DRAFT ENGINEERING EVALUATION

Plant 18587: University of California Hastings College of the Law
200 McAllister Street, San Francisco, CA, 94102

Application 29882: Emergency Standby Diesel Engine-Generator Set

BACKGROUND

University of California Hastings College of the Law (UCH) has applied for an Authority to Construct (AC) and/or a Permit to Operate (PO) for the following equipment:

S-7 Emergency Standby Diesel Engine-Generator Set;
Engine: FPT; Model F3BE9685A-E;
Model Year 2019; EPA Engine Family KFPXL12.9IGR
12.9 L Displacement; 530 BHP; 27.02 gph diesel consumption
Abated by A-7

A-7 Diesel Catalyzed Particulate Filter; Johnson Matthey CRT(+) 4-C-BITO-CS-12-RT; with CARB verified 85% particulate abatement efficiency

S-7 will be located at 200 McAllister Street, San Francisco, CA, 94102. S-7 diesel engine will drive an emergency generator to provide electric power during an emergency/testing. S-7 is an Environmental Protection Agency (EPA)-certified engine but will comply with California Air Resources Board (CARB) Air Toxics Control Measure (ATCM) and the District's Best Available Control Technology (BACT) requirements.

EMISSIONS SUMMARY

Except for sulfur dioxide (SO2), the emission factors for other pollutants from S-7 were obtained from EPA's engine certification for the EPA Certification # KFPXL12.9IGR -004. The SO2 emissions were calculated based on the maximum allowable sulfur content (0.0015% Sulfur by weight) of the diesel fuel with the assumption that all the sulfur present will be converted to SO2 during the combustion process.

Basis:

- 530 brake horsepower (BHP) rated engine power
- Annual emissions based on 15 hours/year operation for testing and maintenance
- Maximum daily emissions are based on 24 hours/day of operation
- 27.02 gallons/hour maximum fuel use rate used to estimate heat input rate of 3.7 million British thermal units per hour (MMBtu/hour)
- Non-methane hydrocarbon (NMHC) or Precursor organic compounds (POC), oxides of nitrogen (NOx), carbon monoxide (CO) and particulate matter less than 10 micrometer aerodynamic diameter (PM_{10}) emission factors provided by EPA Certification #: # KFPXL12.9IGR -004
- SO_2 emissions are quantified based on the full conversion of 0.0015% (~ 15 parts per million) sulfur by weight in the ultra-low sulfur diesel fuel. The SO_2 emission factor was derived from EPA AP-42, Table 3.3-1.

Table 1 summarizes estimated emissions from S-7.

Table 1 – Estimated Emissions from S-7

Pollutant	Uncontrolled Emission Factor at < 15 ppm S		Uncontrolled Annual Emissions	Uncontrolled Max. Daily Emissions	Abatement Efficiency	Controlled Annual Emissions	Controlled Max Daily Emissions
	(g/kw-hr)	(g/hp-hr)	(lb/yr)	(lb/day)	%	(lb/yr)	(lb/day)
NMHC+ NOx	3.80	2.83					
NOx	3.61	2.69	47.14	75.42	0%	47.14	75.42
POC	0.19	0.14	2.48	3.97	0%	2.48	3.97
CO	0.80	0.60	10.45	16.71	0%	10.45	16.71
PM_{10}	0.17	0.13	2.22	3.55	85%	0.33	0.53
SO_2*		0.00155 lb SO2/MMBTU	0.09	0.14	0%	0.09	0.14

PLANT CUMULATIVE INCREASE

Table 2 summarizes the cumulative increase in criteria pollutant emissions that will result from this application.

Table 2 Cumulative Increase

Pollutant	Permitted Emissions (since April 5, 1991)	Emissions Increase with This Application	Cumulative Emissions Increase
	(TPY)	(TPY)	(TPY)
NOx	0.164	0.024	0.188
POC	0.006	0.001	0.007
CO	0.075	0.005	0.080
PM10	0.006	0.000	0.006
SO2	0.000	0.000	0.000
PM2.5*	0.001	0.000	0.001
*Particulate matter less than 2.5 micrometer aerodynamic diameter (PM2.5) is assumed to be equal to PM10			

TOXIC HEALTH RISK ASSESSMENT (HRA)

All PM_{10} emissions are considered diesel particulate matter (DPM) emissions. Annual DPM emissions of 0.33 pounds/year from S-7 are above the District's DPM chronic trigger level of 0.26 pounds/year in Regulation 2-5, Table 2-5-1. Therefore, an HRA is required.

