DRAFT ENGINEERING EVALUATION Raintree Partners LLC. PLANT 21841 APPLICATION 25268

BACKGROUND

Summit Electric, Inc., a consultant, is applying for an Authority to Consult for Raintree Partners LLC. Raintree Partners LLC. would like Summit Electric, Inc. to install a small natural gas fired internal combustion engine (S-1), which will be used to power a standby generator at Raintree's residential building. The natural gas powered emergency standby generator set (S-1) will provide emergency standby power in the event of a disruption to power service. This generator is specifically designated to power the sprinkler system for the building.

S-1 Emergency Standby Generator: Natural Gas Engine, Ford Engine, 200 HP

The combustion of natural gas in an internal combustion engine will result in the emissions of criteria pollutants, greenhouse gases, and toxic air contaminants into the atmosphere. These types of pollutants are briefly discussed on the District's web site at www.baaqmd.gov.

EMISSION CALCULATIONS

The air pollution emissions from the proposed natural gas fired engine are summarized below. The air pollution emissions from this engine are calculated based on maximum equipment capacities, maximum permitted operating times, and standard emission factors and assumptions. These emission calculation criteria are presented below. Criteria pollutant emissions are summarized in Table 1, greenhouse gas emissions are summarized in Table 2, and toxic air contaminant emissions and trigger levels are presented in Table 3.

Pollutants, and Abbreviations, and Acronyms:

Carbon Monoxide CO Nitrogen Oxides NO_x **Precursor Organic Compounds POC** Non-Precursor Organic Compounds **NPOC** Particulate Matter PM (PM that is 10 micrometers or smaller) PM-10 (PM that is 2.5 micrometers or smaller) PM-2.5 Sulfur Dioxide SO_2 Greenhouse Gases **GHG**

Carbon Dioxide CO₂ (a GHG)
Methane CH₄ (a GHG)

Carbon Dioxide Equivalent CO₂e
Toxic Air Contaminants TAC

Engine Capacities:

Output rating at full-load for standby operation:

Natural Gas Consumption at full-load:

Natural Gas Heat Content:

200 bhp
2061 ft³/hour
1000 BTU/ft³

Maximum Firing Rate: 2.061 MM BTU/hour

Maximum Firing Rate Calculation: $(2061 \text{ ft}^3/\text{hr})*(1000 \text{ BTU/ft}^3)*(1 \text{ MM BTU/1,000,000 BTU}) = 2.061 \text{ MM BTU/hour}$

Maximum Permitted Operating Times:

Maximum Daily Operating Time:

(for any type of operation including emergencies) 24 hours/day

Maximum Annual Operating Time:

(for reliability testing and maintenance only) 50 hours/year

Table #1 Summary of Criteria Pollutant Emissions and Ozone Precursor Emissions

	g/bhp-hr ^(a)	lbs/hour	grams/yr	lbs/yr	tons/yr	lbs/day
CO	2.75	1.2125	27500	60.63	0.030	29.10
NO _x (c)	1.00	0.4409	10000	22.05	0.011	10.58
POC (c)	1.00	0.4409	10000	22.05	0.011	10.58

	lb/MMBTU	lbm/hr	lbm/hr-hp	lbm/yr	tons/yr	lbm/day
POC	2.96E-02	6.10E-02	0.000305	3.05028	0.0015251	1.46
NOX	2.21E+00	4.55E+00	0.0227741	227.7405	0.1138703	109.32
CO	3.72E+00	7.67E+00	0.0383346	383.346	0.191673	184.01
PM-10	9.50E-03	1.96E-02	9.79E-05	0.978975	0.0004895	0.47
S02	5.88E-04	1.21E-03	6.059E-06	0.0605934	3.03E-05	0.03
acrolein	2.63E-03	5.42E-03	2.71E-05	0.2710215	0.000135	0.13
					5	
Benzene	1.58E-03	3.26E-03	1.628E-05	0.162819	8.141E-05	0.08
PAH	1.41E-04	2.91E-04	1.453E-06	0.01453005	7.265E-06	0.01
formaldehyde	2.05E-02	4.23E-02	0.0002113	2.112525	0.001056	1.01
					3	

