DRAFT ENGINEERING EVALUATION
KAISER PERMANENTE SAN RAFAEL MEDICAL CENTER
PLANT NO. 3947
APPLICATION NO: 30617

This document is an Engineering Evaluation Report for the issuance of an Authority to Construct for the Kaiser Permanente San Rafael Medical Center. This Report evaluates how the Facility will comply with all applicable requirements of Bay Area Air Quality Management District (BAAQMD) regulations, and it includes permit conditions that will ensure compliance. As explained herein, with these imposed permit conditions, the facility is expected to comply with all applicable air quality regulatory requirements.

BACKGROUND

Kaiser Permanente San Rafael Medical Center (the Facility) operates at 99 Montecillo Road in San Rafael, California. The Facility has applied for an Authority to Construct (AC) and Permit to Operate (PO) the following equipment located within the Facility's on-site boiler room:

S-11 Boiler, Cleaver Brooks, Flexible Watertube FLE(FLX)-200-999-160HW, Multi-fuel, Natural Gas 9.999 MMBtu/hr & No. 2 Fuel Oil (Diesel) 68 gal/hr

S-12 Boiler, Cleaver Brooks, Flexible Watertube FLE(FLX)-200-999-160HW, Multi-fuel, Natural Gas 9.999 MMBtu/hr & No. 2 Fuel Oil (Diesel) 68 gal/hr

S-13 Boiler, Cleaver Brooks, Flexible Watertube FLE(FLX)-200-999-160HW, Multi-fuel, Natural Gas 9.999 MMBtu/hr & No. 2 Fuel Oil (Diesel) 68 gal/hr

In accordance with Regulation 2-1-114.1.2, a district permit is required for any boiler which burns fuels other than natural gas and has a rated heat input equal to or greater than 1 million BTU (MMBtu) per hour. Therefore, S-11, S-12, and S-13 each require an AC and PO.

Sources S-11, S-12, and S-13 will replace existing end-of-life boilers S-4, S-5, and S-6, respectively. Source S-4, S-5, and S-6 were originally permitted in BAAQMD application number 16037 as loss-of-exemption sources[1].

This application proposes a new source of toxic air contaminant (TACs) and is located within 1,000 feet of the outer boundary of the nearest K-12 school. Therefore, public notification pursuant to BAAQMD Regulation 2-1-412 is required.

EMISSION CALCULATIONS

This section summarizes the basis for, and results of, criteria pollutant and TAC emissions from new sources S-11, S-12 and S-13. The emissions calculations were performed in accordance with BAAQMD Engineering Division Permit Handbook, Chapter 2.1 (Boilers, Steam Generators, & Process Heaters). According to the applicant, S-11, S-12 and S-13 each have a dual-fuel capacity for natural gas and oil no heavier than ASTM D396 No. 2. Diesel fuel is currently selected as the backup fuel in the event of natural gas curtailment.

Basis:

- Boilers operate 24 hours per day at 365 days per year, for a total of 8,760 hours per year maximum
- 9.999 MMBtu/hour natural gas maximum firing rate for each boiler S-11, S-12, S-13
- 68 gal/hr fuel oil maximum consumption rate for each boiler S-11, S-12, S-13
- Higher heating value (fuel heat content):
    - Natural gas: 1,020 BTU/SCF (BAAQMD default value)
    - Non-gaseous fuel oil: 140,000 BTU/gallon (per boiler nameplate)

[1] A copy of the engineering evaluation for application 16037 could not be located. However, the boilers' equipment nameplates show a manufacture date of 1973 so it is reasonable to assume they are LOE devices.

Criteria Pollutant Emissions:

Natural Gas Combustion

The criteria pollutant emissions from the boilers' natural gas consumption include combustion products nitrogen oxides (NO_x), carbon monoxide (CO), sulfur dioxide (SO_2), particulate matter (PM_{10} and $PM_{2.5}$) and precursor organic compounds (POCs). Manufacturer-guaranteed emission rates provided by the applicant were assumed for all pollutants. The emissions of S-11, S-12 and S-13 natural gas combustion based on these emission factors are summarized in Table 1A. For determining cumulative increase potential to emit (PTE), continuous operation is assumed (24 hours per day, 365 days per year).

The emissions from S-11, S-12 & S-13 natural gas combustion are summarized in Table 1A.

Table 1A– Natural Gas Combustion Emissions

Criteria Pollutant	Emission Factors			Emissions - Per Boiler				Emissions - Total (3 Boilers)			
	Value	*Units*	*Reference*	*lb/hour*	*lb/day*	*lb/year*	*ton/year*	*lb/hour*	*lb/day*	*lb/year*	*ton/year*
NOx	0.0175	lb/MM BTU	a	0.175	4.200	1,533.000	0.767	0.525	12.600	4,599.000	2.301
CO	0.0790	lb/MM BTU	a	0.790	18.958	6,919.670	3.460	2.370	56.874	20,759.010	10.380
SO2	0.0007	lb/MM BTU	a	0.007	0.168	61.320	0.031	0.021	0.504	183.960	0.093
PM10	0.0175	lb/MM BTU	a	0.175	4.200	1,533.000	0.767	0.525	12.600	4,599.000	2.301
PM2.5	0.0175	lb/MM BTU	a	0.175	4.200	1,533.000	0.767	0.525	12.600	4,599.000	2.301
VOC (POC)	0.0043	lb/MM BTU	a	0.043	1.032	376.680	0.188	0.129	3.096	1,130.040	0.564

References:
a. Manufacturer-guaranteed emission rates

Diesel Combustion

BAAQMD Regulation 9 Rule 7, Section 9-7-113.1 limits boiler operation on non-gaseous fuel to 168 hours in each consecutive 12-month period, plus 48 hours in each consecutive 12-month period for oil-burn readiness testing or agency-required testing. Therefore, S-11, S-12 and S-13 each may each operate up to 216 hours total per year for natural gas curtailment and testing purposes. For determining cumulative increase PTE, a maximum daily operation of 24 hours is assumed, and annually a maximum of 216 hours.

The pollutant emissions from the boilers' diesel consumption include combustion products NO_x, CO, PM_{10}, $PM_{2.5}$, POCs and non-methane POCs (NPOCs). Manufacturer-guaranteed emission rates provided by the applicant were assumed for all pollutants except NPOCs and SO2. The NPOC emission factor was taken from AP-42 Chapter 1.3 Fuel Combustion Table 1.3-3 (Commercial/institutional/residential combustors, Distillate oil fired); NMTOC was assumed equal to NPOC. The SO2 emission factor was taken from AP-42 Chapter 1.3 Fuel Combustion Table 1.3-1: Boilers < 100 MMBtu/hr, Distillate oil fired, assuming 0.0015% wt sulfur.

The emissions from S-11, S-12 & S-13 diesel combustion are summarized in Table 1B.

Table 1B– Diesel Combustion Emissions

Criteria Pollutant	Emission Factors			Emissions - Per Boiler				Emissions - Total (3 Boilers)			
	Value	*Units*	*Reference*	*lb/hour*	*lb/day*	*lb/year*	*ton/year*	*lb/hour*	*lb/day*	*lb/year*	*ton/year*
NOx	0.108	lb/MM Btu	a	1.080	25.917	233.257	0.117	3.240	77.751	699.77	0.351
CO	0.039	lb/MM Btu	a	0.390	9.359	84.232	0.042	1.170	28.077	252.696	0.126
SO2	0.213	lb/1000 gal	b	0.014	0.336	3.024	0.002	0.042	1.008	9.072	0.006
PM10	0.028	lb/MM Btu	a	0.280	6.719	60.474	0.030	0.840	20.157	181.422	0.090
PM2.5	0.028	lb/MM Btu	a	0.280	6.719	60.474	0.030	0.840	20.157	181.422	0.090
POC	0.001	lb/MM Btu	a	0.010	0.240	2.160	0.001	0.030	0.720	6.480	0.003
NPOC	0.216	lb/1000 gal	b	0.015	0.360	3.24	0.002	0.045	1.080	9.720	0.006

References:
a. Manufacturer-guaranteed emission rates
b. AP-42 Chapter 1.3 Fuel Oil Combustion,
   - SO2 – Table 1.3-1: Boilers < 100 MMBTU/hr, Distillate oil fired
   - NPOC - Table 1.3-3: Commercial/institutional/residential combustors

Total combustion emissions from natural gas and diesel consumption for S-11, S-12, and S-13 are summarized in Table 1C.

Table 1C – Total Combustion Emissions

Criteria Pollutant	Emissions - Per Boiler				Emissions - Total (3 Boilers)			
	lb/hour	*lb/day*	*lb/year*	*ton/year*	*lb/hour*	*lb/day*	*lb/year*	*ton/year*
NOx	1.255	30.117	1,766.257	0.884	3.765	90.351	5,298.771	2.652
CO	1.180	28.317	7,003.902	3.502	3.540	84.951	21,011.706	10.506
SO2	0.021	0.504	64.344	0.033	0.063	1.512	193.032	0.099
PM10	0.455	10.919	1,593.474	0.797	1.365	32.757	4,780.422	2.391
PM2.5	0.455	10.919	1,593.474	0.797	1.365	32.757	4,780.422	2.391
POC	0.053	1.272	378.840	0.189	0.159	3.816	1,136.520	0.567
NPOC	0.015	0.360	3.240	0.002	0.045	1.080	9.720	0.006

Plant Cumulative Increase:

Cumulative Increase is defined as the sum of all emissions increases authorized by authorities to construct and permits to operate issued to a facility since the applicable cumulative increase baseline date, which is April 5, 1991 for POC, NOx, SO2, PM10, and CO, and August 31, 2016 for PM2.5.

Table 2 summarizes the cumulative increase in criteria pollutant emissions resulting from the operation of S-11, S-12 and S-13. Emissions from sources S-4, S-5, and S-6 are not reflected in the facility's sitewide because they are loss-of-exemption sources; there is no required adjustment to cumulative increase for shutting down these sources.

Table 2 - Plant Cumulative Emissions

Pollutant	Existing Emissions (TPY)	New Emissions - S11, S12, S13 (TPY)	Reduced Emissions - S4, S5, S6 (TPY)	Total Emissions (TPY)
NOx	0.098	2.652	0.000	2.750
CO	0.089	10.506	0.000	10.595
SO_2	0.000	0.099	0.000	0.099
PM_{10}	0.005	2.391	0.000	2.396
$PM_{2.5}$	0.000	2.391	0.000	2.391
POC	0.005	0.567	0.000	0.572
NPOC	0.000	0.006	0.000	0.006

TOXIC HEALTH RISK ASSESSMENT

Note: There have been no other applications for this facility within the past three-year period.

Natural Gas Combustion Emissions

The predominant toxic air contaminant (TAC) emissions resulting from natural gas consumption include benzene, formaldehyde, and toluene. The TAC emission factors used for natural gas combustion calculation purposes were taken from the BAAQMD "Policy: Emission Factors for Toxic Air Contaminants from Miscellaneous Natural Gas Combustion Sources" dated September 7, 2005. For determining air toxics PTE, continuous operation is assumed (24 hours per day, 365 days per year).

Based on the calculations presented in Table 3A below, with exception of formaldehyde, all TAC emissions from natural gas combustion are below the BAAQMD's Risk Screening trigger levels set forth in Table 1 of Reg. 2-5 (New Source Review for Toxic Air Contaminants). The annual project emissions of formaldehyde exceed the chronic trigger level. Therefore, a toxics health risk assessment (HRA) is triggered.

Table 3A- Natural Gas Combustion - TAC Emission Estimates

Toxic Air Contaminant	Emission Factors			Emissions - Per Boiler		Emissions - Total (3 Boilers)		Trigger		Emissions > Trigger?	
	Value	*Units*	*Reference*	*lb/hour*	*lb/year*	*lb/hour*	*lb/year*	*lb/hour*	*lb/year*	*Acute*	*Chronic*
Benzene	2.06E-06	lb/MM BTU	b	2.06E-05	1.80E-01	6.18E-05	5.41E-01	6.0E-02	2.9E+00	no	no
Formaldehyde	7.35E-05	lb/MM BTU	b	7.35E-04	6.44E+00	2.21E-03	1.93E+01	1.2E-01	1.4E+01	no	yes
Toluene	3.33E-06	lb/MM BTU	b	3.33E-05	2.92E-01	1.00E-04	8.76E-01	8.2E+01	1.2E+04	no	no

b. BAAQMD Memorandum from Brian Bateman (Subject: Emission Factors for Toxic Air Contaminants from Miscellaneous Natural Gas Combustion Sources).

Diesel Combustion Emissions

TAC emissions resulting from boiler diesel combustion include several volatile organics and polycyclic aromatic compounds. Regulation 2-5 Table 1, Footnote 6 states:

> *"Diesel exhaust particulate matter (DPM) should be used as a surrogate for all TAC emissions from diesel-fueled compression-ignition internal combustion engines (CI ICEs). However, DPM should not be used for other types of diesel-fueled combustion equipment, such as boilers or turbines. For equipment other than diesel-fueled CI ICEs, emissions should be determined for individual TACs and compared to the appropriate trigger level for each TAC."*

BAAQMD policy is to default to California Air Toxics Emission Factors (CATEFs), when available, rather than AP-42 default emission factors. Therefore, the TAC emission factors were retrieved from CATEF for boilers. The TAC emission estimates are based on the CATEF mean values reported for uncontrolled emission factors for diesel-fired boilers. For polycyclic aromatic hydrocarbons (PAHs) with no pollutant-specific trigger level, BAAQMD Reg 2-5, Table 1 Footnote 8 was referenced:

"These substances are PAH derivatives that have OEHHA-developed Potency Equivalency Factors (PEFs). PAHs are evaluated as benzo(a)pyrene equivalents; this evaluation process consists of multiplying individual PAH-specific emission levels with their corresponding PEFs listed. The sum of these products is the benzo(a)pyrene-equivalent level and should be compared to the benzo(a)pyrene equivalent trigger level."

A summary of the calculated benzo(a)pyrene equivalent emission factor is shown below in Table 3B. For determining air toxics PTE, it is assumed a daily maximum operation of 24 hours per day and annually 48 hours for oil-burn readiness testing or agency-required testing.

Table 3B- Diesel Combustion – PAHs' Benzo(a)pyrene Equivalent Emission Factor

PAH or derivative		Emission Factors (EF)			PEF (unitless)		EF * PEF	
Name	**CAS #**	*Value*	*Units*	*Reference*	Value	*Reference*	Value	Units
2-Chloronaphthalene	*91-58-7*	0.0000184	lb/1000 gal	c	--	d	--	lb/1000 gal
2-Methylnaphthalene	*91-57-6*	0.00014	lb/1000 gal	c	--	d	--	lb/1000 gal
Acenaphthene	*83-32-9*	0.000211	lb/1000 gal	c	--	d	--	lb/1000 gal
Acenaphthylene	*208-96-8*	0.000065	lb/1000 gal	c	--	d	--	lb/1000 gal
Anthracene	*120-12-7*	0.0000239	lb/1000 gal	c	--	d	--	lb/1000 gal
Benzo(a)anthracene	*56-55-6*	0.0000135	lb/1000 gal	c	0.1	d	1.35E-06	lb/1000 gal
Benzo(a)pyrene	*50-32-8*	0.00000755	lb/1000 gal	c	1	d	7.55E-06	lb/1000 gal
Benzo(b)fluoranthene	*205-99-2*	0.00000667	lb/1000 gal	c	0.1	d	6.67E-07	lb/1000 gal
Benzo(e)pyrene	*192-97-2*	0.000014	lb/1000 gal	c	--	d	--	lb/1000 gal
Benzo(g,h,i)perylene	*191-24-2*	0.0000085	lb/1000 gal	c	--	d	--	lb/1000 gal
Benzo(k)fluoranthene	*207-08-9*	0.0000831	lb/1000 gal	c	0.1	d	8.31E-06	lb/1000 gal
Chrysene	*218-01-9*	0.0000128	lb/1000 gal	c	0.01	d	1.28E-07	lb/1000 gal
Dibenz(a,h)anthracene	*53-70-3*	0.00000649	lb/1000 gal	c	1.05	d	6.81E-06	lb/1000 gal
Fluoranthene	*206-44-0*	0.0000332	lb/1000 gal	c	--	d	--	lb/1000 gal
Fluorene	*86-73-7*	0.000117	lb/1000 gal	c	--	d	--	lb/1000 gal
Indeno(1,2,3-cd)pyrene	*193-39-5*	0.00000664	lb/1000 gal	c	0.1	d	6.64E-07	lb/1000 gal
Perylene	*198-55-0*	0.0000271	lb/1000 gal	c	--	d	--	lb/1000 gal
Phenanthrene	*85-01-8*	0.000372	lb/1000 gal	c	--	d	--	lb/1000 gal
Pyrene	*129-00-0*	0.0000408	lb/1000 gal	c	--	d	--	lb/1000 gal
						SUM	**2.55E-05**	**lb/1000 gal**

References:

c. CATEFs - Boiler (Diesel fired, mean value)
d. BAAQMD Reg 2-5, Table 1, Footnote 8. See Table 3B.

Based on the calculations shown in Table 3C below, all TACs are below the District's Risk Screening trigger levels set forth in Table 1 of Reg. 2-5.

Table 3C- Diesel Combustion - TAC Emission Estimates

Toxic Air Contaminant	Emission Factors			Emissions - Per Boiler		Emissions - Total (3 Boilers)		Trigger		Emissions > Trigger?	
	Value	*Units*	*Reference*	*lb/hour*	*lb/year*	*lb/hour*	*lb/year*	*lb/hour*	*lb/year*	*Acute*	*Chronic*
Benzene	0.00254	lb/1000 gal	c	1.73E-04	8.29E-03	5.18E-04	2.49E-02	6.00E-02	2.90E+00	no	no
Benzo(a)pyrene	0.0000255	lb/1000 gal	c,d	1.73E-06	8.32E-05	5.20E-06	2.50E-04	--	3.30E-03	no	no
Ethylbenzene	0.00149	lb/1000 gal	c	1.01E-04	4.86E-03	3.04E-04	1.46E-02	--	3.30E+01	no	no
Formaldehyde	0.349	lb/1000 gal	c	2.37E-02	1.14E+00	7.12E-02	3.42E+00	1.20E-01	1.40E+01	no	no
Hexane	0.00121	lb/1000 gal	c	8.23E-05	3.95E-03	2.47E-04	1.18E-02	--	2.70E+05	no	no
Naphthalene	0.367	lb/1000 gal	c	2.50E-02	1.20E+00	7.49E-02	3.59E+00	--	2.70E+05	no	no
Propylene	0.00171	lb/1000 gal	c	1.16E-04	5.58E-03	3.49E-04	1.67E-02	--	2.70E+05	no	no
Toluene	0.0015	lb/1000 gal	c	1.02E-04	4.90E-03	3.06E-04	1.47E-02	8.20E+01	1.20E+04	no	no
Xylene (Total)	0.00149	lb/1000 gal	c	1.01E-04	4.86E-03	3.04E-04	1.46E-02	4.90E+01	2.70E+04	no	no

References:

c. CATEFs - Boiler (Diesel fired, mean value)
d. BAAQMD Reg 2-5, Table 1, Footnote 8. See Table 3B.

HRA Results

The HRA analysis estimated the incremental health risk resulting from toxic air contaminant (TAC) emissions from the three multi-fuel boilers (S-11, S-12, and S-13) proposed at this facility.

Results from this HRA indicate that the maximum cancer risk is estimated at **0.21 in a million**, the maximum chronic hazard index is estimated at **0.0014** and the maximum acute hazard index is estimate at **0.011**. In accordance with the District's Regulation 2, Rule 5, this project does not trigger TBACT, because cancer risk is less than 1.0 in a million and chronic hazard index is less than 0.2. This project complies with the Regulation 2-5-302 project risk requirements.