S-7 is subject to the District's HRA streamlining policy for stationary diesel-fueled combustion engines used for backup power or fire pumps. The included HRA streamlining policy checklist shows that a refined HRA is required for this permit application because the nearest receptor is less than 100 feet from the emission point.

Emergency diesel engine S-5 was permitted at this site less than a year ago under AN 29693. Therefore, according to Regulation 2-5-216, S-5 and S-7 constitute a Project and were evaluaterd together for combined health risk under this application.

The project cancer risk at 50 hours of operation for each source S-5 and S-7 was estimated to be 32 in a million. As such, the project did not pass the project risk standards in Regulation 2-5-302. Therefore, the applicant has accepted a reduced operating time of 15 hours per year for S-7 for reliability-related testing and maintenance.

At 15 hours per year of operation for S-7 and 50 hours per year of operation at S-5, the project passes the project risk standards in Regulation 2-5-302. The increased project cancer risk to the maximally exposed receptor resident (MEIR) is 9.6 in a million with a hazard index of 0.0026. The increased project cancer risk to the maximally exposed receptor worker (MEIW) is 3.3 in a million with a hazard index of 0.0026. The increased project cancer risk to the maximum student receptor, attending the DeMarillac Academy, is 0.089 in a million with a hazard index of 0.000048. The cancer risk from S-7 alone was estimated to be 9.4 in a million at MEIR and 3.3 in a million at MEIW. Therefore, per Regulation 2-5-301, S-7 is subject to Best Available Control Technology for toxics (TBACT)

requirement because the cancer risk from S-7 at MEIR, MEIW, or student receptors exceed 1.0 in a million. S-7 meets TBACT because the unabated diesel exhaust particulate matter emission rate of 0.13 g/bhp-hour is less than TBACT emissions level of 0.15 g/bhp-hr. Furthermore, S-7 will be equipped with diesel particulate filter A-7 with an abatement efficiency of 85%, resulting in an overall controlled emission rate of 0.02 g/bhp-hr.

BEST AVAILABLE CONTROL TECHNOLOGY (BACT)

Per Regulation 2-2-301.1, BACT is triggered for a District BACT pollutant if a new source has a potential to emit (PTE) 10.0 or more pounds per day of that pollutant. BACT is a source and pollutant specific requirement.

Per Table 1, S-7 triggers BACT for NOx and CO because the maximum daily emissions exceed 10.0 lb/day. BACT for this source type is specified in the current BAAQMD BACT/TBACT Workbook for IC Engine – *Compression Ignition: Stationary Emergency, non-Agricultural, non-direct drive fire pump, Document # 96.1.3*, Revision 7 dated 12/22/2010. Table 3 summarizes the EPA-certified emission rates for S-7 and compares them to emission rates found in Table 1 of the BACT document # 96.1.3. For NOx, CO, POC and PM_{10}, BACT(2) is the CARB ATCM standard for the respective pollutant at the applicable horsepower rating. For SO_2, BACT(2) is using fuel with sulfur content not to exceed 0.0015%, or 15 ppm. The more restrictive BACT(1) standards are not applicable to this engine because it will be limited to operation as an emergency standby engine.

Table 3: Comparison of Emission Rates of S-7 with BACT Requirements

Pollutant	EPA Certified Emission Rates of S-7 g/kW-hr (g/bhp-hr)	District's BACT 2 Limits Based on CARB ATCM Emission Rates g/kW-hr (g/bhp-hr)
NMHC + NOx	3.8 (2.8)	4.0 (3.0)
CO	0.8 (0.6)	3.5 (2.6)
PM	0.17 (0.13)	0.20 (0.15)

It can be seen from Table 3 above that S-7 meets the District's prevailing BACT(2) standards.