- (a) Emission factors are based on BACT(2) limits from BAAQMD BACT/TBACT Workbook, Document # 96.3.4.
- (b) Emission factors are based on EPA AP-42, Table 3.2-2 (Uncontrolled Natural Gas Emission Factors for 4-Stroke Rich-Burn Engines).
- (c) Ozone precursors are compounds that react in the atmosphere in the presence of sunlight to form ozone, a criteria pollutant. Nitrogen oxides (NO_x) and many non-methane organic compounds are ozone precursors. The Bay Area District refers to these reactive organic compounds as precursor organic compounds (POC). EPA refers to these reactive organic compounds as volatile organic compounds (VOC).
- (d) Non-precursor organic compounds (NPOC) are organic compounds that have negligible or very low photochemical reactivity and that have a very low potential for leading to ozone formation in the breathing zone. Common NPOCs are ethane, acetone, methylene chloride, perchloroethylene, 1,1,1-trichloroethane, and many chlorofluorocarbons. The NPOC emission factor is the sum of the individual emission factors listed in AP-42 Table 3.2-2 for compounds that are NPOCs (in this case, ethane and methylene chloride). All other non-methane organic compounds listed in this AP-42 table are POCs.

Table #2 Summary of Greenhouse Gas (GHG) Emissions

	lbs/MM BTU (b)	pounds/year	tons/year	GWP	tons/year as CO ₂ e	metric tons/year as CO ₂ e
CO_2	1.1E+02	11,356	5.668	1	5.67	5.14
CH ₄	2.3E-01	24	0.012	21	0.25	0.23

Total GHG (a)					5.92	5.37
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- (a) Total GHG emissions are the sum of the emissions of the individual GHG compounds after the individual compound emission rate has been converted to a carbon dioxide equivalent emission rate by multiplying the emissions for a compound times the global warming potential (GWP) for that compound.
- (b) Emission factors are based on EPA AP-42, Table 3.2-2 (Uncontrolled Natural Gas Emission Factors for 4-Stroke Rich-Burn Engines).

Table #3 Summary of Toxic Air Contaminant Emissions and Risk Screen Trigger Levels

	Source Specific	AP-42		Emissions	Trigger Level	Trigger?	Emissions	Trigger Level	Trigger?
Toxic Air Contaminant	EF	EF	PEF	(lb/year)	(lb/year)	(Yes/No)	(lb/hr)	(lb/hr)	(Yes/No)
	(lb/MMBTU)	(lb/MMBTU)							
1,1,2,2-Tetrachloroethane		2.53E-05		2.61E-03	1.90E+00	No			
1,1,2-Trichloroethane		1.53E-05		1.58E-03	6.60E+00	No			
1,1-Dichloroethane		1.13E-05		1.16E-03	6.60E+01	No			
1,3-Butadiene		6.63E-04		6.83E-02	6.30E-01	No			
Acetaldehyde		2.79E-03		2.88E-01	3.80E+01	No	5.75E-03	1.00E+00	No
Acrolein		2.63E-03		2.71E-01	1.40E+01	No	5.42E-03	5.50E-03	No
Benzene		1.58E-03		1.63E-01	3.80E+00	No	3.26E-03	2.90E+00	No
Carbon Tetrachloride		1.77E-05		1.82E-03	2.50E+00	No	3.65E-05	4.20E+00	No
Chlorobenzene		1.29E-05		1.33E-03	3.90E+04	No			
Chloroform		1.37E-05		1.41E-03	2.00E+01	No	2.82E-05	3.30E-01	No
Ethylbenzene		2.48E-05		2.56E-03	4.30E+01	No			
Ethylene Dibromide		2.13E-05		2.19E-03	1.50E+00	No			
Formaldehyde		2.05E-02		2.11E+00	1.80E+01	No	4.23E-02	1.20E-01	No
Methanol		3.06E-03		3.15E-01	1.50E+05	No	6.31E-03	6.20E+01	No
Methylene Chloride		4.12E-05		4.25E-03	1.10E+02	No	8.49E-05	3.10E+01	No
Naphthalene		9.71E-05		1.00E-02	3.20E+00	No			
PAH or derivative *									
Benzo(a)anthracene	0.1	2.94E-07							
Benzo(a)pyrene	1	1.15E-07							
Benzo(b)fluoranthene	0.1	2.37E-07							
Benzo(k)fluoranthene	0.1	1.03E-07							
Dibenz(a,h)anthracene	1.05	1.25E-08							
Indeno(1,2,3-cd)pyrene	0.1	1.69E-07							
PAH or derivative TOTAL		2.08E-07		2.15E-05	6.90E-03	No			
Styrene		1.19E-05		1.23E-03	3.50E+04	No	2.45E-05	4.60E+01	No
Toluene		5.58E-04		5.75E-02	1.20E+04	No	1.15E-03	8.20E+01	No
Vinyl Chloride		7.18E-06		7.40E-04	1.40E+00	No	1.48E-05	4.00E+02	No
Xylene		1.95E-04		2.01E-02	2.70E+04	No	4.02E-04	4.90E+01	No

