South Coast
Air Quality Management District
21865 Copley Drive, Diamond Bar, CA 91765-4178
(909) 396-2000 · www.aqmd.gov

DOCKET
09-AFC-7
DATE MAR 04 2010
RECD. MAR 10 2010

March 4, 2010

Mr. Alan Solomon
Project Manager
California Energy Commission
1516 9th Street MS-15
Sacramento, CA 95814-5512

Subject: Palen Solar Power Project (09-AFC-7) to be located off Corn Spring Road, Desert Center, CA 92239

Dear Mr. Solomon:

This letter is to inform you that the South Coast Air Quality Management District (AQMD) has completed our analysis of the proposed project as described above. Attached for your review is a Preliminary Determination of Compliance (PDOC) that includes the AQMD's engineering analysis.

The proposed facility will be a new non-major stationary source. The final permit to construct is contingent on the CEC approval of the project. In addition, based on the information submitted with the applications, the project as described will comply with the applicable Rules and Regulations of the AQMD.

If you have any questions or wish to provide comments regarding this project, please call Mr. Kenneth L. Coats (909) 396-2527 or Mr. John Yee (909) 396-2531.

Very truly yours,

Mohsen Nazemi, P.E.
Deputy Executive Officer
Engineering and Compliance

MDM:MYL:JTY:klc
Attachments

cc: Mr. Russel Kingsley, AECOM

CERTIFIED MAIL
Return Receipt Required

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|---|---|---|
| | APPLICATION NO.<br>502597 (Master File) | DATE<br>1-19-2010 |
| | PROCESSED BY:<br>Ken Coats | REVIEWED BY: |

# PALEN SOLAR ELECTRIC POWER PROJECT
# PRELIMINARY DETERMINATION OF COMPLIANCE

COMPANY NAME AND ADDRESS

Palen Solar Power I, LLC
1625 Shattuck Avenue, Suite 270
Berkeley, CA 94709

EQUIPMENT LOCATION

Corn Spring Road
Desert Center, CA 92239

Contact: Ms. Elizabeth Ingram (510) 809-4663
AQMD Facility ID: 163054

EQUIPMENT DESCRIPTION

SOLAR-ELECTRIC POWER GENERATING FACILITY CONSISTING OF:

A/N 506828
BOILER, AUXILLIARY STEAM, NEBRASKA, MODEL NB-201D-45-SH, 35 MMBTU/HR, WATER TUBE, PROPANE FIRED, 29,000 LB/HR STEAM AT 165 PSIG, 480 DEGREES FAHRENHEIT, EQUIPPED WITH A CB NATCOM, MODEL NO. (TBD) ULTRA-LOW NOx RAPID MIX BURNER.

A/N 506834
BOILER, AUXILLIARY STEAM, NEBRASKA, MODEL NB-201D-45-SH, 35 MMBTU/HR, WATER TUBE, PROPANE FIRED, 29,000 LB/HR STEAM AT 165 PSIG, 480 DEGREES FAHRENHEIT, EQUIPPED WITH A CB NATCOM, MODEL NO. (TBD) ULTRA-LOW NOx RAPID MIX BURNER.

A/N: TBD
INTERNAL COMBUSTION ENGINE, EMERGENCY, 2,922 BHP, CUMMINS, DIESEL FUELED, LEAN BURN, FOUR CYCLE, MODEL NO. QSK60-G6, TURBOCHARGED AND AFTERCOOLED, DRIVING AN ELECTRICAL GENERATOR RATED AT 2.18 MW

A/N: TBD
INTERNAL COMBUSTION ENGINE, EMERGENCY, 2,922 BHP, CUMMINS, DIESEL FUELED, LEAN BURN, FOUR CYCLE, MODEL NO. QSK60-G6, TURBOCHARGED AND AFTERCOOLED, DRIVING AN ELECTRICAL GENERATOR RATED AT 2.18 MW.

A/N 506831
INTERNAL COMBUSTION ENGINE, EMERGENCY, 300 BHP, DIESEL FUELED, CATERPILLAR, MODEL NO. 9CPXL08.8ESK, LEAN BURN, FOUR CYCLE, TURBOCHARGED AND AFTERCOOLED, DRIVING A FIRE PUMP.

A/N 506836
INTERNAL COMBUSTION ENGINE, EMERGENCY, 300 BHP, DIESEL FUELED, CATERPILLAR, MODEL NO. 9CPXL08.8ESK, LEAN BURN, FOUR CYCLE, TURBOCHARGED AND AFTERCOOLED, DRIVING A FIRE PUMP.

A/N 506829
STORAGE TANK, HEAT TRANSFER FLUID, 15,900 GALLONS, HEIGHT: 22 FEET; DIAMETER: 12 FEET, VENTED TO AN ACTIVATED CARBON ADSORPTION SYSTEM WITH TWO CANISTERS IN SERIES, CAPACITY: 2,000 POUNDS.

A/N 506833
STORAGE TANK, HEAT TRANSFER FLUID, 15,900 GALLONS, HEIGHT: 22 FEET; DIAMETER: 12 FEET, VENTED TO AN ACTIVATED CARBON ADSORPTION SYSTEM WITH TWO CANISTERS IN SERIES, CAPACITY: 2,000 POUNDS.

A/N 506827
LAND TREATMENT UNIT, SOIL REMEDIATION AREA, LENGTH: 800 FEET; WIDTH: 200 FEET

BACKGROUND / HISTORY
The Palen Solar Power Project (PSPP) is a new facility which will be located in the Southern California inland desert, off of Corn Spring Road, approximately 10 miles east of Desert Center in eastern Riverside County. The project site will occupy 2,970 acres of public lands owned by the Federal Government. PSPP was originally submitted to AQMD as two separate facilities, each with identical equipment. The two original companies involved with the project were Solar Millennium LLC (AQMD ID No. 161483) and Chevron Energy Solutions (AQMD ID No. 161484). Although both companies were separate facilities with separate AQMD ID numbers, both companies in a joint venture, were proposing to construct and operate a 500 MW solar-thermal-electric power generating facility, with each facility adjacent to the other, and each rated at 250 MW. Table 1 below shows the original applications for Permit to Construct, submitted by both Chevron Energy Solutions and Solar Millennium, LLC and the corresponding equipment descriptions and permit processing fees. Neither facility requested expedited permit processing under Rule 301(u).

Table 1: Original Applications for Permit to Construct

| Company | A/N | Equipment Description | Processing Fee |
|---|---|---|---|
| Chevron Energy Solutions | 502597 | Boiler, 35 MMBTU/hr | $4,478.51 |
| | 502598 | Heater, 35 MMBTU/hr | $4,478.51 |
| | 502601 | Emergency Fire Pump, 300 bhp | $3,244.91 |
| | 502602 | Emergency Electrical Generator, 300 bhp | $3,244.91 |
| | 502599 | Storage Tank / Ullage System | $4,478.51 |
| | 502600 | Carbon Adsorption System | $3,244.91 |
| | | **TOTAL FOR CHEVRON ENERGY SOLUTIONS** | $23,170.26 |
| Solar Millennium, LLC | 502590 | Boiler, 35 MMBTU/hr | $4,478.51 |
| | 502591 | Heater, 35 MMBTU/hr | $4,478.51 |
| | 502594 | Emergency Fire Pump, 300 bhp | $3,244.91 |
| | 502595 | Emergency Electrical Generator, 300 bhp | $3,244.91 |
| | 502580 | Storage Tank / Ullage System | $4,478.51 |
| | 502592 | Carbon Adsorption System | $3,244.91 |
| | 502593 | Land Treatment Unit | $4,478.51 |
| | | **TOTAL FOR SOLAR MILLENNIUM, LLC** | $27,648.77 |

The applications for both facilities listed in Table 1 above were initially deemed data inadequate on October 21, 2009 (see letters in engineering file) because the required processing fees submitted with the application package were insufficient and information pertaining to the specific equipment was also not included. The correct fees were submitted to the AQMD and AQMD agreed to deem the applications data adequate on October 23, 2009 (see letters in engineering file) with the understanding that the equipment specific information requested by AQMD would be submitted as it became available.