OFFSETS

Regulation 2-2-302 requires offsets for NOx and POC emission increases from any new or modified source if the facility-wide, post-project PTE of that pollutant is greater than 10 tons/year. Regulation 2-2-303 requires offsets for PM2.5, PM10, and SO2 emission increases from any new or modified source if the facility-wide, post-project PTE of that pollutant is greater than 100 tons/year and if the un-offset cumulative increase in emissions of that pollutant at the facility and any related sources since the baseline date exceeds 1 ton per year.

Table 4 summarizes the facility-wide, post project potential to emit for all criteria pollutants. Per the District's policy titled "Calculating Potential to Emit for Emergency Backup Power Generators", dated 6/3/2019, the annual potential to emit for each existing and proposed emergency engine has been estimated for 100 hours per year of emergency operation plus the permitted operating time for reliability-related testing and maintenance of the respective engine.

The post-project, facility-wide PTE will not exceed 10 tpy for NOx and POC. The post-project, facility-wide PTE will not exceed 100 tpy for PM10, SO2, and PM2.5 emissions. Therefore, offsets are not required for emission increases from this application, summarized in Table 2.

Table 4: Facility-Wide PTE and Offset Requirement

Source #	Annual Permitted Operating Time	Power Output	Fuel Input	Emission Factors[1]					Annual PTE[2]				
	hr/yr	BHP	MMBtu/hr	lb/HP-hr				lb/MMBtu	tons/year				
				NOx	POC	CO	PM_{10}	SO_2	NOx	POC	CO	PM_{10}	SO_2[3]
1	20	220	2.06	3.10E-02	2.51E-03	6.68E-03	2.20E-03	2.90E-01	0.409	0.033	0.088	0.029	0.036
2	20	317	2.04	1.41E-02	1.10E-03	1.32E-03	4.41E-04	1.55E-03	0.268	0.021	0.025	0.008	0.000
3	50	364	2.47	6.08E-03	3.30E-04	5.42E-03	2.42E-04	1.55E-03	0.166	0.009	0.148	0.007	0.000
4	20	350	3.27	3.10E-02	2.51E-03	6.68E-03	2.20E-03	2.90E-01	0.651	0.053	0.140	0.046	0.057
5	50	315	2.1	5.44E-03	1.81E-04	9.86E-04	1.64E-04	1.55E-03	0.128	0.004	0.023	0.004	0.000
7	15	530	3.7	5.93E-03	3.12E-04	1.31E-03	4.19E-05	1.55E-03	0.181	0.010	0.040	0.001	0.00033
Total Post-Project Facility-wide PTE									**1.803**	**0.130**	**0.465**	**0.095**	**0.094**

1. **Emission Factors for S-2, S-3, S-5 and S-7 are EPA/CARB certified emission rates obtained from the specific source's engineering evaluation report and/or manufacturer's specifications. Emission factors for S-1 and S-4 were obtained from AP-42 Chapter 3.3 as specific certified emission rates were not available for these engines.**
2. **Annual PTE except SO2 (tpy) = Emission Factor lb /HP-hr * Power Output HP * (100 + permitted non-emergency operating time) hours per year / 2000 lb per ton**
3. **Annual PTE for SO2 (tpy) = Emission Factor lb /MMBtu * Power Input MMBtu/hr * (100 + permitted non-emergency operating hours) hours per year / 2000 lb per ton**

Example:
Annual PTE for NOx for S-1 = 0.031 lb NOx/HP-hr * 220 HP * (100+20) hours per year / 2000 lb per ton = 0.409 tpy NOx

STATEMENT OF COMPLIANCE

The owner/operator is expected to comply with all applicable requirements. Key requirements are listed below:

Airborne Toxic Control Measure (ATCM) for Stationary Compression Ignition Engines

S-7 is subject to ATCM, 5/19/2011, Section 93115, Title 17, California Code of Regulations. As shown in Table 5 below, S-7 meets the ATCM requirements in Table 1 of Section 93115 for 2008+ model year engines.

