ENGINEERING EVALUATION REPORT
CHINESE HOSPITAL
APPLICATIONS NUMBER 026777 and 026975

BACKGROUND:
Chinese Hospital (BAAQMD P#13371) applied for a permit to operate a Standby Generator Diesel Engine on 12/15/14; then for an additional identical unit on 02/15/15. Since the permitting of diesel engines at this facility triggers a school public notification in accordance with Regulation 2-1-412, the applications will be evaluated together and public noticed together. Therefore, this evaluation is for permits to operate the following:

S-3: Standby Generator Diesel IC Engine; Caterpillar Model C32 DITA, 1502 BHP, equipped with Johnson Matthey S-DPF Diesel Particulate Filter
S-4: Standby Generator Diesel IC Engine; Caterpillar Model C32 DITA, 1502 BHP, equipped with Johnson Matthey S-DPF Diesel Particulate Filter

EMISSIONS:
The Caterpillar Model C32 DITA engine is certified by EPA as a Tier 2 diesel engine and has the following minimum certification emissions data:

NOx + NMHC:	4.8 g/bhp-hr
CO:	2.6 g/bhp-hr
PM:	0.15 g/bhp-hr

When NOx and NMHC are given as a combined value, it is the District's policy to assume that 5% of the total value is POC, with the remainder being NOx. Therefore, the NOx and POC factors are assumed to be:

NOx:	4.56 g/bhp-hr
POC:	0.24 g/bhp-hr

Since SO_2 emissions are directly related to the amount of sulfur in the fuel, the SO_2 emission factor based on the use of California low sulfur fuel can be determined. Given the following California diesel fuel characteristics:

Heating Value	139,000 BTU/gallon
Specific Weight	7.1 lbs/gallon
Maximum Sulfur Content	0.0015% (wt)

and assuming that all sulfur in the fuel is converted to SO2 at a ratio of one-to-one...

SO_2 = (1 gallon fuel/0.139 MMBTU)(7.1 lb fuel/gallon fuel)(0.000015 lb S/lb fuel)(lb-mole S/32 lb S)(lb-mole SO2/lb-mole S)(64 lb SO2/lb-mole SO2)
= 0.0015 lb SO_2/MMBTU

Each engine consumes a maximum of 71.9 gallons of fuel per hour (9.99 MMBTU/hr). Therefore, potential SO_2 emissions will be 0.015 lb/hr (0.005 g/bhp-hr).

Using the above emissions factors and assuming 50 hours per year of non-emergency operation, the maximum uncontrolled emissions from each engine will be:

NOx = 755.0 lb/yr
CO = 430.5 lb/yr
POC = 39.7 lb/yr
PM = 24.8 lb/yr
SO_2 = 0.8 lb/yr

Diesel Particulate Filter: S-3 and S-4 will each be equipped with a Johnson Matthey diesel particulate filter, a CARB Verified Level 3+ device (at least 85% reduction of PM). Although these filters may significantly reduce NOx, CO, and POC as well as PM, no pollutant reductions beyond the verified 85% PM removal will be assumed.

* Including the 85% PM removal, the maximum annual emissions of diesel PM from each engine will be **3.73 lb/yr**.

CUMULATIVE EMISSIONS:
(tons/yr)

NOx	=	0.755
CO	=	0.431
POC	=	0.040
PM_{10}	=	0.025
SO_2	=	0.001

TOXIC RISK ASSESSMENT:
Abated emissions of Diesel Exhaust Particulate Matter for each engine will be as high as 3.73 lb/yr. Since this is above the screening level of 0.34 lb/yr, a health risk screening analysis (HRSA) is required. The analysis (completed on April 16, 2015) estimates the incremental health risk from the combined operation of the proposed standby generator diesel engines S-3 and S-4. Assuming 50 hours per year of operation for each engine, the maximum cancer risk is estimated to be **1.4 in a million** and the chronic hazard index is **0.0005**. In accordance with Regulation 2-5, these are acceptable risk levels.