^{*} CATEF Factors were used instead of AP-42.

PLANT CUMULATIVE EMISSIONS

The District maintains a plant wide cumulative emission increase inventory for all new or modified sources at a facility. The cumulative emission increases that will result from the operation of the proposed engine are summarized in Table 4.

Table 4

Plant Cumulative Emission Increase: (tons/year)					
Pollutant	Existing	New	Total		
NOx	0.000	0.011	0.011		
POC	0.000	0.011	0.011		
CO	0.000	0.030	0.030		
PM_{10}	0.000	0.001	0.001		
SO_2	0.000	0.000	0.000		
NPOC	0.000	0.000	0.000		

STATEMENT OF COMPLIANCE

Regulation 1 General Provisions and Definitions

From Regulation 1-301, no person shall discharge from any source whatsoever such quantities of air contaminants or other material which cause injury, detriment, nuisance or annoyance to any considerable number of persons or the public; or which endangers the comfort, repose, health or safety of any such persons or the public, or which causes, or has a natural tendency to cause, injury or damage to business or property. For purposes of this section, three or more violation notices validly issued in a 30 day period to a facility for public nuisance shall give rise to a rebuttable presumption that the violations resulted from negligent conduct.

Regulation 2 Permits, Rule 1 General Requirements

CEQA Requirements

The project is considered to be ministerial under the District's CEQA Regulation 2-1-311 and therefore is not subject to CEQA review. The engineering review for this project requires only the application of standard permit conditions and standard emissions factors and therefore is not discretionary as defined by CEQA. (Permit Handbook Chapter 2.3.2)

Public Notice Requirements;

This facility is within 1,000 feet of two schools and is therefore subject to the public notification requirements of Regulation 2-1-412. A Public Notice was prepared and sent out to the home address of the students of the schools and to each address within a radius of 1,000 feet of the source. This Evaluation Report was posted on the District Webpage along with the Public Notice.

Regulation 2 Permits, Rule 2 New Source Review

Best Available Control Technology

In accordance with Regulation 2-2-301, Best Available Control Technology (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_x, CO, SO₂ or PM₁₀. As shown in Table 1, the emissions of NO_x, CO, and POC from the proposed engine will each exceed 10 pounds/day. Therefore, BACT is triggered for each of these pollutants.

The District's BACT/TBACT Workbook (which is available on the District web site at: http://hank.baaqmd.gov/pmt/bactworkbook/default.htm) includes BACT guidelines for many common sources. The BACT guideline for a natural gas fired emergency engine is provided below. The District has determined that the proposed engine will satisfy the requirement to use BACT by complying with the BACT(2) limits specified in the following guideline.