Table 5 ATCM Emission Standard Compliance

	Emissions from S-7 g/bhp-hr	ATCM §93115 Standard g/bhp-hr	NSPS Subpart IIII g/bhp-hr
NMHC+NOx	2.83	3.0	3.0
CO	0.6	2.6	2.6
PM	0.019	0.15	0.15

New Source Performance Standards (NSPS)

S-7 is subject to 40 CFR 60, Subpart IIII, Standards of Performance for Stationary Compression Ignition Internal Combustion Engines. Section 60.4205(b) requires S-7 to comply with the emission standards in Section 60.4202, which refers to 40 CFR 89.112 and 40 CFR 89.113 for all pollutants. Table 5 summarizes the Tier 3 emission standards in Table 1 of 40 CFR 89.112 (a) that apply to S-7. As shown in Table 5 above, S-7 will comply with the emissions standards in NSPS IIII. S-7 will comply with fuel sulfur content requirement in NSPS IIII Section 60.4207(b) because CARB diesel sold in California meets the above standards. S-7 will comply with other requirements of NSPS Subpart IIII such as installation of non-resettable hour meter on the engines and a backpressure monitor on the DPF and limiting the time for reliability testing to less than 100 hours per year through the permit conditions imposed on S-7.

National Emissions Standards for Hazardous Air Pollutants (NESHAP)

S-7 is subject to 40 CFR 63, Subpart ZZZZ (Stationary Reciprocating Internal Combustion Engines (RICE)). Per NESAHP 40 CFR Section 63.6590(c)(1), S-7 is required to meet the requirements in 40 CFR 63, Subpart ZZZZ by meeting the requirements in NSPS IIII.

District Rules

S-7 is expected to comply with Regulation 6-1-303.1, which limits the visible emissions to Ringelmann No. 2 or an opacity of 40% for no more than 3 minutes in any hour.

S-7 is expected to comply with Regulation 9-1-301, which limits the ground level concentrations of SO2 to 0.5 ppm continuously for 3 consecutive minutes or 0.25 ppm averaged over 60 consecutive minutes, or 0.05 ppm averaged over 24 hours.

S-7 is exempt from the emission rate limits in Regulation 9, Rule 8 ("Inorganic Gaseous Pollutants - NOx and CO from Stationary Internal Combustion Engines") Sections 9-8-301 through 305 and from Sections 501 and 503 per Reg. 9-8-110.5 (Emergency Standby Engines). S-7 is subject to and is expected to comply with 9-8-330.3 (Emergency Standby Engines, Hours of Operation) since non-emergency hours of operation will be limited in the permit conditions to 15 hours per year. S-7 is also subject to and is expected to comply with monitoring and record keeping requirements of Regulations 9-8-502.1 and 9-8-530, which are incorporated into the proposed permit conditions.

California Environmental Quality Act (CEQA)

This project is ministerial under the District Regulation 2-1-311 (Permit Handbook Chapter 2.3.1) and is therefore not subject to CEQA review.

Prevention of Significant Deterioration (PSD)

The project will not trigger a PSD review because the facility is not a major facility per Regulation 2-2-304.

Major Facility Review

Major facility review per Regulation 2-6 is also not triggered because this facility is not a major facility, not a phase II acid rain facility, not a subject solid waste incinerator, and not a designated facility.

School Notification (Regulation 2-1-412)

S-7 is located less than 1,000 feet from two K-12 schools and is therefore, subject to the public notification requirements of Regulation 2-1-412. A public notice will be prepared and sent to all addresses within 1,000 feet of S-7 and parents and guardians of students of the following school(s):

De Marillac Academy
175 Golden Gate Avenue, San Francisco, CA, 94102

Tenderloin Community School
627 Turk Street, San Francisco, CA, 94102

All comments received shall be summarized in final evaluation report.