On February 2, 2010, AQMD was notified by AECOM, the applicant's consultant, that PSPP has underwent a change of ownership and the new owner, Palen Solar I, LLC, plans to combine the two facilities into one, eliminate the HTF heaters, increase the ratings of both electrical generators from 300 bhp to 2,922 bhp, and own and operate all of the equipment. New applications were submitted under Palen Solar I, LLC and a new facility ID and application numbers are pending. The applications for the previous two owners, listed in Table 1 above, will be cancelled and the permit processing fees will be adjusted to reflect the proposed changes to the equipment.

Processing Fee Summary

The two boilers are identical and therefore, one of the boilers receives a 50% discount off of the original processing fee. In addition, both of the emergency fire pump ic engines and both of the emergency electrical generator ic engines are identical and therefore two of these devices receives a 50% discount off of the original processing fee. The total fees are shown in table 2 below.

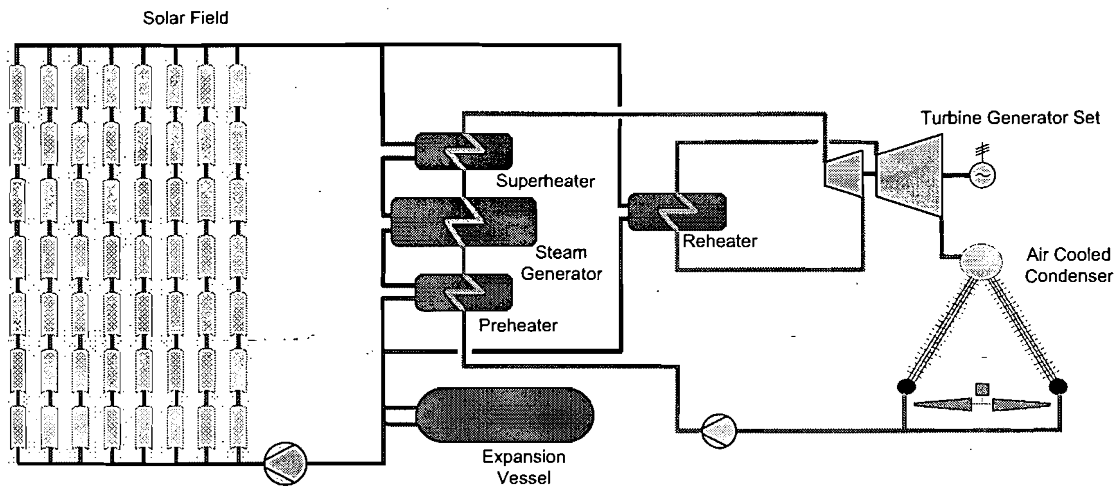
Table 2 - Summary of Permit Processing Fees for Palen Solar I, LLC

| A/N | Submittal Date | Data Adequate | Equipment | Schedule | Processing Fee |
|---|---|---|---|---|---|
| TBD | TBD | TBD | Boiler, 35 MMBTU/hr | D | $4,478.51 |
| TBD | TBD | TBD | Boiler, 35 MMBTU/hr | D | $2,239.26 |
| TBD | TBD | TBD | IC Engine, 2,922 BHP,Emergency Power | B | $2,051.52 |
| TBD | TBD | TBD | IC Engine, 2,922 BHP,Emergency Power | B | $1,025.76 |
| TBD | TBD | TBD | IC Engine, 300 BHP, Emergency Fire Pump | B | $2,051.52 |
| TBD | TBD | TBD | IC Engine, 300 BHP, Emergency Fire Pump | B | $1,025.76 |
| TBD | TBD | TBD | Storage Tank / Ullage System | C | $3,244.91 |
| TBD | TBD | TBD | Carbon Adsorption System | C | $3,244.91 |
| TBD | TBD | TBD | Land Treatment Unit | D | $4,478.51 |
| | | | | TOTAL | $23,840.66 |

PROCESS DESCRIPTION

PSPP will use solar parabolic trough technology to generate electricity. Arrays of parabolic mirrors focus solar radiation on a receiver tube located at the focal point of the parabola to collect heat energy. Heat transfer fluid (HTF) is heated to approximately 750 degrees F as it circulates through the receiver tubes. The heated HTF is then piped through a series of heat exchangers where it releases its stored heat to generate high pressure steam. The steam is next piped to a traditional steam turbine generator (STG) where electricity is produced. The electrical output of the plant is therefore produced strictly by the use of solar energy, and no fossil fuels will be used for electricity production. The thermodynamic cycle is illustrated in below and described in the steps which follow:

Figure 1 - Thermodynamic Cycle for PSPP




In Figure 1 above, HTF flows from the top to the bottom of the figure, arriving from the solar field and transferring heat in the superheater and reheater, then to the solar steam generator (SSG) and lastly in the preheater before returning to the solar field to be heated again. The steps below illustrate the fluid flow for both the HTF and the power-cycle working fluid (water) in the thermodynamic cycle of Figure 1:

Step 1
Water from the de-aerator and feedwater heaters is pumped from low to high pressure and piped to the solar preheater. HTF provides heat to the preheater which heats the feedwater to its saturation temperature.

Step 2
The high pressure saturated water enters the SSG where it is heated by warmer HTF. The water boils and exits as saturated steam.

Step 3
The saturated steam flows through to the superheater where hot HTF takes the saturated steam at constant pressure up to higher temperature prior to being fed to the high pressure (HP) section of the steam turbine.

Step 4
The superheated steam expands through the HP section of the steam turbine turning the generator to produce electricity.

Stem 5
The steam let down from the turbine's HP section is then reheated in a solar reheater which is fed with hot HTF. The reheated steam is then fed to the intermediate pressure (IP) section of the steam turbine.

Step 6
The IP steam exhausts into the low pressure (LP) section of the steam turbine. All sections of the STG decrease the temperature and pressure of the steam, with the LP section extracting the last available power from the steam.

Step 7
The wet steam from the LP section then enters the air-cooled condenser (ACC) where it is cooled at a constant low pressure to become a saturated liquid. The condensed liquid returns to the feedwater heater train and the beginning of the steam cycle to begin the process again.

Electrical power will be generated only during daylight hours. The solar plant will operate according to the following operational modes:

Stand-by
A propane-fired auxiliary boiler rated at 35 MMBTU/hr and a capacity of 25,000 lb/hr steam provides steam for maintaining steam cycle equipment vacuum overnight and for start-up. Steam generated by the auxiliary boiler will be at a relatively low pressure, approximately 165 psig. Sealing steam is used to prevent air from entering the steam turbine while the condenser is under vacuum. This method reduces start-up time for the plant compared to relying on solar generated steam as the sealing steam source. Unlike a gas fired power plant, a solar thermal plant must wait for the sun to rise to start generating steam and has a finite time to generate electricity. If the plant does not have a secondary source of steam, plant start-up will be delayed and the total daily electrical generation will be reduced. By using the auxiliary boiler as a secondary source of sealing steam (the primary source being the sun), daily start-up times can be reduced by up to 60 minutes. Conservatively assuming the the STG is on-line 30 minutes sooner each day, at a minimum of 25 MW, 350 days per year yields an additional 4,500 MW-hr of renewable energy each year.