Source Category

Source:	IC Engine – Spark Igniti Emergency Engine	ion, Natural Gas Fired	Revision: Document #:	96.3.4
Class:	>= 50 HP		Date:	5/7/03

Determination

Determination		
POLLUTANT	BACT	TYPICAL TECHNOLOGY
	1. Technologically Feasible/	
	Cost Effective	
	2. Achieved in Practice	
DOC	1. <i>n/d</i>	1. n/d
POC	$2. 1.0 g/bhp-hr^a$	2. lean burn technology ^a
MO	1. <i>n/d</i>	1. n/d
NOx	2. 1.0 g/bhp-hr ^a	2. lean burn technology ^a
	1.n/a	1. <i>n/a</i>
SO_2	2. <i>n/s</i>	2. natural gas ^a
CO	1. <i>n/d</i>	1. <i>n/d</i>
CO	2. 2.75 g/bhp-hr ^a	2. lean burn technology ^a
	1. <i>n/d</i>	1. <i>n/d</i>
PM_{10}	2. <i>n/s</i>	2. natural gas ^a
NPOC	1. <i>n/a</i>	1. <i>n/a</i>
NPOC	2. <i>n/a</i>	2. n/a

References

a. 1993 BACT 2 levels for IC Engine-Spark Ignition, Nat. Gas > 250 HP (3/19/93) without the need for post-combustion controls (not considered to be cost effective for emergency only applications).

Offsets

In accordance with Regulation 2-2-302, emission offsets are required if a facility will emit 10 tons/year or more of nitrogen oxides or 10 tons/year or more of POC. Since this facility will not emit more than 10 tons/year of NO_x or POC, this facility is not subject to NO_x or POC offset requirements.

In accordance with Regulation 2-2-303, offsets of SO_2 and PM-10 emissions are only required if the facility is deemed to be major facility for SO_2 or PM-10 emission. Since this facility will emit less than 100 tons/year of SO_2 and less than 100 tons/year of PM-10, it is not considered to be a major facility for either of these pollutants. Therefore, SO_2 and PM-10 offsets are not required.

Prevention of Significant Deterioration (PSD)

PSD is not applicable to this facility as it will emit less than 100 tons per year of each pollutant specified Regulation 2 Rule 2, Section 304 and less than 100,000 tons/year of total GHG emissions (expressed as CO₂ equivalent emissions).

Regulation 2 Permits, Rule 5 New Source Review of Toxic Air Contaminants

Estimated toxic pollutant emissions at the exhaust stack are summarized in Table 3 above and compared to their respective toxic risk screen trigger level provided in Table 2-5-1 of Regulation 2, Rule 5. The source of the emission factors used in the emissions calculations are from EPA's AP-42 document (Table 3.2-2) and the California Air Resource Board's toxic emission factor database (CATEF).

As shown in the table, no toxic compound exceeded their respective toxic trigger level. Toxic compounds below the toxic trigger level are not expected to result in any significant health risks.

The operation of this small emergency standby engine on natural gas (a clean burning fuel) should pose no health threat to the impacted community.

Regulation 6 Particulate Matter, Rule 1 General Requirements

The owner/operator of S-1 shall comply with Regulation 6 (Particulate Matter –General Requirements). S-1 is subject to the limitations of Regulation 6-1-303.1 (Ringelmann No. 2 Limitation). Regulation 6, Rule 1, Section 303 states that a person shall not emit for a period or periods aggregating more than three minutes in any hour, a visible emission that is as dark or darker than No. 2 on the Ringelmann Chart, or of such opacity as to obscure an observer's view to an equivalent or greater degree, nor shall said emission, as perceived by an opacity sensing device in good working order, where such device is required by District Regulations, be equal to or greater than 40% opacity. The engine is subject to Regulation 6-1-303.1 (Ringelmann No. 2 Limitation), as the engine displacement is less than 25 liter and the engine is only used for emergency power. The District expects that the proposed engine will comply with these standards because it is a gas fired spark-ignited engine and properly operating spark-ignited gas fired engines have very low particulate emissions.

The District also expects this engine will comply with Regulation 6-1-305 (Visible Particles). Visible particulate emissions are not normally associated with combustion of gaseous fuels, such as natural gas, so compliance with this limit is expected.

Regulation 6-1-310 (Particulate Weight Limitation) limits particulate matter emissions to no more than 0.15 grains per dscf of exhaust volume. Based on the AP-42 emission rate identified in the emissions section and the expected engine exhaust rate of 1535 scfm, the expected grain

loading for the proposed engine is 0.0015 gr/dscf. The engine emissions are well below the 0.15 gr/dscf standard.

Regulation 9 Inorganic Gaseous Pollutants, Rule 1 Sulfur Dioxide

Regulation 9-1-301 (*Inorganic Gaseous Pollutants: Sulfur Dioxide for Limitations on Ground Level Concentrations*). Pursuant to Regulation 9-1-301, the ground level concentrations of SO₂ will not exceed 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. Facility is in compliance with Regulation 9-1-302 General Emission Limitation: a person shall not emit from any source, other than a ship, a gas stream containing sulfur dioxide in excess of 300 ppm. Facility is in compliance with this requirement as sulfur dioxide content is much lower than 300 ppm limit. For natural gas (300 ppm of SO2 in the exhaust = 0.04966 lbs of SO2/MM BTU and AP-42 SO2 is much less than this value at 5.88E-4 lbs of SO2/MM BTU).

<u>Regulation 9 Inorganic Gaseous Pollutants, Rule 8 Nitrogen Oxides and Carbon Monoxide</u> from Stationary Internal Combustion Engines

S-1 will be operated as an emergency standby generator and therefore is not subject to the emission rate limits in Regulation 9, Rule 8 (Inorganic Gaseous Pollutants: NOx and CO from Stationary Internal Combustion Engines), Section 110.5 (Emergency Standby Engines). S-1 is exempt from the requirements of Regulations 9-8-301 (Emission Limits – Spark-Ignited Engines Powered by Fossil Derived Fuels), 9-8-302 (Emission Limits – Spark-Ignited Engines Powered by Waste Derived Fuels), 9-8-303 (Emissions Limits – Delayed Compliance, Existing Spark-Ignited Engines, 51 to 250 bhp or Model Year 1996 or Later), 9-8-304 (Emission Limits – Compression-Ignited Engines), 9-8-305 (Emission Limits – Delayed Compliance, Existing Compression-Ignited Engines, Model Year 1996 or Later), 9-8-501 (Initial Demonstration of Compliance) and 9-8-503 (Quarterly Demonstration of Compliance).

The facility will be in compliance with allowable operating hours and the corresponding record keeping in Regulations 9-8-330.3 (*Emergency Standby Engines, Hours of Operation*), Recordkeeping 9-8-502.1- where records shall be kept on a monthly basis and 530 (*Emergency Standby Engines, Monitoring and Recordkeeping*) will be included in the Permit Conditions below. Regulation 9-8-530 requirements are incorporated into the proposed permit conditions.

NSPS

The engine is subject to 40 CFR 60, Subpart JJJJ Standards of Performance for Stationary Spark Ignition Internal Combustion Engines because it was manufactured after January 2009 for emergency engines with a maximum engine power greater than 25 HP (see 40 CFR Part 60.4230(a)(4)(iv). In accordance with 40 CFR Part 60.4233(e), owners and operators of stationary spark-ignited engines that are greater than 100 bhp must comply with the limits in Table 1 of Subpart JJJJ.

From Table 1 of Subpart JJJJ, the proposed engine is subject to the emission standards for emergency engines that are 130 bhp or larger. The specific limits are listed below in Table 5. The proposed engine is expected to comply with these NSPS limits because this engine is required to meet District BACT standards for CO, NO_x, and POC, and the District's BACT(2) limits for CO, NO_x, and POC are equal to or less than the applicable Subpart JJJJ limits (see comparison in Table #5 below).

Table #5 Comparison of NSPS and BACT Limits

Compounds	District BACT(2) Limits	NSPS, Subpart JJJJ Limits
	grams/bhp-hour	grams/bhp-hour
CO	2.75	4.0
NOx	1.00	2.0
VOC (same as POC)	1.00	1.0

In accordance with 40 CFR Part 60.4243(b), the owner or operator of the proposed engine must demonstrate compliance with the applicable emission limits by either (a) purchasing a certified engine, operating and maintaining the engine in accordance with the manufacturer's instructions, and keeping records of all maintenance, adjustments, and repairs conducted on the engine, or (b) purchasing a non-certified engine, conducting an initial performance test, operating the engine in a manner that is consistent with good air pollution control practices, complying with the maintenance plan for the engine, and keeping records of all testing, adjustments, maintenance, and repairs. The owner/operator is expected to comply with the requirements described above by either purchasing a certified engine or meeting the addition performance testing criteria for non-certified engines. All engines are expected to be operated in accordance with good air pollution control practices and maintained, tuned, and repaired in accordance with manufacturer recommendations. The owner or operator must keep records of all maintenance, repairs and testing to demonstrate compliance with these provisions.

