Enforcement Issue(s)

Recommendation

Staff recommends that SEL be approved by the order associated with this TSD. The emergency engines have gone through a Tier 2 analysis and the toxicologist has completed the health impact assessment. This recommendation is based on the following facts and conditions: Information used in this review was derived from the application received 12/5/16 and additional information received in January and February of 2019 from SEL, as well as a toxicologist at the Ecology HQ in Lacey, WA. The full Second Tier review and recommendation can be found with the permit file.

Emission Calculations

See Appendix B "Emissions Calculations", emissions have been calculated by SEL and provided in their application *(18AQ-E041)*

County Attainment Status

Pollutant	Status
PM_{10}	attainment
SO_2	attainment

NO_2	attainment
Ozone	attainment
CO	attainment
Lead	attainment

Part 70 Permit Determination

The Schweitzer Engineering Labs electronics manufacturing operation is not subject to the Part 70 Permit requirements because the potential to emit (PTE) of:

(1) each criteria pollutant is less than one hundred (100) tons per year;
(2) a single hazardous air pollutant (HAP) is less than ten (10) tons per year, and;
(3) any combination of HAPs is less than twenty-five (25) tons per year.

Federal Rule Applicability

(1) The NSPS for internal combustion compression ignition emergency engines (at 40 CFR 60, Subpart IIII) applies to the emergency engine-generators. The Generac generators exceed the emission limitations (better than Tier II engines) in place when they were installed (2001). The paint booth does not perform the operations (stripping with methylene chloride or spray coating with carcinogens) that would trigger applicability of the NESHAP at 40 CFR 63, Subpart HHHHHH, although the substantive requirements of that NESHAP (booth filter efficiency, no metal HAPs) are satisfied at SEL (from previous TSD review).

NAAQS

The facility proposed the hour limitations will reduce source emissions below New Source Review emission exemption thresholds, which are set with the understanding that operation of the facility as permitted would not cause or contribute to a NAAQS exceedance.

State Rule Applicability and BACT determination

BACT Analysis

SEL reviewed the available published literature as well as previous BACT implementations by Ecology and identified the following technologies for the control of diesel engine pollutants from the proposed emergency generators:

Urea-SCR system consisting of a urea-based-SCR. This system is high efficient for control of NO2, but ineffective for DEEP/PM, CO, and COCs.

The SCR system functions by injecting a liquid reducing agent, such as urea, through a catalyst into the exhaust stream of the diesel engine. The urea reacts with the exhaust stream converting nitrogen oxides into nitrogen and water. The use of a lean ultralow sulfur fuel is required to achieve good NOx destruction efficiencies. SCR can reduce NOx emissions by up to 90-95 percent while simultaneously reducing hydrocarbon (HC), CO and PM emissions.

For SCR systems to function effectively, exhaust temperatures must be high enough (about 200 to 500^{o}C) to enable catalyst activation. For this reason, SCR control

efficiencies are expected to be relatively low during the first 20 to 30 minutes after engine start up, especially during maintenance, and testing loads. There are also complications of managing and controlling the excess ammonia (ammonia slip) from SCR use. Because backup engines typically experience long idle periods between operations, urea crystallization inside reagent distribution lines could cause damage to the SCR system and to the engine.

Catalyzed DPF, Which includes a DPF and a DOC in a single package. This system is highly efficient for control of PM/DEEP, CO, and VOCs. It is ineffective for NO2. These add-on devices include passive and active DPFs, depending on the method used to clean the filters (i.e., regeneration). Passive filters rely on a catalyst while active filters typically use continuous heating with a fuel burner to clean the filters. The use of DPFs to control diesel engine exhaust particulate emissions has been demonstrated in multiple engine installations worldwide. Particulate matter reductions of up to 85% or more have been reported. Therefore, this technology was identified as the top case control option for diesel engine exhaust particulate emissions from the proposed engines.

Integrated Control Package consisting of a diesel particulate filter (DPF) and urea-based selective catalytic reducer (SCR). This system is highly efficient for control of NO2, PM/DEEP, CO, and VOCs.