Warm-up
In the mornings, this mode brings the HTF flow rate and temperatures up to their steady state operating conditions by positioning all required valves, starting the required numbers of HTF main pumps for establishing a minimum flow within the solar field, and tracking the solar field collectors into the sun. Normal operational conditions (565 degrees F at solar field inlet and 739 degrees F at solar field outlet) are usually achieved within 30 minutes or less. At the beginning of warm-up, HTF is circulated through a bypass around the power block heat exchangers until the outlet temperature reaches the residual steam temperature in the heat exchangers. HTF is then circulated through the heat exchangers and the bypass is closed. As the HTF temperature at the solar field outlet continues to rise, steam pressure builds up in the heat exchangers until the minimum turbine inlet conditions are reached, at which time the turbine is started and run up to speed. The turbine is synchronized and loaded according to the design specification until its power output matches the full steady state solar field thermal output.

Solar Field Control Mode
The Distributed Control System (DCS), which coordinates and integrates power block, HTF system and solar field operation, automatically enters the solar field control mode after completing the warm-up mode. It regulates the flow by controlling the HTF main pump speeds to maintain the solar field outlet temperature of 739°F. Several HTF pumps will generally be operated in parallel at the speed required to

provide the required flow in the field, but in exceptional cases (e.g., during maintenance), lower numbers of pumps may be used alone, providing up to 70 percent of full flow at nominal pump capacity. If the thermal output of the solar field is higher than the capacity of the steam generation system, collectors within the solar field are de-focused to maintain design operating temperatures

Shutdown

If the minimal thermal input to the turbine required by the operating strategy cannot be met under the prevalent weather conditions, then shutdown is indicated. Operators would track all solar collectors into the stow position, reduce the number of HTF main pumps to a minimum, and stop the HTF flow to the power block heat exchangers.

Freeze Protection

To avoid the problem of HTF freezing, one or both of the auxiliary boilers will be used to ensure system temperature stays above 54°F whenever the solar field is off-line. A freeze protection system will be used to prevent freezing of the HTF piping systems during cold winter nights. Since the HTF freezes at a relatively high temperature, warm HTF will be circulated at low flow rates from the boiler(s) through the solar field.

The following is a description of the major energy conversion components of the PSPP, including the solar collection system, SSG, STG, auxiliary boilers, and HTF freeze protection heat exchanger. The PSPP will be a parabolic trough solar power plant that has a nominal (gross) output of 500 MW. The plant will consist of a conventional steam Rankine-cycle power block, a parabolic trough solar field, a HTF system and steam generation system, as well as a variety of ancillary facilities (sometimes referred to collectively as "balance-of-plant" [BOP]), such as water treatment, electrical switchgear, administration, warehouse, and maintenance facilities, etc

Solar Collector Assemblies

The solar field will be a modular, distributed system of solar collector assemblies (SCAs) connected in a series-parallel arrangement via a system of insulated pipes. The collectors will be equipped with a sun tracking mechanism that moves the reflecting panels toward the sun to the optimum angle for solar energy collection. The SCAs are oriented north-south to rotate east-west to track the sun as it moves across the sky throughout the day. HTF will flow from the HTF pumping area in the power block to the cold HTF header that distributes it to the collector loops of SCAs in the solar field. The SCAs collect heat by means of linear troughs of parabolic reflectors which focus sunlight onto a straight line of heat collection elements (HCEs) welded along the focus of the parabolic trough. The HCE is mounted on a mechanical support system that includes a steel support structure, pylons and bearings. Each SCA includes local measurement instrumentation, a hydraulic drive system, and a controller which independently tracks the sun to maintain mirror focus on the HCEs, and protects the HCEs from overheating.

Mirrors

The parabolic mirrors to be used in the Project are low-iron glass mirrors, and are known to be one of the most reliable components in the solar collection assemblies. No long-term degradation of the mirrors has been observed, and older mirrors can be brought back to nearly full reflectivity with simple cleaning. Typical life spans of the reflective mirrors are expected to be 30 years or more.

Heat Collection Elements

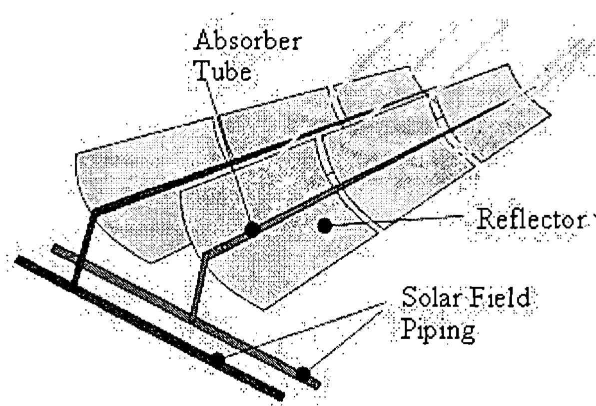
The HCEs of the solar plant are comprised of steel tubes surrounded by evacuated glass tube insulators. The steel tube has a coated surface which enhances its heat transfer properties with a high absorptivity for direct solar radiation, accompanied by low emissivity. Glass to metal seals and metal bellows are incorporated into the HCE to ensure a vacuum-tight enclosure. The enclosure protects the coated surface and reduces heat losses by acting as an insulator.

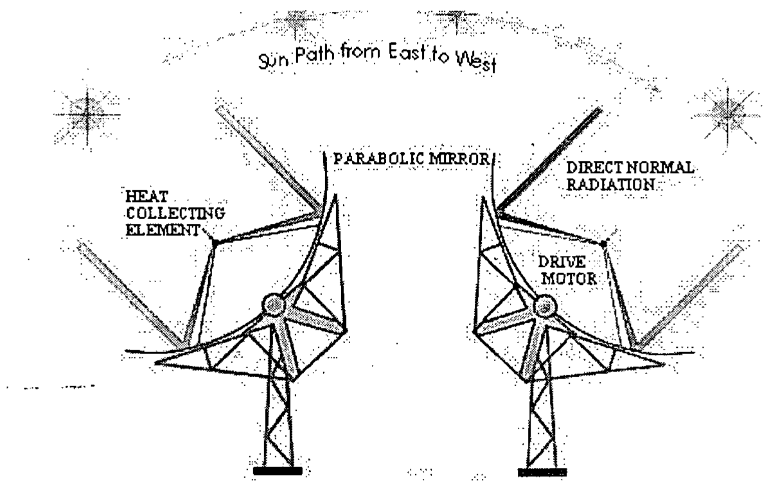
The glass tube cylinder has anti-reflective coating on both the inner and outer surfaces to reduce reflective losses off the glass tube, thereby increasing the transmissivity. Usually, to maintain the tube's insulating properties, getters, or scavengers, are installed in the vacuum space to absorb hydrogen and other gases that may permeate into the vacuum cylinder over time.

Parabolic Trough Collector Loop

Each of the collector loops consist of two adjacent rows of SCAs, each row about 1,300 feet long. The two rows are connected by a crossover pipe. HTF is heated in the loop and enters the hot header, which returns hot HTF from all loops to the power block where the steam generating equipment is located. In normal operation, HTF enters the field at 565°F and leaves the field at 739°F.

The following illustrations depict the components of the solar collection assembly.






HTF Expansion Tanks / Ullage System

The HTF system collectively consists of the HTF piping, a 15,900-gallon storage tank, an expansion tank, four or more overflow vessels (the exact number is currently under evaluation), and an ullage system to capture, recover, and recondition the HTF. The ullage system consists of several vessels, as explained below. The HTF piping system includes the valves, flanges, pumps, pressure relief devices that would potentially emit fugitive VOC emissions. The HTF is a liquid synthetic hydrocarbon mixture of diphenyl ether and biphenyl. Similar formulations are marketed by different manufacturers under the names of Therminol® or Dowtherm®. It has a freeze point of about 54°F.

Expansion Tanks

Thermal HTF expansion is accommodated in the expansion vessel – a pressurized tank with nitrogen blanketing. With rising HTF temperatures, HTF in the expansion vessel reaches its design working level and overflows into four overflow vessels. With falling HTF temperatures, one of four overflow return pumps supplies HTF from the overflow vessels back into the expansion vessel.

PSPP will be equipped with four expansion tanks and sixteen overflow tanks. The expansion vessels are elevated to provide net positive suction head to the HTF main pumps. Expansion vessels have approximately 5,000 cubic feet ($ft^3$) of fillable volume and are 37 feet long and 14 feet in diameter. Overflow vessels have approximately 18,000 $ft^3$ of fillable volume and are 110 feet long and 15 feet in diameter. Each expansion vessel is supported about six meters above finish grade on a steel frame structure which may be integrated into the HTF pumping area pipe support rack. The four overflow vessels are located side-by-side below each of the expansion vessel. Underneath all HTF vessels is a concrete containment pit sized to accommodate the entire volume of HTF in all vessels when full. The pit is also the central drain location for fugitive HTF leaks in the HTF pumping and handling area of the plant. The pit basin is drained by a sump pump to a collection tank that is regularly emptied and transported offsite for recycling and reprocessing. The collection tank has a design capacity of 2,200 $ft^3$. Some internal structures within the expansion vessel allow distribution of feed HTF to the ullage system for stripping of gaseous contamination of low boiling point HTF degradation products such as benzene and removal of high boiling point residuals.

Ullage System

Each ullage system will utilize a 2-stage condensing system to reclaim usable HTF liquids and carbon filtration to control emissions of HTF low-boiling derivates. The mixture of gas (i.e., nitrogen and hydrocarbon vapors) from the expansion vessel enters the ullage system via ullage vessel #1. The HTF vapor within the mixture condenses and is recirculated to the HTF loop. If necessary, the HTF content of the first ullage vessel is cooled by recirculation through an air cooler. Leaving the first ullage vessel, residual mixture of gas enters the second ullage vessel, where it will be further condensed. The second ullage vessel is 15 feet tall and 8 feet in diameter with a capacity of approximately 600 $ft^3$. The content of the second ullage vessel is cooled by recirculation through a second air cooler. By cooling, the hydrocarbons within the gaseous mixture condense to a large extent and are collected in the ullage drain vessel. Residual gaseous components are vented to the vessel pit through an active carbon adsorption system reducing VOC concentration by 98 percent, or more. The volume of collected liquid residuals and vented gas will depend upon the final operating temperature during the previous day of operation and the temperature of the system overnight. The liquid residuals are stored in a reclamation drain vessel with a capacity of approximately 350 $ft^3$. Emissions to atmosphere from the ullage vent will be limited to 1.5 pounds per day, vented from the second ullage vessel at predefined intervals ranging between one to three days. To maintain sufficient system pressure within the HTF cycle, nitrogen is introduced simultaneously with the venting.

Solar Steam Generator System

The SSG system transfers the latent heat from the HTF to the feedwater. The steam generated in the SSG is piped to a Rankine-cycle reheat steam turbine. Heat exchangers are included as part of the SSG system to preheat and boil the condensate, superheat the steam, and reheat the steam. Steam from the SSG is sent to the STG. The steam expands through the STG turbine blades to drive the steam turbine, which in turn drives the generator, converting mechanical energy to electrical energy. The Project's STG is expected to be a three-stage casing type with HP, IP and LP steam sections. The STG is equipped with accessories required to provide efficient, safe, and reliable operation.

Steam Cycle Heat Rejection System

The cooling system for heat rejection from the steam cycle consists of a forced draft air-cooled condenser (ACC) or "dry cooling" system. The dry cooling system receives exhaust steam from the LP section of the STG and condenses it to liquid for return to the SSG. There will be two ACC units for the PSPP

Land Treatment Unit

The PSPP will use a land treatment unit (LTU) to bio-remediate soil contaminated with HTF. The LTU will be designed in accordance with Regional Water Quality Control Board requirements including the use of multiple High Density Polyethylene (HDPE) liners and a leachate collection and removal system (LCRS). The LTU is expected to comprise an area of about 8 acres. In a passive mode (i.e., landfarming), the LTU would utilize indigenous bacteria to digest hydrocarbons contained in HTF-contaminated soil. If enhanced bioremediation is needed, nutrients including nitrogen and phosphorus would be added in addition to water and aeration to enhance the bacterial activity within the contaminated soil. The soil would remain in the LTU until HTF concentrations are reduced to an average concentration of less than 100 milligrams of HTF per kilogram of soil, typically within two to three months.

OPERATING SCHEDULE

Power generation will only occur during daylight hours. The number of hours per day will vary according to the season. The operating schedule for the emissions units vary from the hours of operation of the power generating facilities, depending on the function of the equipment. The operating schedules for the emissions units are described below

- The auxiliary boilers are used for startup of the steam turbine. On a normal operating day, full-load boiler operation for startup will last less than two hours. The boiler will also be operated approximately 15 hours per day in stand-by mode at 25 percent load.
- The HTF expansion tanks are in use 24 hours per day providing room for HTF expansion and contraction; however, they are vented to atmosphere (through controls) only two hours per day, or less, as the HTF heats and expands during startup. The remainder of the day the HTF tanks are closed to atmosphere and act only as surge tanks. Total annual duration of venting is expected to be 400 hours per year.
- The cooling towers will operate during the same hours as the solar collectors because the cooling tower is required for the steam cycle, estimated at 16 hours per day and 3,700 hours per year.
- The fire water pump engines will be readiness tested once per week for a period not to exceed one hour, with annual operation not to exceed 50 hours. Emergency use of the engine is restricted to 200 hours per year.
- The emergency generator engines will be readiness tested once per week for a period not to exceed one hour, with annual operation not to exceed 50 hours. Emergency use of the engine is restricted to 200 hours per year.

A plant layout diagram is shown on the next page.

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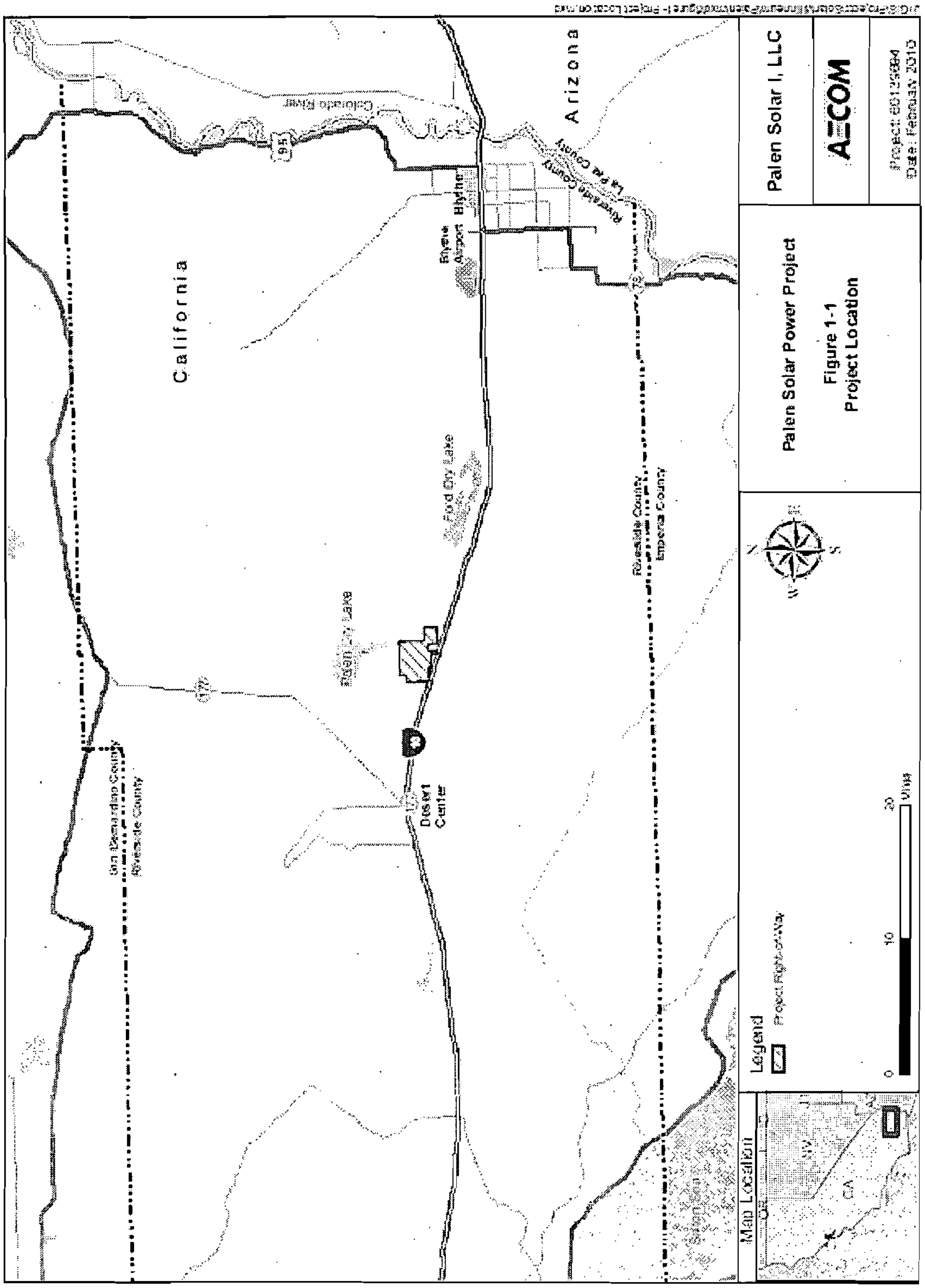
| | PROCESSED BY:<br>Ken Coats | REVIEWED BY: |



Palen Solar Power Project
Figure 1-1
Project Location

EMISSIONS

This section provides an overview of the assumptions and calculation methods used to estimate equipment emissions. PSPP will operate the following devices at the site:

- Two 35-MMBtu/hr propane-fired auxiliary boilers used for start up and freeze protection;
- Two 300-hp diesel-fired emergency fire water pump engines;
- Two 2,922-hp diesel-fired emergency generator engines; and
- Two HTF expansion/ullage system, including fugitive emissions.
- A single LTU to manage HTF-contaminated soil will also be used.

Auxiliary Boilers

The auxiliary boilers will be operated under the following assumptions and are the basis for emission calculations

- Propane will be the only fuel used by the boilers;
- Boilers will be equipped with ultra-low-NOx (9 parts per million by volume) burners;
- Daily operation of each boiler will be limited to 15 hours per day at 25 percent load and two hours per day at full load;
- Annual operation of each boiler will be limited to 5,000 hours per year with a duty cycle of 10 percent at full load and 90 percent at 25 percent load;
- 100 percent of the PM10 emissions are PM2.5; and
- Maximum controlled emissions are equivalent to maximum uncontrolled emissions because the auxiliary boilers will not be equipped with add-on controls.

The criteria pollutant emission factors used for the NOx and CO emission estimates are based on the current BACT requirements of ≤ 9 ppmv and ≤ 50 ppmv respectively, each at 3% O2, dry basis. The BACT Guidelines for Minor Sources indicates no BACT requirements for VOC and the use of natural gas for PM10. The PM10 and VOC emission factors are based on vendor performance warranties, and the SOx emission factor was taken from the SCAQMD 2008 Annual Emission Report General Instruction Book for external propane combustion. Boiler criteria pollutant emissions for a single boiler are shown in Table 2 below. .

**Table 2: Auxiliary Boiler Criteria Polluant Emissions (One Boiler)**

| Pollutant | Hourly Emissions (lb/hr) | Maximum Hourly (lb/hr) | Maximum Daily (lb/day) | Annual (lb/yr) | 30-DA[1] (lb/day) |
|---|---|---|---|---|---|
| NOx | 0.07 | 0.39 | 2.24 | 632 | 1.78 |
| VOC | 0.03 | 0.18 | 1.01 | 284 | 0.79 |
| CO | 0.24 | 1.31 | 7.56 | 2,137 | 5.94 |
| PM10 | 0.06 | 0.35 | 2.01 | 569 | 1.58 |
| PM2.5 | 0.06 | 0.35 | 2.01 | 569 | 1.58 |
| SOx | 0.03 | 0.40 | 2.27 | 283 | 0.79 |

**Table 3: Auxiliary Boiler Criteria Polluant Emissions (Two Boilers)**

| Pollutant | Hourly Emissions (lb/hr) | Maximum Hourly (lb/hr) | Maximum Daily (lb/day) | Annual (lb/yr) | 30-DA[1] (lb/day) |
|---|---|---|---|---|---|
| NOx | 0.14 | 0.78 | 4.48 | 1,264 | 3.51 |
| VOC | 0.06 | 0.36 | 2.02 | 568 | 1.58 |
| CO | 0.48 | 2.62 | 15.12 | 4,274 | 11.87 |
| PM10 | 0.12 | 0.70 | 4.02 | 1,138 | 3.16 |
| PM2.5 | 0.12 | 0.70 | 4.02 | 1,138 | 3.16 |
| SOx | 0.06 | 0.80 | 4.54 | 566 | 1.57 |

Emergency Fire Pump Engines

The assumptions made regarding emergency fire pump engine operation are listed below:

- Engines will use ultra-low sulfur (15 parts per million by weight) diesel fuel;
- Engines have Tier 3 Certification;
- Engine emissions are based on a single one-hour test per week per engine, not to exceed 50 hours per year, and will be limited to an annual maximum of 200 hr/yr emergency use. Note the 200 hr/yr limit is inclusive of the allotted 50 hr/yr for maintenance and testing;
- Maximum controlled emissions are equal to maximum uncontrolled emissions because emergency engines do not have add-on controls

Emission estimates are based on emission factors for EPA Tier 3 certified engines, as determined by the BACT Guidelines for Minor Sources.

[1] Note the 30 DA emissions are for informational purposes only since the facility is exempt from offsets under SB827.

Emission estimates for SOx are based on estimated fuel use of 15.3 gallons per hour for each engine with a heating value of 137,000 Btu per gallon and fuel sulfur content of 15 ppm by weight. Fire pump engine criteria pollutant emissions are shown in Tables 4 and 5 below.

**Table 4: Emergency Fire Pump Emissions (One Engine)**

| Pollutant | Hourly Emissions (lb/hr) | Maximum Hourly (lb/hr) | Maximum Daily (lb/day) | Annual (lb/yr) | 30-DA[2] (lb/day) |
|---|---|---|---|---|---|
| NOx | 1.07E-02 | 1.88 | 1.88 | 94.16 | 0.261 |
| VOC | 5.66E-04 | 0.10 | 0.10 | 4.96 | 0.014 |
| CO | 9.81E-03 | 1.72 | 1.72 | 85.90 | 0.240 |
| PM10 | 5.66E-04 | 0.10 | 0.10 | 4.96 | 0.014 |
| PM2.5 | 1.89E-05 | 0.003 | 0.003 | 0.17 | 0.00047 |
| SOx | 5.66E-04 | 0.10 | 0.10 | 4.96 | 0.014 |

**Table 5: Emergency Fire Pump Emissions (Two Engines)**

| Pollutant | Hourly Emissions (lb/hr) | Maximum Hourly (lb/hr) | Maximum Daily (lb/day) | Annual (lb/yr) | 30-DA[2] (lb/day) |
|---|---|---|---|---|---|
| NOx | 2.14E-02 | 3.76 | 3.76 | 188.32 | 0.523 |
| VOC | 1.13E-03 | 0.20 | 0.20 | 9.92 | 0.0276 |
| CO | 1.96E-02 | 3.44 | 3.44 | 171.80 | 0.478 |
| PM10 | 1.13E-02 | 0.20 | 0.20 | 9.92 | 0.0276 |
| PM2.5 | 3.78E-05 | 0.006 | 0.006 | 0.34 | 0.0009 |
| SOx | 1.13E-02 | 0.20 | 0.20 | 9.92 | 0.0276 |

## Emergency Electrical Generators

The assumptions made regarding emergency electrical generator engine operation are listed below:

- Engines will use ultra-low sulfur (15 parts per million by weight) diesel fuel;
- Engines have Tier 2 Certification;
- Engine emissions are based on a single one-hour test per week per engine, not to exceed 50 hours per year, and will be limited to an annual maximum of 200 hr/yr emergency use. Note the 200 hr/yr limit is inclusive of the allotted 50 hr/yr for maintenance and testing;
- Maximum controlled emissions are equal to maximum uncontrolled emissions because emergency engines do not have add-on controls

[2] Note the 30 DA emissions are for informational purposes only since the facility is exempt from offsets under SB827.

Emission estimates are based on emission factors for EPA Tier 2 certified engines, as determined by the BACT Guidelines for Minor Sources. Emission estimates for SOx are based on estimated fuel use of 141.4 gallons per hour for each engine and fuel sulfur content of 15 ppm by weight. Emergency electrical generator engine emissions are shown in Tables 6 and 7 below.

**Table 6: Emergency Electrical Generator Emissions (One Engine)**

| Pollutant | Hourly Emissions (lb/hr) | Maximum Hourly (lb/hr) | Maximum Daily (lb/day) | Annual (lb/yr) | 30-DA[3] (lb/day) |
|---|---|---|---|---|---|
| NOx | 1.68E-01 | 29.35 | 29.35 | 1,467.44 | 4.08 |
| VOC | 8.82E-03 | 1.54 | 1.54 | 77.23 | 0.215 |
| CO | 9.55E-02 | 16.73 | 16.73 | 836.70 | 2.32 |
| PM10 | 5.51E-03 | 0.97 | 0.97 | 48.27 | 0.134 |
| PM2.5 | 5.51E-03 | 0.97 | 0.97 | 48.27 | 0.134 |
| SOx | 1.74E-04 | 0.031 | 0.031 | 1.53 | 0.0043 |

**Table 7: Emergency Electrical Generator Emissions (Two Engines)**

| Pollutant | Hourly Emissions (lb/hr) | Maximum Hourly (lb/hr) | Maximum Daily (lb/day) | Annual (lb/yr) | 30-DA[3] (lb/day) |
|---|---|---|---|---|---|
| NOx | 3.36E-01 | 58.70 | 58.70 | 2,934.88 | 8.15 |
| VOC | 1.76E-02 | 3.08 | 3.08 | 154.46 | 0.429 |
| CO | 1.91E-01 | 33.46 | 33.46 | 1,673.40 | 4.65 |
| PM10 | 1.10E-02 | 1.94 | 1.94 | 96.54 | 0.268 |
| PM2.5 | 1.10E-02 | 1.94 | 1.94 | 96.54 | 0.268 |
| SOx | 3.48E-04 | 0.062 | 0.062 | 3.06 | 0.0085 |

<u>HTF Ullage System Vent Emissions and Piping Fugitives</u>

The total uncontrolled VOC emissions from the HTF expansion/ullage tank vent were estimated based on data provided by an existing solar plant (the Kramer Junction Solar Electric Generating System [SEGS] facility), extrapolated to account for HTF system size. The assumptions made regarding HTF ullage system operation that were used as the basis for the emission calculations include:

- Two HTF ullage systems
- The VOC emissions are controlled with the use of two carbon adsorption canisters in series with an overall control efficiency of 98 percent;
- VOC emissions are limited to a maximum 0.75 lb/hr or 1.5 lb/day after pollution control;
- The HTF ullage system are vented for a maximum of two hours per day; and
- The maximum annual operation (i.e., venting of the ullage system to atmosphere, through controls) is estimated at 400 hours per year.

[3] Note the 30 DA emissions are for informational purposes only since the facility is exempt from offsets under SB827

Fugitive VOC emissions may occur in the HTF piping in the solar field from fugitive components such as pumps, seals, flanges, and valves. For the purpose of this application, the HTF piping fugitive emissions are accumulated with the HTF expansion tanks/ullage system permit unit. The fugitive VOC emissions are estimated based on component count data obtained from a recent Application for Certification (AFC) filed for a solar thermal facility using parabolic troughs (the Beacon Solar Energy Project) extrapolated to account for the relative difference in HTF system size. The assumptions made for the fugitive emission calculations include:

- Fugitive emissions can occur 24 hours per day, 365 days per year;
- Fugitive emissions only consist of VOCs; and
- Maximum controlled emissions are equivalent to maximum uncontrolled emissions because the fugitive emissions are not controlled.

The fugitive pollutant emission factors were taken from the EPA 1995 Protocol for Equipment Leak Emission Estimates for Oil and Gas Production. Since the HTF has a very low vapor pressure, the values for "Heavy Oil" were used to estimate the emissions.

For these emission estimates, it is assumed that the VOC emissions from the HTF storage tank(s) are negligible, as HTF has a negligible vapor pressure below about 300°F. Similarly, it is assumed that there will no VOC emissions from waste load out of heavy ends from the ullage system as the heavy ends are expected to have a vapor pressure that is substantially lower than the HTF fluid itself, and the vapor pressure of HTF at ambient conditions is negligible. The HTF expansion tanks/ullage system emissions are presented in Table 8 below

Table 8: HTF System VOC Emissions

| Source | Hourly (R1) (lb/hr) | Hourly (R2) (lb/hr) | Max Hourly (R1) (lb/hr) | Max Hourly (R2) (lb/hr) | Max Daily (R1) (lb/day) | Max Daily (R2) (lb/day) | AA (lb/yr) | 30-DA (lb/day) |
|---|---|---|---|---|---|---|---|---|
| Ullage System Vent | 1.71 | 0.034 | 37.50 | 0.75 | 75.00 | 1.50 | 300 | 1.50 |
| Piping Fugitives | 0.18 | 0.18 | 0.18 | 0.18 | 4.38 | 4.38 | 1,598 | 4.38 |
| Total | 1.89 | 0.214 | 37.68 | 0.93 | 79.38 | 5.88 | 1,898 | 5.88 |

<u>Land Treatment Unit VOC Emissions</u>

The facility will use either land farming or bioremediation in an on-site land treatment unit to remediate HTF-contaminated soils. Land treatment will be conducted at ambient temperatures. At ambient temperatures, the vapor pressure of the HTF is negligible and, therefore, the expected VOC emissions are negligible and have not been estimated for this application.

Table 9 below shows the annual emissions from the entire facility. Note the emissions from the emergency fire pump and emergency electrical generator were computed assuming the annual operation for the engines is 50 hours/year.

**Table 9: Annual Criteria Pollutant Emissions**

| Source | Pollutant | | | | | |
|---|---|---|---|---|---|---|
| | NOx | VOC | CO | PM10 | PM2.5 | SOx |
| Auxiliary Boilers | 1,263.64 | 568.75 | 4,273.18 | 1,137.50 | 1,137.50 | 566.75 |
| Emergency Fire Water Pump Engines | 188.33 | 9.91 | 171.81 | 9.91 | 9.91 | 9.91 |
| Emergency Generator Engines | 2,934.88 | 154.46 | 1,673.40 | 96.54 | 96.54 | 3.06 |
| HTF Ullage System Vents | --- | 600.00 | --- | --- | -- | --- |
| **HTF Fugitives** | --- | 3,196.36 | -- | -- | -- | -- |
| | | | | | | |
| **Total (lb/yr)** | 4,386.85 | 4,529.48 | 6,118.39 | 1,243.95 | 1,243.95 | 579.72 |
| **Total (TPY)** | 2.19 | 2.26 | 3.06 | 0.622 | 0.622 | 0.29 |
| **Facility 30DA** | 12.183 | 12.58 | 17.00 | 3.46 | 3.46 | 1.61 |

## Toxic Air Contaminants

Toxic air contaminant (TAC) emissions are estimated for normal operations of each emissions unit. The TAC emissions from the auxiliary boilers, emergency fire water pump and generator engines, and HTF ullage system vent were calculated. The total TAC emissions from the PSPP are less than 0.3 tons per year.

## Auxiliary Boiler and HTF Heater TAC Emission Calculations

AP-42 does not provide TAC emission factors for the combustion of propane, so the TAC emissions from the auxiliary boilers were estimated based on EPA AP-42 emission factors for natural gas combustion.

## Emergency Engine TAC Emission Calculations

TAC emissions from the emergency fire water pump and generator engines were quantified for routine testing and maintenance operation, which will be limited to no more than one hour per day, 50 hours per year, per engine. Emissions are not calculated for emergency use. The TAC emissions were characterized as aggregate particulate emissions (diesel particulate matter [DPM]) from diesel-fired engines. The DPM emissions are assumed to be equal to the PM10 emissions.

## HTF Ullage System Vent TAC Emissions

The total uncontrolled TAC emissions from the HTF ullage tank vent were estimated based on data provided by an existing solar thermal parabolic trough plant and extrapolated to account for HTF system size. HTF is composed of approximately 75 percent diphenyl ether and 25 percent biphenyl. For this application, because both of these compounds contain benzene rings, it was conservatively assumed that the HTF breakdown products would consist primarily (approximately 99 percent) of benzene. Controlled emissions were calculated based on the use of two carbon adsorption canisters in series with an overall control efficiency of 98 percent.

Table 10 below list the breakdown of the TAC emissions for each permit unit.

Table 10: TAC Emissions By Emissions Unit

| Pollutant | Auxiliary Boiler | | Fire Water Pump | | Generator | | HTF Ullage Vent | | |
|---|---|---|---|---|---|---|---|---|---|
| | Hourly lb/hr | Annual lb/yr | Hourly lb/hr | Annual lb/yr | Hourly lb/hr | Annual lb/yr | Hourly (R1) lb/hr | Hourly (R2) lb/hr | Annual lb/yr |
| 7,12-Dimethylbenz(a)anthracene | 5.49E-07 | 8.92E-04 | | | | | | | |
| Acenaphthene | 6.18E-08 | 1.00E-04 | | | | | | | |
| Acenaphthylene | 6.18E-08 | 1.00E-04 | | | | | | | |
| Anthracene | 8.24E-08 | 1.34E-04 | | | | | | | |
| Benz(a)anthracene | 6.18E-08 | 1.00E-04 | | | | | | | |
| Benzene | 7.21E-05 | 1.17E-01 | | | | | 3.75E+01 | 7.50E-01 | 3.00E+02 |
| Benzo(a)pyrene | 4.12E-08 | 6.69E-05 | | | | | | | |
| Benzo(b)fluoranthene | 6.18E-08 | 1.00E-04 | | | | | | | |
| Benzo(g,h,i)perylene | 4.12E-08 | 6.69E-05 | | | | | | | |
| Benzo(k)fluoranthene | 6.18E-08 | 1.00E-04 | | | | | | | |
| Biphenyl | 0 | 0 | | | | | 3.75E-03 | 7.50E-05 | 3.00E-02 |
| Chrysene | 6.18E-08 | 1.00E-04 | | | | | | | |
| Dibenz(a,h)anthracene | 4.12E-08 | 6.69E-05 | | | | | | | |
| Dichlorobenzene | 4.12E-05 | 6.69E-02 | | | | | | | |
| Diesel Particulate Matter | 0 | 0 | 9.91E-02 | 4.96E+00 | 9.91E-02 | 4.96E+00 | | | |
| Fluoranthene | 1.03E-07 | 1.67E-04 | | | | | | | |
| Formaldehyde | 2.57E-03 | 4.18E+00 | | | | | | | |
| Hexane | 6.18E-02 | 1.00E+02 | | | | | | | |
| Indeno(1,2,3-cd)pyrene | 6.18E-08 | 1.00E-04 | | | | | | | |
| Naphthalene | 2.09E-05 | 3.40E-02 | | | | | | | |
| Phenanthrene | 5.83E-07 | 9.48E-04 | | | | | | | |
| Pyrene | 1.72E-07 | 2.79E-04 | | | | | | | |
| Toluene | 1.17E-04 | 1.90E-01 | | | | | | | |
| TOTALS | 0.0646 | 104.59 | 9.91E-02 | 4.96 | 9.91E-02 | 4.96 | 37.50 | 0.75 | 300.03 |

## PROHIBITORY RULE EVALUATION

### RULE 212 - Standards for Approving Permits

Rule 212 requires that a person shall not build, erect, install, alter, or replace any equipment, the use of which may cause the issuance of air contaminants or the use of which may eliminate, reduce, or control the issuance of air contaminants without first obtaining written authorization for such construction from the Executive Officer. Rule 212(c) states that a project requires written notification if there is an emission increase for ANY criteria pollutant in excess of the daily maximums specified in Rule 212(g), if the equipment is located within 1,000 feet of the outer boundary of a school, or if the MICR is equal to or greater than one in a million (1EE-6). The MICR is expected to be less than 0.07EE-6, and the facility is located more than 1,000 feet from a school. Therefore, a public notice is not required for the PSPP.

### RULE 401 - Visible Emissions

This rule limits visible emissions to an opacity of less than 20 percent (Ringlemann No.1), as published by the United States Bureau of Mines. It is unlikely, with the use of the SCR /CO catalyst configuration that there will be visible emissions. However, in the unlikely event that visible emissions do occur, anything greater than 20 percent opacity is not expected to last for greater than 3 minutes. During normal operation, no visible emissions are expected. Therefore, compliance with this rule is expected.

### RULE 402 - Nuisance

A person must not 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 to the public, or which endanger the comfort, repose, health or safety of any such persons or the public, or which cause, or have a natural tendency to cause, injury or damage to business or property. Due to the application of BACT on each emission source and the distance from the emission sources to any potential receptors, the Project will comply with this rule.

RULE 403 - Fugitive Dust
The purpose of this rule is to reduce the amount of particulate matter entrained in the ambient air as a result of man-made fugitive dust sources by requiring actions to prevent, reduce, or mitigate fugitive dust emissions. The provisions of this rule apply to any activity or man-made condition capable of generating fugitive dust. This rule prohibits emissions of fugitive dust beyond the property line of the emission source. The applicant will be taking steps to prevent and/or reduce or mitigate fugitive dust emissions from the project site. Such measures include covering loose material on haul vehicles, watering, and using chemical stabilizers when necessary. The PSPP is expected to comply with this rule.

RULE 431.1 - Sulfur Content of Gaseous Fuels
The purpose of this rule is to reduce SOx emissions from the burning of gaseous fuels in stationary equipment requiring a PTO by the District. PSPP will use propane fuel for the boilers which complies with the sulfur requirement of this rule, and thus the Project is exempt from additional requirements established by Rule 431.1.

RULE 463 - Storage of Organic Liquids
No person is allowed to place, store or hold in any tank with a capacity of 39,630 gallons or greater, any organic liquid having a true vapor pressure of 25.8 millimeters mercury (mmHg) (0.5 pounds per square inch [psi]) absolute or greater under actual storage conditions, and in any tank of more than 75,000 liters (19,815 gallons) capacity, any organic liquid having a true vapor pressure of 77.5 mm Hg (1.5 psi) absolute or greater under actual storage conditions, unless such tank is a pressure tank maintaining working pressures sufficient at all times to prevent organic vapor loss to the atmosphere, or is designed and equipped with an approved vapor control device. The PSPP will have insulating mineral oil (transformers), hydraulic oil (steam turbine and other equipment), and lubricating oil on site, all of which are stored in quantities less than 39,630 gallons and which have a true vapor pressure less than 1 psi at 68°F. The Project also will store diesel, which has a vapor pressure of 0.008 psia (0.40 mm of mercury), on site in 300-gallon tanks. HTF will be stored in 15,900-gallon tanks. The vapor pressure of HTF is 0.019 mmHg at 80°F. Because these vapor pressures are below prescribed limits for these tank volumes, the project will comply with this rule.

RULE 474 - Fuel Burning Equipment-Oxides of Nitrogen
A person is not allowed to discharge into the atmosphere from any non-mobile fuel burning equipment NOx in excess of the concentrations specified in the rule. The Project is expected to comply with this rule with the use of ultra-low-NOx burners and propane fuel in the auxiliary boilers. The fire water pumps and emergency generator engines comply with this requirement through the use of Tier 2 & Tier 3 compliance engines.

Rule 1110.2 - Emissions from Gaseous and Liquid-Fueled Internal Combustion Engines
The purpose of Rule 1110.2 is to reduce NOx, VOC, and CO from internal combustion engines. The diesel engines proposed for this Project are low-usage engines which will each operate less than 200 hours per year and which will be used for firefighting and emergency purposes, and are therefore exempt from the requirements of this rule. Elapsed operating time meters will be installed and maintained on each engine to substantiate compliance.

Rule 1146 - Emissions of Oxides of Nitrogen from Industrial, Institutional and Commercial Boilers, Steam Generators and Process Heaters
The purpose of this rule is to limit NOx emissions from boilers, steam generators, and process heaters of greater than 5 MMBtu per hour rated input capacity used in industrial, institutional, and commercial operations with several listed exceptions. The rule specifies NOx limits and CO compliance plans for boilers, steam generators, and process heaters by size process function. The boilers will burn propane exclusively and, will comply with NOx and CO BACT which is less than the 30 ppm NOx and 400 ppm CO limits in this rule. Compliance is expected.

Rule 1166 - Volatile Organic Compound Emissions from Decontamination of Soil
This rule sets forth requirements to control the VOC emissions from excavating, grading, handling and treating VOC-contaminated soil as a result of leakage from storage or transfer operations, accidental spillage, or other deposition. The requirements of this rule do not apply to:

- Decontamination of less than one cubic yard of contaminated soil;
- Contaminated soil removed for the sole purpose of sampling;
- Accidental spillage of five gallons or less of VOC-containing material; and
- Soil excavation or handling as a result of an emergency as declared by an authorized health officer, agricultural commissioner, fire protection officer, or other authorized agency officer. Whenever possible, the Executive Officer must be notified by telephone prior to commencing.

The soil decontamination planned for the Project is land farming or bioremediation of soils contaminated with HTF due to equipment leaks or spills. At ambient conditions, the HTF has a very low vapor pressure, and consequently the VOC emissions from this operation are expected to be negligible. However, the SCAQMD does not have an exemption for de minimis activities; thus the Project will comply with the rule by obtaining and commencing operation pursuant to a mitigation plan approved by the Executive Officer and applying the appropriate control measures, which may include covering the pile or applying a wetting agent.

NEW SOURCE REVIEW (NSR) ANALYSIS
This regulation sets forth pre-construction review requirements for new, modified, or relocated facilities to ensure that the operation of such facilities does not interfere with progress in attainment of the National Ambient Air Quality Standards (NAAQS), and that future economic growth within the District is not unnecessarily restricted. The specific air quality goal of this regulation is to achieve no net increases from new or modified permitted sources of nonattainment air contaminants or their precursors. In addition to nonattainment air contaminants, this regulation also limits emission increases of ammonia and ozone depleting compounds from new, modified or relocated facilities by requiring the use of BACT on each permit unit.

BACT
The Executive Officer shall deny the Permit to Construct for any new source which results in an emission increase of any non-attainment air contaminant, any ozone depleting compound, or ammonia unless the applicant can demonstrate that BACT is employed for the new source. PSPP is a new source with a potential for an increase in emissions and therefore, BACT is required. The PSPP is a non-major source

and as such BACT is determined in accordance with the BACT Guidelines for Non-Major Polluting Facilities – Part D. Below is an analysis of the BACT requirements for the major components of the PSPP. (Note CO BACT is addressed under Regulation XVII section).

Auxiliary Boiler, 35 MMBTU/hr

| Pollutant | Minor Source BACT | Proposed BACT | Comply (Yes/No) |
|---|---|---|---|
| NOx | ≤9 ppmv @ 3% O2, dry | ≤9 ppmv @ 3% O2, dry | Yes |
| VOC | None | None | Yes |
| PM10 | Natural Gas | Propane fired | Yes |
| SOx | Natural Gas | Propane fired | Yes |

Emergency Fire Pump, 300 bhp (300≤ bhp < 750)

| Pollutant | Minor Source BACT (Tier 3) | Proposed BACT (Tier 3) | Comply (Yes/No) |
|---|---|---|---|
| NOx+NMHC | 3.0 gm/bhp-hr | 3.0 gm/bhp-hr | Yes |
| PM10 | 0.15 gm/bhp-hr | 0.15 gm/bhp-hr | