

**EVALUATION REPORT**  
**City College of San Francisco**  
**50 Phelan Ave**  
**San Francisco, CA 94112**  
**PLANT NUMBER A9365**  
**APPLICATION NUMBER 31918**

**Background**

Decker Electric is applying for an Authority to Construct/Permit to Operate for the following equipment on behalf of City College of San Francisco:

**S-10 Standby Emergency Diesel Generator, equipped with integral Selective Catalytic Reduction (SCR) and Diesel Particulate Filter (DPF), 1490 bhp**  
**Make: Cummins Inc, Model: QST30-G5 NR2, Model Year: 2022**  
**8.70 MMBtu/hr**

The Diesel engine will be used for backup power for critical facility/life safety system at City College of San Francisco and mitigate emergency power failure. The engine will be able to operate unrestricted during emergency use events. The engine will be limited to a maximum of 50 hours per year for maintenance and testing. The criteria pollutants associated with the source are nitrogen oxides (NO<sub>x</sub>), carbon monoxide (CO), precursor organic compounds (POC), sulfur dioxide (SO<sub>2</sub>), and particulate matter (PM).

S-10 meets the Environmental Protection Agency and California Air Resources Board (EPA/CARB) Tier 4 Final Off-road standard. The engine will burn commercially available California low sulfur diesel fuel. The sulfur content of the diesel fuel will not exceed 0.0015% by weight.

**Emissions Calculation**

**Table 1. Engine Specifications and EPA Certified Emission Factors**

<b>Engine Manufacturer</b>	Cummins INC
<b>Model</b>	QST30-G5 NR2
<b>Model Year</b>	2022
<b>Family Name</b>	EPA-SE
<b>Engine Power Rating, hp</b>	1490
<b>Fuel Consumption, gal/hr</b>	63.5
<b>Displacement, L</b>	30.5
<b>NO<sub>x</sub>, g/kW-hr (g/hp-hr)*</b>	0.67 (0.50)
<b>Non-Methane Hydrocarbons (NMHC), g/kW-hr (g/hp-hr) *</b>	0.19 (0.14)
<b>CO, g/kW-hr (g/hp-hr)*</b>	3.50 (2.60)
<b>PM, g/kW-hr (g/hp-hr)*</b>	0.03 (0.02)

\*EPA certified emission rates converted assuming 1 kW = 1.341 hp.

**Table 2. Annual and Daily Emissions from EPA/CARB Certified Data from S-10**

<b>Pollutant</b>	<b>Emission Factor (g/bhp-hr)</b>	<b>Max Daily Emissions<sup>1</sup> (lb/day)</b>	<b>Annual Emissions (lb/year)</b>	<b>Annual Emissions<sup>2</sup> (ton/year)</b>
NO <sub>x</sub>	0.50	39.4	82.0	0.041
POC	0.14	11.0	23.0	0.012
CO	2.6	204.8	426.7	0.213
PM <sub>10</sub>	0.02	1.6	3.3	0.002
PM <sub>2.5</sub>	0.02	1.6	3.3	0.002
SO <sub>2</sub> <sup>3</sup>	0.006	0.4	0.9	0.0005

Basis:

- <sup>1</sup>Max daily emissions: Assume 24-hour operation

$$0.50 \frac{g \text{ NO}_x}{\text{bhp} - \text{hr}} * 1490 \text{ bhp} * \frac{24 \text{ hr}}{\text{day}} * \frac{0.0022 \text{ lb}}{1 \text{ g}} = 39.4 \frac{\text{lb of NO}_x}{\text{day}}$$

- <sup>2</sup>Annual emissions: Reliability-related activity, 44 hours is permissible for S-10 by detail HRA analysis.

- <sup>3</sup>SO<sub>2</sub> emission factor from AP-42 Table 3.4-1

CARB Diesel Sulfur Content = 15 ppm = 0.0015%

SO<sub>2</sub> Emission Factor ((g of SO<sub>2</sub>)/(bhp – hr))

$$= ([8.09 * 10^{(-3)}] * 0.0015 \text{ lbs}/(\text{bhp} - \text{hr})) * 454 \text{ g}/(\text{lbs})$$

$$= 0.006 \text{ (g of SO}_2\text{)} / (\text{bhp} - \text{hr})$$

**Figure 1. Emission Standard for New Stationary Emergency Standby Diesel-Fueled CI Engines**

**Table 1: Emission Standards for New Stationary Emergency Standby Diesel-Fueled CI Engines g/bhp-hr (g/kW-hr)**

Maximum Engine Power	Model year(s)	PM	NMHC+NOx	CO
50 ≤ HP < 75 (37 ≤ kW < 56)	2007	0.15 (0.20)	5.6 (7.5) 3.5 (4.7)	3.7 (5.0)
	2008+			
75 ≤ HP < 100 (56 ≤ kW < 75)	2007	0.15 (0.20)	5.6 (7.5) 3.5 (4.7)	3.7 (5.0)
	2008+			
100 ≤ HP < 175 (75 ≤ kW < 130)	2007	0.15 (0.20)	3.0 (4.0)	3.7 (5.0)
	2008+			
175 ≤ HP < 300 (130 ≤ kW < 225)	2007	0.15 (0.20)	3.0 (4.0)	2.6 (3.5)
	2008+			
300 ≤ HP < 600 (225 ≤ kW < 450)	2007	0.15 (0.20)	3.0 (4.0)	2.6 (3.5)
	2008+			
600 ≤ HP < 750 (450 ≤ kW < 560)	2007	0.15 (0.20)	3.0 (4.0)	2.6 (3.5)
	2008+			
HP > 750 (kW > 560)	2007	0.15 (0.20)	4.8 (6.4)	2.6 (3.5)
	2008+			

S-10 meets ATCM Emission Standard of engines power larger than 750 bhp.

Reference: Title 17, California Code of Regulations Section 93115, ATCM, May 19, 2011.

**Cumulative Increase**

Table 3 summarizes the cumulative increase in criteria pollutant emissions that will result from this application.

**Table 3. Plant Cumulative Emissions Increase, Post 4/5/91**

Criteria Pollutant	Existing Emissions Post 4/5/91 (tons/yr)	Application Emissions (tons/yr)	Cumulative Emissions (tons/yr)
NOx	0.312	0.041	0.353
POC	1.709	0.012	1.721
CO	0.060	0.213	0.273
PM <sub>10</sub>	0.010	0.002	0.012
PM <sub>2.5</sub>	0.003	0.002	0.005
SO <sub>2</sub>	0.000	0.0005	0.0005

**Health Risk Assessment (HRA)**

At a maximum rate of 3.3 lb/year, the Diesel particulate emissions from the project are greater than the toxic trigger level of 0.26 lb/year. All PM<sub>10</sub> emissions are considered diesel particulate emissions. There was one other application (29115), which was considered a related project permitted in the last five years.

Using the EPA certified PM emission factor for the engine, a 50 hour per year limit for reliability-related activities, and assuming PM is in the form of diesel exhaust PM, the following annual emission rate for diesel exhaust PM was calculated.

$$\frac{0.02 \text{ g PM}}{\text{hp-hr}} \times 1490 \text{ hp} \times \frac{\text{lb}}{454 \text{ g}} \times \frac{50 \text{ hr}}{\text{yr}} = 3.3 \text{ lb PM/yr}$$

Pursuant to Regulation 2-5-110, the application is subject to the provisions of the rule since the increase in diesel exhaust PM emissions from the project is above the trigger level listed in Table 2-5-1 of the regulation 2-5-110 (0.26 lb/yr).

S-10 is not eligible for the District’s HRA streamlining policy for stationary Diesel-fuel 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. The District’s HRA analysis estimates the incremental health risk impacts from toxic air contaminant (TAC) emissions from non-emergency operation of a standby diesel engine generator (S-10) at this facility along with another diesel engine under AN 29115 (S-9). Results from the HRA indicate that the project cancer risk is estimated at **1.1 in a million**, the project chronic hazard index (HI) is estimated at **0.00087**, and the project acute HI is estimated at **0.0018**.

Based on the HRA result, S-10 does not require TBACT because the cancer risk from S-10 is less than 1.0 in million at 50 hours of non-emergency operation per year. However, S-9 requires TBACT because the estimated source risk exceeds a cancer risk of 1.0 in a million. Source S-9 meets TBACT requirement of BACT Guideline, dated 12/22/2010 and the current BACT Guideline, dated 12/22/2020 as shown below. S-9 satisfied the TBACT requirement of Regulation 2-5-301 for the cancer risk greater than 1.0. Therefore, S-9 is allowed to retain the existing 50 hours of non-emergency operation per year.

PM <sub>10</sub> TBACT Requirement Dated 12/22/2010 (g/bhp-hr)	PM <sub>10</sub> TBACT Requirement Dated 12/22/2020 (g/bhp-hr)	S-9 PM <sub>10</sub> Emission Factor from A/N 29115, PO issued on 12/17/2018
0.15 g/bhp-hr	0.15 g/bhp-hr	0.13 g/bhp-hr

Since the estimated project cancer risk does not exceed 10.0 in a million and hazard indices do not exceed 1.0, this project complies with the District’s Regulation 2-5-302 project risk requirements, for projects not located in an Overburdened Community, as defined in Regulation 2-1-243.

**Best Available Control Technology (BACT)**

In accordance with Regulation 2-2-301, BACT is triggered for any new or modified source with the potential to emit 10 pounds or more per highest day of POC, NPOC, NO<sub>x</sub>, CO, SO<sub>2</sub>, PM<sub>10</sub> or PM<sub>2.5</sub>.

Based on the emission calculations above, the owner/operator of S-10 is subject to BACT for the following pollutant: NO<sub>x</sub>, CO, and POC. BACT 1 levels do not apply for “engines used exclusively for emergency use during involuntary loss of power” as per Reference b, Document 96.1.2 of the BAAQMD BACT Guidelines for IC Engines. Hence, the owner/operator has to meet BACT 2 limits presented below.

**BAY AREA AIR QUALITY MANAGEMENT DISTRICT  
 Best Available Control Technology (BACT) Guideline**

Source Category:

<b>Source:</b>	<b>IC Engine-Compression Ignition: Stationary Emergency, non- Agricultural, non-direct drive fire pump</b>	<b>Revision:</b>	<b>7</b>
		<b>Document #:</b>	<b>96.1.3</b>
<b>Class:</b>	<input type="checkbox"/> 50 BHP Output	<b>Date:</b>	<b>12/22/2010</b>

Determination:

Pollutant	BACT 1. Technologically Feasible/ Cost Effective 2. Achieved in Practice TBACT	TYPICAL TECHNOLOGY
<b>POC (NMHC)</b>	1. n/s <sup>c</sup> 2. CARB ATCM standard <sup>a</sup> for POC at applicable horsepower rating (see attached Table 1).	1. n/s <sup>c</sup> 2. Any engine certified or verified to achieve the applicable standard. <sup>a</sup>
<b>NOx</b>	1. n/s <sup>c</sup> 2. CARB ATCM standard <sup>a</sup> for NOx at applicable horsepower rating (see attached Table 1).	1. n/s <sup>c</sup> 2. Any engine certified or verified to achieve the applicable standard. <sup>a</sup>
<b>SO<sub>2</sub></b>	1. n/s <sup>c</sup> 2. Fuel sulfur content not to exceed 0.0015% (wt) or 15 ppm (wt).	1. n/s <sup>c</sup> 2. CARB Diesel Fuel (Ultra Low Sulfur Diesel)
<b>CO</b>	1. n/s <sup>c</sup> 2. CARB ATCM standard <sup>a</sup> for CO at the applicable horsepower rating (see attached Table 1).	1. n/s <sup>c</sup> 2. Any engine certified or verified to achieve the applicable standard. <sup>a</sup>
<b>PM<sub>10</sub></b>	1. n/s <sup>c</sup> 2. 0.15 g/bhp-hr  3. 0.15 g/bhp-hr	1. n/s <sup>c</sup> 2. Any engine or technology demonstrated, certified or verified to achieve the applicable standard.  3. Any engine or technology demonstrated, certified or verified to achieve the applicable standard.
<b>NPOC</b>	1. n/s 2. n/s	1. n/s 2. n/s

**References**

a. ATCM standard (listed below): Where NMHC + NOx is listed (with no individual standards for NOx or NMHC) as the standard, the portions may be considered 95% NOx and 5% NMHC. For the purposes of

determining BACT NMHC = POC. Any engine which has been certified or demonstrated to meet the current year tier standard may be considered compliant with the certified emission standard for that pollutant.

b. Deleted (no longer applies).

c. Cost effectiveness analysis must be based on lesser of 50 hr/yr or non-emergency operation as limited by District health risk screen analysis.

Therefore, S-10 will comply with the proposed BACT by meeting the ATCM requirements.

**Offsets**

In accordance with the Air District’s Policy for Calculating Potential to Emit (PTE) for Emergency Backup Power Generators, the Potential to Emit for S-10 was estimated assuming 150 hours of operation per year (50 hours per year for reliability-related and testing operation + 100 hours per year for emergency operation).

Basis for PTE calculation:

- LOE Diesel engine Emission Factors are from AP 42, Chapter 3.3.1, Table 3.3-1
- LOE Natural Gas engine Emission Factors are from AP 42, Chapter 3.2.1, Table 3.2-1
- Operating hours of 150 hours is used for calculating PTE for S-4, S-5, and S-9
- Yearly usages allowance for PTE for LOE engines are 120 hours per year for S-6, S-7, and S-8

**Table 4. List of Sources at the facility**

Source Number	Power (bhp) or (MMBtu/hr)	Fuel	Source Description
1	28 MMBtu/hr	Natural Gas or Diesel	Space Heater Boiler A/N 14299
2	28 MMBtu/hr	Natural Gas or Diesel	Space Heater Boiler A/N 14299
3	NA	NA	Paint Spray Booth A/N 2661
4	317	Diesel	Permitted A/N 9219
5	317	Diesel	Permitted A/N 9219
6	150	Natural Gas	LOE A/N 29115
7	750	Natural Gas	LOE A/N 29115
8	227	Diesel	LOE A/N 29115
9	364	Diesel	Permitted A/N 29115
10	1490	Diesel	A/N 31918

**Table 5. Potential to Emit at the Facility**

Source Number/Pollutant	NOx (ton/year)	CO (ton/year)	SO2 (ton/year)	PMs (ton/year)	TOC or POC (ton/year)	NPOC (ton/year)
S-1 and S-2	6.670	1.000	0.029	0.360	0.280	0
3	0	0	0	0	1.194	1.194
4	0.215	0.024	0.006	0.004	0.006	0
5	0.215	0.024	0.006	0.004	0.006	0
6	0.073	0.009	0.000	0.001	0.038	0
7	0.363	0.044	0.000	0.004	0.188	0
8	0.422	0.091	0.028	0.030	0.034	0
9	0.145	0.085	0.000	0.008	0.008	0

10	0.123	0.642	0.001	0.005	0.034	0
Total	8.225	1.919	0.071	0.416	1.508	1.194

Note. Please see detail Excel Spreadsheet calculation for Application 31918- City College of San Francisco

This facility has a PTE of 8.225 tons of NO<sub>x</sub> per year and 1.508 tons of POC per year. The facility has a potential to emit less than 10 tons per years of NO<sub>x</sub> and POC after the new or modified source is constructed. Since the facility PTE levels are below the offset trigger levels specified in Regulation 2-2, offsets are not required.