STATEMENT OF COMPLIANCE

CEQA

The project is considered to be ministerial under the District's CEQA Reg. 2-1-311 and therefore is not subject to CEQA review. The engineering review for this project requires only the application of fixed standards and objective measurements outlined in the Permit Handbook Chapter 2.1 (Boilers, Steam Generators, and Process Heaters).

Public School Notification

This application proposes a new source of TACs and is located within 1,000 feet of the outer boundary of the nearest K-12 school (with more than 12 children enrolled). Therefore, public notification pursuant to Reg. 2-1-412 is required. Mark Day School is an active, private K-8 school located within 1,000 feet of the proposed source with more than 12 students enrolled. Within a ¼-mi. radius of the proposed project are Vallecito Elementary School and Terra Linda High School as well. The school public notice will therefore be distributed on [DATE] to the parents and guardians of the students of the following schools as well as to addresses located within 1,000 feet of the facility:

Mark Day School, 39 Trellis Drive, San Rafael CA 94903
Vallecito Elementary School, 50 Nova Albion Way, San Rafael CA 94903
Terra Linda High School, 320 Nova Albion Way, San Rafael CA 94903

Offsets

Offsets are not required per Regulation 2-2-302 because the Plant's actual POC and NOx emissions are each less than 10 ton/yr.

Best Available Control Technology

In accordance with Reg. 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 criteria pollutants (POC, NPOC, NOx, CO, SO_2, PM_{10}, or $PM_{2.5}$).

BACT - Natural Gas Combustion

Criteria pollutant emissions per boiler sources S-11, S-12, and S-13 are each below the 10 lbs per highest day with the exception of CO when fired on natural gas fuel; therefore, BACT is triggered for CO during natural gas fuel usage. The BAAQMD BACT/TBACT Handbook for Boilers rated 5 to 33 MMBtu/hr heat input (Document 17.1.1, Rev 4, Dated 8/4/10) specifies BACT for CO as follows:

Pollutant	BACT 1. Technologically Feasible/ Cost Effective 2. Achieved in Practice	TYPICAL TECHNOLOGY
CO	1. 50 ppmv @ 3% O_2 Dry [a,e] 2. 50 ppmv @ 3% O_2 Dry, for Firetube Boilers[f] 100 ppmv @ 3% O_2 Dry, for Watertube Boilers [a,e]	1. Good Combustion Practice [a] 2. Good Combustion Practice [a]

BACT1 (technologically feasible and cost-effective) is specified as 50 ppmvd @ 3% oxygen via good combustion practice. BACT1 must be both technologically feasible and cost-effective. Per the applicant's intended use of S-11, S-12, and S-13 with variable load and dual-fuel requirements, a watertube boiler is necessary. A firetube boiler would not meet the applicant's operating specifications and would cost approximately 2x the cost and require 2x the footprint of a watertube boiler. The applicant submitted a letter from RF MacDonald (boiler supplier) dated July 29, 2020 certifying that for S-11, S-12, and S-13: "50 ppm CO

[is] not attainable in practice due to the dual fuel (natural gas / No. 2 oil) fired burners, and furnace geometry of watertube boilers" and that "no other manufacturer can meet these requirements" for this size rating (i.e. the BACT1 limit). Also, the application of a control technology for CO specifically, such as an oxidation catalyst, is not compatible with compact, auxiliary package burners. BACT1 is therefore deemed to be not technologically feasible for watertube boilers of this size rating.

BACT2 (achieved in practice) for CO is specified as 100 ppmvd @ 3% oxygen for watertube boilers, achieved via good combustion practice. The boiler manufacturer has certified that S-11, S-12, and S-13 can achieve 100 ppmvd @ 3% oxygen at all firing rates. Therefore, BACT is satisfied for natural gas combustion CO emissions.

BACT - Diesel Combustion

Criteria pollutant emissions per boiler sources S-11, S-12, and S-13 are each below the 10 lbs per highest day with the exception of NOx when fired on diesel fuel; therefore, BACT is triggered for NOx during diesel fuel usage. The BAAQMD BACT/TBACT Handbook does not specify a BACT determination for diesel-fueled boilers. In this case, BAAQMD guidance states that alternative candidates of BACT determination information may include the CAPCOA/CARB BACT Clearinghouse, the EPA BACT/LAER Clearinghouse, the South Coast Air Quality Management District (SCAQMD) BACT Guideline, determinations made by other air districts, and published, independently verified equipment performance and operating data.