PERMIT CONDITIONS

COND# 22815 ----------

1. The owner/operator shall not exceed 15 hours per year per engine for reliability-related testing.
   [Basis: Regulation 2-5]

2. The owner/operator shall operate each emergency standby engine only for the following purposes:
   to mitigate emergency conditions, for emission testing to demonstrate compliance with a District, State or Federal emission limit, or for reliability-related activities (maintenance and other testing, but excluding emission testing). Operating while mitigating emergency conditions or while emission testing to show compliance with District, State or Federal emission limits is not limited.
   [Basis: Title 17, California Code of Regulations, section 93115, ATCM for Stationary CI Engines]

3. The owner/operator shall operate each emergency standby engine only when a non-resettable totalizing meter (with a minimum display capability of 9,999 hours) that measures the hours of operation for the engine is installed, operated and properly maintained.
   [Basis: Title 17, California Code of Regulations, section 93115, ATCM for Stationary CI Engines]

4. Records: The owner/operator shall maintain the following monthly records in a District-approved log for at least 36 months from the date of entry (60 months if the facility has been issued a Title V Major Facility Review Permit or a Synthetic Minor Operating Permit). Log entries shall be retained on-site, either at a central location or at the engine's location and made immediately available to the District staff upon request.
   a. Hours of operation for reliability-related activities (maintenance and testing).
   b. Hours of operation for emission testing to show compliance with emission limits.
   c. Hours of operation (emergency).
   d. For each emergency, the nature of the emergency condition.
   e. Fuel usage for each engine(s).
   [Basis: Title 17, California Code of Regulations, section 93115, ATCM for Stationary CI Engines]

5. At School and Near-School Operation:
   If the emergency standby engine is located on school grounds or within 500 feet of any school grounds, the following requirements shall apply:
   The owner/operator shall not operate each stationary emergency standby diesel-fueled engine for non-emergency use, including maintenance and testing, during the following periods:
   a. Whenever there is a school sponsored activity (if the engine is located on school grounds)
   b. Between 7:30 a.m. and 3:30 p.m. on days when school is in session.

   "School" or "School Grounds" means any public or private school used for the purposes of the education of more than 12 children in kindergarten or any of grades 1 to 12, inclusive, but does not include any private school in which education is primarily conducted in a private home(s). "School" or "School Grounds" includes any building or structure, athletic field, or other areas of school property but does not include unimproved school property.
   [Basis: Title 17, California Code of Regulations, section 93115, ATCM for Stationary CI Engines]

End of Conditions

COND# 24354 ----------

1. The owner/operator shall abate the particulate emissions from the emergency diesel engine with a Diesel Particulate Filter at all times the engine is in operation.
   [Basis: "ATCM for Stationary Compression Ignition Engines" Section 93115.6(a)(3) or 93115.6(b)(3), Title 17, CA Code of Regulations]

2. The owner/operator shall install and maintain a backpressure monitor that notifies the owner or operator when the high backpressure limit of the engine is approached. The owner/operator shall maintain records of any corrective action taken after the backpressure monitor has notified the owner or operator that the high backpressure limit of the engine is approached in a District-approved log for at least 36 months from the date of entry (60 months if the facility has been issued a Title V Major Facility Review Permit or a Synthetic Minor Operating Permit).
   [Basis: "ATCM for Stationary Compression Ignition Engines" Section 93115.10(d), Title 17, CA Code of Regulations; 40 CFR 60.4214c]

End of Conditions

RECOMMENDATION

The District has reviewed the material contained in the permit application for the proposed project and has made a preliminary determination that the project is expected to comply with all applicable requirements of District, state, and federal air quality-related regulations. The preliminary recommendation is to issue an Authority to Construct for the equipment listed below. However, the proposed sources will be located within 1,000 feet of at least one K-12 school, which triggers the public notification requirements of Regulation 2-1-412. After the comments are received and reviewed, the District will make a final determination on the permit.

I recommend that the District initiate a public notice and consider any comments received prior to taking any final action on issuance of an Authority to Construct and/or a Permit to Operate for the following equipment:

S-7 Emergency Standby Diesel Engine-Generator Set;
Engine: FPT; Model F3BE9685A-E;
Model Year 2019; EPA Engine Family KFPXL12.9IGR
12.9 L Displacement; 530 BHP; 27.02 gph diesel consumption
Abated by A-7

A-7 Diesel Catalyzed Particulate Filter; Johnson Matthey CRT(+) 4-C-BITO-CS-12-RT; with CARB verified 85% particulate abatement efficiency

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Snigdha Mehta
Air Quality Engineer
Engineering Division