Diesel Oxidation Catalyst (DOC). This system is highly efficient for removal of CO, VOCs, and gaseous TAPs. It is partially effective for removal of PM/DEEP. Emissions of NO2 typically decrease after DOC use.

This method utilizes metal catalysts to oxidize carbon monoxide, particulate matter, and hydrocarbons in the diesel exhaust. Diesel oxidation catalysts (DOCs) are commercially available and reliable for controlling particulate matter, carbon monoxide and hydrocarbon emissions from diesel engines. While the primary pollutant controlled by DOCs is carbon monoxide (approximately 90% reduction), DOCs have also been demonstrated to reduce up to 30% of diesel engine exhaust particulate emissions, and more than 50% of hydrocarbon emissions.

Emission controls inherent to EPA Tier 2-certified engines. Diesel engine manufacturers typically use proprietary combustion control methods to achieve the emission reductions needed to meet applicable EPA tier standards. Common controls include fuel injection timing retard and exhaust gas recirculation. Injection timing retard reduces the peak flame temperature and NOx emissions, but may lead to higher fuel consumption.

The following removal efficiencies were provided by SEL:

Table 1: Approximate % Removal Efficiency by Pollutant

Control Technology	**PM2.5/DEEP**	**CO**	**VOCs**	**NO2**
Selective Catalytic Reducer + Diesel Particulate Filter	90	90	80	90

Selective Catalytic Reducer	Not Effective	Not Effective	Not Effective	70-90
Diesel Particulate Filter	90	90	80	Not Effective
Diesel Oxidation Catalyst	10-30	90	80	Not Effective

A cost analysis was conducted by SEL:

Table 2: Cost Effectiveness for Control Technologies

Control Technology	Cost per HP	Total HP	Total Cost	Cost per Ton of Total Criteria Pollutants
SCR	$80	2576	$206,080	$151,529
DPF	$3838	2579	$98,002	$72,060
SCR + DPF	$118	2579	$304,322	$223,766

Using the cost effectiveness criteria of $10,000 per ton of criteria pollutant, the above options are economically infeasible and are above the cost effectiveness threshold.

BACT Determination for the emergency diesel generators

Ecology determines BACT for the emergency diesel engines located at SEL is:

1. Use of EPA Tier 2 certified engines and the emission controls inherent to EPA Tier-2 certified engines

SEL reviewed and conducted a t-BACT feasibility study for Isopropyl Alcohol (IPA) from the wave solder machines as well as the transformer varnishing operation:

> **Thermal Incineration.** VOC destruction efficiency depends upon design criteria (i.e., chamber temperature, residence time, inlet VOC concentration, compound type, and degree of mixing) (EPA, 1992). Typical thermal incinerator design efficiencies range from 98 to 99.99% and above, depending on system requirements and characteristics of the contaminated stream (EPA, 1992; EPA, 1996a). The typical design conditions needed to meet 98% or greater control or a 20 parts per million by volume (ppmv) compound exit concentration are: 870/C (1600/F) combustion temperature, 0.75 second residence time, and proper mixing. For halogenated VOC streams, 1100/C (2000/F) combustion temperature, 1.0 second residence time, and use of an acid gas scrubber on the outlet is recommended (EPA, 1992).
>
> **Recuperative Incinerator.** Same technology as a thermal incinerator except there is heat recovery of exhaust air by a heat exchanger (EPA 1992).
>
> **Regenerative Thermal or Catalytic Oxidizer.** One of today's most widely accepted air pollution control technologies across industry is a Regenerative Thermal Oxidizer, commonly referred to as a RTO. They are very versatile and extremely efficient – heat recovery efficiency can reach 97%. This is achieved through the storage of heat by dense

ceramic stoneware. Regenerative Thermal Oxidizers are ideal in low VOC concentrations and during long continuous operations. (GCEsystems)

SEL has evaluated the cost effectiveness of these options and reported these values:

Table 3: Cost Analysis of IPA emission control (SEL permit application)

Control Technology	**Estimated Costs (Capital + 1yr O&M costs)**	**Cost/ton of IPA emissions**
Thermal Incineration	$2,870,000	$46,290
Recuperative Incinerator	$2,080,000	$33,548
Regenerative Thermal or Catalytic Oxidizer	$2,775,000	$44,758

Using the cost effectiveness criteria for IPA, the cost effectiveness ceiling is $9,260 per ton of IPA emissions and all three of these options exceed this ceiling.

t-BACT Determination for the wave solder machines/transformer varnishing operation

Ecology determines BACT for the wave solder machines/transformer varnishing operation is:

1. The use of a low-VOC flux. Examples currently being sought out and researched by SEL are: 95-DRX-M+ by Balver Zinn Cobar, 95-RXN-M/95-RXZ-M/95-SEL/94-XM6 also by Balver Zinn Cobar, ECOFREC 405 by Inventec, IF 3006 by Interflux, and 636-038 (WF-9956) FLUX. All MSDS sheets for these low VOX fluxes are located in the application.

Paint Booth BACT Analysis

Table 4: BACT Analysis Table for the Paint Booth

Pollutant	**BACT**
VOC	• Proper Spraying Techniques • Use of HVLP equivalent transfer efficiency spray gun • 98% capture efficiency dry filters • All coating done within the paint booth
NOx	
SOx	
PM	
CO	
Toxics	• t-Bact is the same as BACT

BACT Determination for the paint booth operation

Ecology determines BACT for the paint booth operation at SEL to be:

1. Use of an HVLP (High Volume Low Pressure), or an equivalent transfer efficiency, spray gun for coating. This efficiency is around 65%.
2. Using capture filters that are at least 98% efficient.
3. All coating operations to occur within an enclosed building (paint booth) and using proper spraying techniques in order to maximize transfer efficiency of paint.

Second Tier Review and the Health Impact Assessment Recommendation

Due to the exceedance of the ASIL for DEEP, a Second Tier Review is required to be performed. This review was performed by the Ecology Toxicologist and the review has been completed. "Ecology concludes that the health risk is acceptable and recommends approval of the project". This statement is taken form the HIA Recommendation document completed in August 2019. For further details contained within the document, see the Permit File located at Ecology's Eastern Regional Office.

Conclusion

Ecology has determined the applicant, Schweitzer Engineering Labs, has satisfied all of the requirements of New Source Review for its proposed new air emission sources. The operation of this facility shall be subject to the conditions of the attached proposed Approval Order No. 19AQ-E007.

Below is the TSD produced in 2015, kept for referencing purposes.

TECHNICAL SUPPORT DOCUMENT
NOTICE OF CONSTRUCTION AND
PRELIMINARY DETERMINATION OF APPROVAL
SCHWEITZER ENGINEERING LABS
PULLMAN, WASHINGTON
APRIL, 2015

1. EXECUTIVE SUMMARY

The Washington State Department of Ecology (Ecology) has determined that the applicant, Schweitzer Engineering Labs (SEL), has satisfied all of the requirements of New Source Review for its 2014 proposal to back-permit engine generators, evaporators, and a paint booth at its electronic manufacturing facility in Pullman, Washington. Ecology now finds that the project will have no significant adverse impact on air quality. The following outlines Ecology's technical analysis of this proposed facility.

2. INTRODUCTION

2.1. The Project
On December 3, 2014, SEL submitted an NOC application proposing to back permit engine generators and other equipment Ecology had discovered at SEL's campus in Pullman, WA. The proposed approval will limit operation of the equipment requiring permit to limit emissions to levels below significance for NSR permitting, while still allowing SEL flexibility for its needs.

2.1.1. SEL operates an electronics manufacturing facility located at 2350 NE Hopkins Court, in Pullman, WA. A legal description of the location is the SE ¼ of Section 29 and the SW ¼ of Section 28, Township 15 North, Range 45 East, Willamette Meridian, Whitman County.

2.1.1.1. The permit requested in the application materials involves no new construction, instead , a back-permitting of previously installed emergency engine-generators (six total, 5-180 kW, 1-500 kW), two evaporators, and a limited use paint booth.

2.1.1.2. During operation of the facility, there will be very minor emissions from natural gas combustion for the evaporators, and very limited VOC and PM from the paint booth. The engine generators will emit air contaminants during reliability and maintenance testing, and also during any period of emergency operation (during a power outage at the facility). Ecology has identified no other pollutants of significance emitted by this facility.

2.1.1.3. No Air Quality Program enforcement actions have been taken against this facility.

3. APPLICABLE REGULATIONS

3.1. WAC 173-400-113, Requirements for new sources in attainment or unclassifiable areas, is the State regulation that defines the evaluations of the SEL project. The subsections of WAC 173-400-113 require the following:

3.1.1. WAC 173-400-113(1): "The proposed new source will comply with all applicable new source performance standards (NSPS), national emission standards for hazardous air pollutants (NESHAP)…".

3.1.1.1. The NSPS for internal combustion compression ignition emergency engines (at 40 CFR 60, Subpart IIII) applies to the emergency engine-generators. The Generac generators exceed the emission limitations (better than Tier II engines) in place when they were installed (2001). The paint booth does not perform the operations (stripping with methylene chloride or spray coating with carcinogens) that would trigger applicability of the NESHAP at 40 CFR 63, Subpart HHHHHH, although the substantive requirements of that NESHAP (booth filter efficiency, no metal HAPs) are satisfied at SEL.

Ecology is not aware of any other NSPS or NESHAP that apply to the SEL operations.

3.1.2. WAC 173-400-113(2): "The proposed new source or modification will employ BACT for all pollutants not previously emitted or whose emissions would increase as a result of the new source or modification". SEL is required to employ BACT in the terms and conditions of the Approval Order associated with this Technical Support Document.

3.1.3. Specific BACT

3.1.3.1. PM:

3.1.3.1.1. The paint booth filters are approved for replacement only with filters that satisfy the NESHAP: 40 CFR 63 Subpart HHHHHH (98% Capture of Overspray).

3.1.3.2. VOC:

3.1.3.2.1. The extremely low use rates of solvent-based coatings at this facility makes any form of VOC limitation cost-prohibitive. For VOC in this volume of coating operation, SELs move toward exclusive powder coating could be considered a BACT-level of VOC control.

3.1.4. WAC 173-400-113(3): "Allowable emissions from the proposed new source or modification will not delay the attainment date for an area not in attainment, nor cause or contribute to a violation of any air quality standard."

3.1.5. WAC 173-400-113(5): "If the proposed new source or the proposed modification will emit any toxic air pollutants regulated under chapter 173-460 WAC, the source meets all applicable requirements of that program." Ecology is unaware of toxic air pollutants emitted in quantities greater than deminimus by this facility.

3.1.6. WAC 173-460, Controls for New Sources of Toxic Air Pollutants, is the State regulation that addresses the risk to the public from routine releases of toxic air

contaminants from new and modified sources. .” Ecology is unaware of toxic air pollutants emitted in quantities greater than deminimus by this facility.

4. THE NOC APPLICATION

An application for the SEL facility was received December 3, 2014. All equipment requiring approval had been in place and operating since around 2001, necessitating this ‘back-permitting’ effort by Ecology. .

5. Determinations of Best Available Control Technology (BACT) and Best Available Control Technology for Toxics (t-BACT)
   5.1. There are no emission points determined to emit significant quantities of criteria or toxic air pollutants at this facility. The back-up diesel generators could be significant if operated continuously, but they are limited by the conditions of this approval to 45 hours per year.

6. AMBIENT AIR QUALITY ANALYSIS
   Emissions from the equipment at this facility are below deminimus, making modeling unnecessary.
7. EMISSIONS

The following are estimated emissions at limits proposed by the applicant for generators (45 hours per year) or at a coating usage limit five times the actual presented in application materials for coatings in the paint booth:

Paint Booth VOC: 44.45 pounds per year

Aggregate Generators:
VOC: 56.04 pounds per year
NOx: 1065.36 pounds per year
CO: 171.20 pounds per year
PM: 38.08 pounds per year
PM_{10}: 36.24 pounds per year

8. Conclusion:

On the basis of the above evaluation and the NOC application submitted December 3rd, 2014, Ecology has determined that the operation of the equipment identified in the above-referenced application will conform to the requirements of the Washington Clean Air Act. If operated in accordance with the NOC application and the terms and conditions of Approval Order 15AQ-E610, operation of this facility may be approved.