**Statement of Compliance**

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

**Airborne Toxic Control Measure for Stationary Compression Ignition Engines**

ATCM, 5/19/2011, section 93115, title 17, CA Code of Regulations

**District Rules**

Regulation 6-1-303 (*Ringelmann No. 2 Limitation*)

Regulation 6-1-305 (*Visible Particles*)

Regulation 9-1-301 (*Limitations on Ground Level Concentrations of SO<sub>2</sub>*)

Regulation 9-8 (*NO<sub>x</sub> and CO from Stationary Internal Combustion Engines*)

Section 9-8-110.5 – Limited exemption for emergency standby engines

Section 9-8-330 – Hours of operation for emergency standby engines

Section 9-8-502 – Recordkeeping

**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.

**New Source Performance Standards (NSPS)**

40 CFR 60, Subpart IIII (*Stationary Compression Ignition Internal Combustion Engines*)

**National Emissions Standards for Hazardous Air Pollutants (NESHAP)**

40 CFR 63, Subpart ZZZZ (*Stationary Reciprocating Internal Combustion Engines (RICE)*)

**Prevention of Significant Deterioration (PSD)**

This application is not part of a PSD project as defined in Regulation 2-2.

**School Notification (Regulation 2-1-412)**

This project is within 1,000 feet from the nearest K-12 school and therefore is subject to the public notification requirements of Regulation 2-1-412. Public notice was prepared and sent to all addresses within 1000 feet of the Diesel Generator set and parents and guardians of students of Archbishop Riordan High School and San Francisco Adventist School. The public comment period lasted from xxxxx to xxxxx. At the end of the comment period, there were xxx written comments and xxxx voicemails received.

**Overburdened Community (Regulation 2-1-243)**

This project is not located within the Overburdened Community (OBC) as defined in Regulation 2-1-243.

**Permit Conditions**

**Condition no. 27778**

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Tier 4 Certified Engines, equipped with SCR and DPF

1. The owner/operator shall ensure the engine is abated at all times of operation by an approved Selective Catalytic Reduction (SCR) System and Diesel Particulate Filter (DPF) equipped with a backpressure monitor or other approved Diesel Exhaust Particulate Matter Abatement System. The engine, SCR System, and DPF with backpressure monitor or other approved system shall be installed, maintained, and operated in accordance with the manufacturer specifications and/or best modern practices.  
[Basis: Cumulative Increase, Title 17 CCR Section 93115.6(a)(3), 40 CFR 1039.101, BACT, TBACT]
2. The owner/operator shall take all corrective actions recommended by the manufacturer in response to backpressure monitor notifications.  
[Basis: Cumulative Increase, Title 17 CCR Section 93115.6(a)(3), 40 CFR 1039.101, BACT, TBACT]
3. The owner/operator shall ensure urea injection commences as soon as the SCR catalyst bed reaches minimum operating temperature as specified by the manufacturer.  
[Basis: Cumulative Increase, Title 17 CCR Section 93115.6(a)(3), 40 CFR 1039.101, BACT, TBACT]
4. The owner/operator shall ensure the engine emissions do not exceed an ammonia (NH<sub>3</sub>) slip of 10 ppmv, dry @15% O<sub>2</sub> from the SCR system. If deemed necessary to demonstrate compliance with Regulation 2, Rule 5, the Air District may require a source test to determine compliance with this emission limit.  
[Basis: Regulation 2, Rule 5]
5. To determine compliance with the above conditions, the owner/operator shall maintain the following records in a Air District-approved log and shall make these records available to Air District staff upon request. All records shall be retained 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 Synthetic Minor Operating Permit). These recordkeeping requirements shall not replace the recordkeeping requirements contained in any applicable Air District or state regulations.
  - a. Engine, SCR, and DPF maintenance records
  - b. SCR system owner's manual or manufacturer's specifications

- c. DPF owner's manual or manufacturer's specifications
  - d. All backpressure monitor notifications and corrective actions
- [Basis: BACT, Cumulative Increase, Recordkeeping]

**Condition no. 22850**

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1. The owner/operator shall not exceed 50 hours per year per engine for reliability-related testing.  
[Basis: Title 17, California Code of Regulations, section 93115, ATCM for Stationary CI Engines]
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]

### **Recommendation**

The Air District has evaluated the permit application for the proposed project and has made a preliminary determination that the project is expected to comply with all applicable Air District, state, and federal air quality-related regulations, including the health risks resulting from toxic air contaminant emissions. The preliminary recommendation is to issue a permit for this project. After considering all comments received, the Air District will make a final determination.