BACT/TBACT REVIEW:
The engines are Tier 2 certified, which meets the current BACT/TBACT standards for emergency use diesel engines. (Ref. BAAQMD BACT Guideline, Revision 7, Document 96.1.3, 12/22/2010)

OFFSETS REVIEW:
In accordance with Regulation 2-2-302: “Before the APCO may issue an authority to construct or a permit to operate for a new or modified source at a facility which emits or will be permitted to emit more than 10 tons per year but less than 35 tons per year, on a pollutant specific basis, of precursor organic compounds or nitrogen oxides, emission offsets shall be provided, by the District (or by the applicant, if the Small Facility Banking account has been exhausted) at a 1.0 to 1.0 ratio for the emission from the new or modified source and any pre-existing cumulative increase.”

Since total permitted POC and NOx emissions will be less than 10 tons per year, offsets are not required for this application.

STATEMENT OF COMPLIANCE:
Diesel IC engines are subject to the requirements of BAAQMD Regulation 6 “Particulate Matter and Visible Emissions” and Regulation 9, Rule 1 “Inorganic Gaseous Pollutants – Sulfur Dioxide”.

Particulate Matter and Visible Emissions
BAAQMD Regulation 6-310 limits PM emissions to 0.15 gr/dscf. If it is assumed that the diesel engine exhaust gases contain 15% excess oxygen under normal operating conditions, the Regulation 6-310 limit can be compared to the AP-42 PM emission factor as follows:

From 40 CFR 60, Appendix A, Method 19, Table 19-1, a stoichiometric dry gas combustion factor of 9,190 dscf/MMBTU is given for distillate oil combustion. At 15% excess O_2 this factor becomes:

9,190 x [21%/(21% - 15%)] = 32,165 dscf (combustion products)/MMBTU

The conversion of 0.15 gr/dscf @ 15% O_2 to lb/MMBTU is then:

(32,165 dscf/MMBTU) x (0.15 gr/dscf) x (lb/7,000 gr) = 0.689 lb/MMBTU

Based on the stated PM emission rates and fuel consumption data, the proposed engine will have PM emissions far below the Regulation 6-310 standard.

Compliance with the Ringelmann 1.0 limit of Regulation 6-301 can be demonstrated by casual observation.

SO2 Emissions

Regulation 9-1-304 requires all liquid fuels to have a sulfur content ≤0.5% (wt). All diesel allowed to be sold in California has a sulfur content far below 0.5%. The current CARB standard for low-sulfur diesel fuel is 1.5 ppm by weight (equivalent to 0.0015%).

CARB ATCM For Stationary Compression Ignition Engines

The Airborne Toxic Control Measure (ATCM) for Stationary Compression Ignition Engines, CCR Title 17, Section 93115.6 limits non-emergency use (Maintenance and Testing) for new stationary emergency standby diesel-fueled engines as follows:

Diesel PM Emission Rate (g/bhp-hr)	Allowable Maintenance and Testing (hours/hr)
≤0.15	50*
≤0.01	51 to 100*

* Upon approval by the District

Based on the diesel PM emissions data provided with this application, the ATCM requires that the engines be limited to 50 hours per year of non-emergency operation.

In addition, Section 93115.5 (a) requires the use of CARB Diesel Fuel for any new or in-use stationary diesel engine.

Other Requirements

This application is exempt from the requirements of a CEQA review because the permitting of “Internal Combustion Engines” as outlined in Permit Handbook Chapter 2.3.1 is a ministerial operation.

Part 60, Subpart IIII and Part 63, Subpart ZZZZ apply to emergency standby engines. Subpart IIII sets emission limits that are equal to the EPA certification standards for a particular engine model year and size. Emergency engine owners must purchase a certified engine and operate it according to the manufacturer’s instructions. This part also has limits on hours of non-emergency operation for emergency engines (100 hrs/yr). Emergency engines are not subject to notification requirements and do not make a site a designated facility (not subject to Title V).

Subpart ZZZZ, requires owners of emergency engines to comply with subpart ZZZZ by complying with Part 60, Subpart IIII or JJJJ, which ever applies.

This application is subject to the requirements of Regulation 2-1-412 “Public Notice, Schools”.

PERMIT CONDITIONS:
Standard Permit Conditions #22850 and 24354

Condition# 22850

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]

Condition# 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(e), title 17, CA Code of Regulations; 40 CFR 60.4214c]

RECOMMENDATIONS:
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 a Change of Permit Conditions as shown above. However, the facility is located within 1000 feet of a school, which triggers the public notification requirements of District 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 a change of permit conditions.

By: _____
Ted Hull
Senior Air Quality Engineer