The SCAQMD BACT Guidelines for Non-Major Polluting Facilities (i.e. minor facilities) specifies that oil-fired boilers comply with SCAQMD Rule 1146 or 1146.1 (as of 10-20-2000). Rule 1146 applies to boilers, steam generators, and process heaters equal to or greater than 5 MMBtu/hour rated heat input capacity used in all industrial, institutional, and commercial operation; Rule 1146.1 applies to boilers greater than 2 MMBtu/hour and less than 5 MMBtu/hour. Rule 1146 is therefore applicable to S-11, S-12 and S-13. Table 1146-1 contains NOx Emission Limits and Compliance Schedule; within this table (c)(1)(B) specifies that any units fired on non-gaseous fuels meet a NOx limit of 40 ppm. However, it is likely that a low-NOx fuel such as Amber 363 would be required to meet this NOx limit (as evidenced for example by SCAQMD BACT determination on App. No. 363025, dated 2/2/2000). However, Amber 363 is currently sold only by a Southern California petroleum distributor at locations between Bakersfield and San Diego and is therefore assumed to be impractical to purchase in Northern California.

The analogous regulation to SCAQMD Rule 1146 for BAAQMD jurisdiction is Regulation 9 Rule 7. The BACT recommendation is to follow all applicable requirements of Regulation 9, Rule 7 (further discussed on the next page). Therefore, BACT is satisfied for diesel combustion NOx emissions.

Particulate Matter (Regulation 6, Rule 1)

Boilers are subject to BAAQMD Regulation 6, Rule 1, limiting the quantity of particulate matter source emissions. Section 6-1-114 *Limited Exemption, Total Suspended Particulate (TSP) Emission Limits for Fuel Combustion* provides certain sources an exemption from Section 6-1-310.2 and 311.2 TSP standards; proposed sources S11, S-12 and S-13 boilers are gas-and liquid-fired indirect heat exchangers eligible for the Section 6-1-114.1 limited exemption. Below is a compliance summary for the applicable Regulation 6-1 standards. Note that Sections 6-1-303, 304, 306, 307, 320, and 330 do not apply to S-11, S-12 or S-13 based on their source type and size. Also, S-11, S-12 and S-13 are not subject to the monitoring and recordkeeping provisions in Section 6-1-500.

6-1-301: Except as provided in Sections 6-1-303, 304 and 306, a person shall not emit from any source for a period or aggregate period of more than three minutes in any hour, a visible emission that is as dark or darker than No. 1 on the Ringelmann Chart, or of such opacity as to obscure an observer's view to an equivalent or greater degree.
> S-11, S-12 and S-13 are expected to comply with this standard. A permit condition will be imposed to enforce compliance.

6-1-302: Except as provided in Sections 6-1-303, 304 and 306, a person shall not emit from any source for a period or aggregate period of more than three minutes in any hour an emission equal to or greater than 20% opacity.
> S-11, S-12 and S-13 are expected to comply with this standard. A permit condition will be imposed to enforce compliance.

6-1-305: No person shall emit particles from any operation in sufficient number to cause annoyance to any other person where the particles are large enough to be visible as individual particles at the emission point, or of such size and nature as to be visible individually as incandescent particles. This Section shall only apply if such particles fall on real property other than the property of the person responsible for the emission.
> S-11, S-12 and S-13 are expected to comply with this standard.

6-1-310 TSP Concentration Limits: 310.1 No person shall emit TSP from any source in excess of 343 mg per dscm (0.15 gr per dscf) of exhaust volume.
> S-11, S-12 and S-13 comply with the 0.15 gr/dscf limit with respect to both natural gas and diesel fuel combustion. Per AP 42, Table 1.4-2, the default PM10 emission factor for natural gas combustion is estimated at 7.6 E-06 lb/dscf flue gas exhaust which is equivalent to 0.05 gr/dscf (assuming 7000 grain/lb). For diesel operation, the PM emission rate is 3.3 lbs/1000 gal which is equivalent to 0.02 gr/dscf (assuming 7000 grain/lb, 0.14 MMBtu/gal, and 9190 dscf/MMBtu EPA F_d factor for oil).
> Note that Section 6-1-310.2 is not applicable per the 6-1-114.1 limited exemption.

6-1-311 TSP Weight Limits: 311.1 No person shall emit TSP from any source at a rate in excess of the limit indicated for the source's Process Weight Rate in Table 6-1-311.1. This section shall not apply to gas-, liquid- or solid-fuel fired indirect heat exchangers.
> This section does not apply to S-11, S-12 or S-13 boilers because they are gas- and liquid-fired indirect heat exchangers.
> Note that Section 311.2 is not applicable per the 6-1-114.1 limited exemption.

Inorganic Emissions (Regulation 9, Rule 7)

Boilers are subject to the requirements of BAAQMD Regulation 9 Inorganic Gaseous Pollutants, Rule 7 NOx and CO from Industrial, Institutional and Commercial Boilers, Steam Generators and Process Heaters.

Sources S-11, S-12 and S-13 are subject to the "Limited Exemption, Natural Gas Curtailment and Testing" provisions under Regulation 9-7-113. This section exempts the boilers from the emission limit requirements in 9-7-307 while burning non-gaseous fuel during a natural gas curtailment or during testing to verify readiness for curtailment, provided all the following conditions are met:

9-7-113.1: The device does not burn non-gaseous fuel for more than 168 hours in each consecutive 12-month period, plus 48 hours in each consecutive 12-month period for oil-burn readiness testing or state, federal or local agency-required performance testing.
> A standard permit condition will be imposed to ensure compliance with this requirement.

9-7-113.2: The device does not exceed a NOx exhaust concentration of 150 ppmv, dry at 3 percent oxygen.
> S-11, S-12 and S-13 are expected to meet this requirement as the manufacturer-guaranteed emission rate for NOx during diesel combustion is 85 ppmvd at 3% oxygen. A one-time testing event using a portable handheld monitor, will be required the next time that the site operates S-11, S-12 and S-13 on diesel fuel. A permit condition requiring such testing will be imposed to ensure compliance with this provision.

9-7-113.3: *The records specified in Section 9-7-503.3 are maintained.*
> As further discussed below, a standard permit condition will be imposed to ensure compliance with this requirement.

Also, Regulation 9-7-307.3 requires NO_x and CO emission limits of 15 and 400 ppmv (dry at 3% oxygen), respectively, for a boiler with a rated heat input of 10 to < 20 MMBtu/hour.
> Based on the manufacturer guaranteed emission rates, S-11, S-12 and S-13 are expected to comply with these limits. Therefore, Regulation 9-7-307.3 is satisfied.

Table 4. S-11, S-12 & S-13 NOx and CO Emission Rates (Manufacturer-Guaranteed), ppmvd @ 3% O_2 (Natural gas fuel)

Source	NOx	CO
S-11, S-12, S-13	15	100

Regulation 9-7-503 requires any person operating a source subject to Regulation 9 Rule 7 to keep records of the following items and retained for a minimum of 2 years from the date of entry:

9-7-503.1 Documentation verifying tune-ups performed in accordance with Sections 9-7-304.2 or 309.2.
> However, a standard permit condition will be imposed to ensure compliance with this requirement.

9-7-503.2 In the event that the limited exemption of Section 9-7-113 is invoked, documentation from the natural gas supplier verifying that natural gas was unavailable due to a natural gas curtailment.
> A standard permit condition will be imposed to ensure S-11, S-12 and S-13 are in compliance with this requirement.

9-7-503.3 Documentation verifying the hours of equipment testing using non-gaseous fuel, and of total operating hours using non-gaseous fuel during each calendar month.
> A standard permit condition will be imposed to ensure S-11, S-12 and S-13 are in compliance with this requirement.

9-7-503.4 The results of any testing required by Sections 9-7-403 or 506.
> A standard permit condition will be imposed to ensure S-11, S-12 and S-13 are in compliance with applicable requirement 9-7-506.

9-7-503.5 Digester gas-fired and landfill gas-fired devices operating under Section 9-7-307.7 shall maintain records of total operating hours and operating hours firing or co-firing digester or landfill gas.
> Sources S-11, S-12 and S-13 are not fired by digester gas or landfill gas; therefore, this provision does not apply.

Regulation 9-7-506 requires periodic emissions testing every calendar year for sources subject to emission limits set forth in Section 9-7-307.3. Testing must be conducted in accordance with Sections 9-7-601, -602, or using a portable analyzer in accordance with 9-7-606.
> A standard permit condition will be imposed to ensure S-11, S-12 and S-13 are in compliance with this requirement.

New Source Performance Standards (NSPS)

A boiler may be subject to the NSPS, if it is used as steam generating unit for which construction, modification, or reconstruction is commenced after June 9, 1989 and it has a maximum design heat input capacity of 29 megawatts (MW) (100 million Btu per hour (Btu/hr)) or less, but greater than or equal to 2.9 MW (10 million Btu/hr). Sources S-11, S-12 and S-13 are each rated at 9.999 MM Btu/hr and therefore not subject to 40 CFR 60, Subpart Dc, Standards of Performance for Industrial/Commercial/Institutional Steam Generating Units (Small). Subpart Dc only applies to equipment constructed after June 9, 1989 and it has a maximum design heat input capacity less than 100 MMBtu but greater than or equal to 10 MMBtu/hour.

National Emission Standards for Hazardous Air Pollutants (NESHAPs)

EPA finalized the NESHAPS for Area Sources: Industrial, Commercial, and Institutional Boilers, 40 CFR Part 63 Subpart JJJJJJ on March 21, 2011 and finalized amendments on February 1, 2013 and September 14, 2016. This rule applies to existing and new industrial boilers, institutional boilers, and commercial boilers located at area sources of hazardous air pollutants. Area sources are facilities that emit or have the potential to emit less than 10 tons per year of a single hazardous air pollutant, or less than 25 tons per year of combined hazardous air pollutants. Gas-fired boilers, which burn gaseous fuel not combined with any solid fuels and only burn liquid fuel during periods of gas curtailment, gas supply interruption and periodic testing, maintenance, or operator training up to 48 hours per year, are not covered under the rule. [See 40 CFR § 63.11237 (definition of "Gas-fired boiler")]. Therefore, NESHAPs are not triggered.

Other

PSD is not triggered.

PERMIT CONDITIONS

Application # 30617: Kaiser Permanente San Rafael Medical Center, Plant #3947: Conditions for S-11, S-12 & S-13

Condition #: 27290

Note: In addition to the following conditions, the permit holder of Sources S-11, S-12 and S-13 shall comply with all applicable requirements of Regulation 9, Rule 7.

1. The owner/operator shall burn only natural gas at Sources S-11, S-12 and S-13 except during periods of natural gas curtailment or during short test periods as allowed under Regulation 9-7-113.1. [Basis: Cumulative Increase, Regulation 9-7-113].

2. The owner/operator shall not use more than 2,628,000 therms of natural gas at Sources S-11, S-12 and S-13 during any consecutive twelve-month period. [Basis: Cumulative Increase]

3. For each boiler, the owner/operator may burn non-gaseous fuel for up to 168 hours in each consecutive 12-month period during periods of natural gas curtailment, plus up to 48 hours in each consecutive 12-month period for oil-burn readiness testing or state, federal, or local agency-required performance testing [Basis: Regulation 9-7-113.1].

4. The owner/operator shall not emit from any source for a period or periods aggregating more than three minutes in any hour, a visible emission which is as dark or darker than No. 1 on the Ringelmann Chart or of such opacity as to obscure an observer's view to an equivalent or greater degree. [basis: Regulation 6-1-301]

5. The owner/operator shall not emit from any source for a period or periods aggregating more than three minutes in any hour, an emission equal to or greater than 20% opacity. [basis: Regulation 6-1-302]

6. The owner/operator shall ensure that NOx emissions from Sources S-11, S-12 and S-13 do not exceed 15 ppmv at 3% oxygen, dry basis, when firing natural gas. [Basis: Regulation 9, Rule 7-307.3, Cumulative Increase]

7. The owner/operator shall ensure that CO emissions from Sources S-11, S-12 and S-13 do not exceed 100 ppmv at 3% oxygen, dry basis, when firing natural gas. [Basis: Regulation 9, Rule 7-307.3, BACT, Cumulative Increase]

8. To demonstrate compliance with the above emissions limitations in Parts 6 and 7, the owner/operator shall initiate periodic emissions testing of each boiler (at minimum and maximum loads) at least once every calendar year. Such testing may be conducted either by source testing performed in compliance with the District's Manual of Procedures, or by use of a portable analyzer that meets the specifications and testing protocols set out in Regulation 9, Rule 7-606. [Basis: Regulation 9-7-506]

9. The owner/operator shall ensure that NOx emissions from Source S-11, S-12 and S-13 do not exceed 85 ppmv at 3% oxygen, dry basis, when firing diesel fuel. [Basis: Cumulative Increase, Regulation 9-7-113.2]

10. To demonstrate compliance with the above emissions limitation in Part 9, the owner/operator shall complete a one-time emissions test of the boilers the next time diesel fuel is fired. Such testing may be conducted either by source testing performed in compliance with the District's Manual of Procedures, or by use of a portable analyzer that meets the specifications and testing protocols set out in Regulation 9, Rule 7-606. [Basis: Regulation 9-7-113.2]

11. The owner/operator shall install and maintain a non-resettable totalizing fuel meter for both natural gas and non-gaseous fuel, unless the permit holder applies for and receives written approval from the District to use an alternative method for measuring the cumulative annual fuel usage. [Basis: Cumulative Increase]

12. The owner/operator shall maintain records of the following:
    a. Total monthly natural gas usage for each boiler and a summary of natural gas usage in therms for each boiler for each consecutive rolling twelve-month period.
    b. Dates and times that non-gaseous fuel was used at each boiler and the reason for each event, and total operating hours using non-gaseous fuel during each calendar month.
    c. For each natural gas curtailment event in which non-gaseous fuel is used at S-11, S-12 and/or S-13, documentation from the natural gas supplier verifying that natural gas was unavailable due to a natural gas curtailment.
    d. Documentation verifying annual boiler tune-ups.
    e. Copies of the results of all monitoring and source testing events conducted at each boiler.

    The owner/operator shall retain these records for at least two years from date of entry and shall make these records available to District staff upon request. [Basis: Cumulative Increase; Regulation 9, Rule 7]

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 source will be located within 1,000 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 an Authority to Construct/Permit to Operate for the following sources:

S-11 Boiler, Cleaver Brooks, Flexible Watertube FLE(FLX)-200-999-160HW, Multi-fuel, Natural Gas 9.999 MMBtu/hr & No. 2 Fuel Oil (Diesel) 68 gal/hr

S-12 Boiler, Cleaver Brooks, Flexible Watertube FLE(FLX)-200-999-160HW, Multi-fuel, Natural Gas 9.999 MMBtu/hr & No. 2 Fuel Oil (Diesel) 68 gal/hr

S-13 Boiler, Cleaver Brooks, Flexible Watertube FLE(FLX)-200-999-160HW, Multi-fuel, Natural Gas 9.999 MMBtu/hr & No. 2 Fuel Oil (Diesel) 68 gal/hr

_____ Date: _____

Caryn Quist, P.E.
Air Quality Engineer