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

**S-10 Standby Emergency Diesel Generator, equipped with integral Selective Catalytic Reduction (SCR) and Diesel Particulate Filter (DPF), 1490 bhp, Make: Cummins Inc, Model: QST30-G5 NR2, Model Year: 2022 8.70 MMBtu/hr**

Prepared by: Thuya Maw, Air Quality Engineer I  
 Data: 03/23/2023

**Appendix A. List of Sources for PTE calculation**

Source	Power (BHP)	A/N	Source Description	Estimated Fuel Consumption (gal/hr or scfm/hr)	Fuel	Status	PTE hour
1		12591	HVAC Boiler		NG	Grandfather	120
2		12591	HVAC Boiler		Diesel	Grandfather	120
3		2661	Paint Booth		Diesel	Permitted	150
4		9219	Gen Set		Diesel	Permitted	150
5		9219	Gen Set		Diesel	Permitted	150
6		29115	NG Gen Set		NG	LOE	100
7		29115	NG Gen Set		NG	LOE	100
8		29115	Diesel Gen Set		Diesel	LOE	100
9		29115	Diesel Gen Set		Diesel	Permitted	120
10		31918	Diesel Gen Set		Diesel	AC	150

**Sources total**

Pollutant	ton/yr
NOx	8.225
CO	1.919
SO2	0.071
PMs	0.416
TOC	1.508
NPOC	1.194

## Appendix B

### Emission from S-9 and Emission Factors A/N 29115

**Table 1. Emissions from S-9 from CARB Emissions Data**

Pollutant	Emission Factor (g/bhp-hr)	Max Daily Emissions (lb/day)	Annual Emissions (lb/yr)	Annual Emissions (tons/yr)
NOx	2.41	46.39	96.64	0.048
POC	0.13	2.44	5.09	0.003
CO	1.42	27.29	56.85	0.028
PM <sub>10</sub>	0.13	2.59	5.39	0.003
SO <sub>2</sub>	0.0015	0.09	0.18	0.000

### S-9 Emission Certificate

#### EXHAUST EMISSION DATA SHEET

#### MQ POWER GENERATOR SET

Model: DCA300SSC



**The engine used in this generator set is certified to comply with United States EPA Tier 3 and CARB Mobile Off-Highway emission regulations.**

<b>ENGINE DATA</b>		
Manufacturer:	CUMMINS	Bore: 4.49 in. (114 mm)
Model:	QSL9-G3	Stroke: 5.71 in. (145 mm)
Type:	4-Cycle Diesel, In-Line, 6-Cylinder	Displacement: 543 cid (8.9 liters)
Aspiration:	Turbocharged, Charge Air Cooled	Compression Ratio: 17.8:1
<b>PERFORMANCE DATA</b>		
SAE Gross HP @ 1800 RPM (60 Hz)	399	
Rated Load Fuel Consumption (gal/Hr)	19.0	
Rated Load Exhaust Gas Flow (cfm)	2040	
Rated Load Exhaust Gas Temperature (°F)	1035	
<b>United States EPA - Mobile Off-Highway Tier 3 Limits - ≥302 BHP ~ &lt;603 BHP</b>		
Criteria Pollutant	Emission Requirements	Certified Engine Emissions
NOx (Oxides of Nitrogen as NO <sub>2</sub> )	2.98 gr/bhp-hr	2.54 gr/bhp-hr
HC (Total Unburned Hydrocarbons)	(NOx + HC)* Combined	(NOx + HC)* Combined
CO (Carbon Monoxide)	2.61 gr/bhp-hr	1.42 gr/bhp-hr
PM (Particulate Matter)	0.15 gr/bhp-hr	0.13 gr/bhp-hr
EPA Engine Family: ACEXL0540AAB		
EPA Certificate of Conformance: CEX-STNRCI-10-30		
ARB Executive Order: U-R-002-0521		
Effective Date: Model Year 2010		
Note: Engine operation with excessive air intake or exhaust restriction beyond factory published maximum limits, or with improper service maintenance, may result in higher emission levels.		