In accordance with 40 CFR Part 60.4233(d), emergency engines are limited to 100 hours/year of operation for maintenance and readiness testing, emissions testing, emergency demand response, and for specifically allowed types of non-emergency operation (no more than 50 hours/year). District permit conditions will limit maintenance and readiness testing to 50 hours/year. District conditions for emergency engines do not allow any operating time for demand response programs. Initial compliance demonstration testing is not expected to require more than 10 hours/year of additional operation. Therefore, the District permit conditions are expected to ensure that this engine will comply with the 100 hour/year operating limitation. The District permits conditions require the owner or operator to maintain records of operating time for all types of operation and fuel usage for this engine. These records will demonstrate compliance with the Subpart JJJJ operating time limitations.

If the owner/operator does not purchase a certified engine, initial compliance demonstration testing is required and must be performed in accordance with 40 CFR Part 60.4244. The District requires submittal of emissions testing protocol prior to conducting performance tests to ensure that all required testing procedures will be met.

In accordance with 40 CFR Part 60.4245, owners or operators of subject engines must keep records of all notifications, maintenance conducted on the engine, and compliance documentation (either documentation that shows the owner purchased a certified engine or documentation that confirms the owner conducted the required testing and the testing demonstrated compliance with the applicable limits). The owner or operator is expected to comply with these notification and records keeping requirements.

NESHAP

The engine is subject to the emission or operating limitations in 40 CFR 63, Subpart ZZZZ, National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines per 40 CFR 63.6585(c). In addition, the source is a new stationary RICE located at an area source, and it must meet the requirements of 40 CFR Part 60 Subpart JJJJ, for spark ignition engines per 63.6590(c)(1). The engine S-1 is expected to comply with all applicable requirements of 40 CFR Part 60 Subpart JJJJ, as shown in the "NSPS" section of this evaluation above. S-1 is expected to comply with this NESHAP by meeting the applicable NSPS requirements.

PERMIT CONDITIONS

APPLICATION 25268; Summit Electric Inc; PLANT 21841 CONDITIONS FOR S-1

In addition to complying with the permit conditions below, the owner or operator shall comply with all applicable provisions of: Regulation 6, Rule 1; Regulation 9, Rule 1; Regulation 9, Rule 8; and 40 CFR Part 60, Subpart JJJJ.

Permit Conditions for Emergency Stationary Natural Gas Engines: Standard Condition #23112

- 1. The owner or operator shall operate the stationary emergency standby engine, only to mitigate emergency conditions or for reliability-related activities (maintenance and testing). Operating while mitigating emergency conditions and while emission testing to show compliance with this part is unlimited. Operating for reliability-related activities are limited to 50 hours per year. (Basis: Emergency Standby Engines, Hours of Operation Regulation 9-8-330)
- 2. The Owner/Operator shall equip the emergency standby engine(s) with: a non-resettable totalizing meter that measures hours of operation or fuel usage (Basis: Emergency Standby Engines, Monitoring and Record keeping 9-8-530)
- 3. 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. 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 (maintenance and testing).
 - b. Hours of operation for emission testing.
 - c. Hours of operation (emergency).
 - d. For each emergency, the nature of the emergency condition.
 - e. Fuel usage for engine.

(Basis: Emergency Standby Engines, Monitoring and Recordkeeping 9-8-530)

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 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 source will be located within 1000 feet of a school, which triggers the public notification requirements of District Regulation 2-1-412.6. 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 for the following equipment:

S-1 Emergency Standby Generator: Natural Gas Engine, Ford Engine, 200 HP

Bv:		
- J	Irma Salinas Senior AQ Engineer	_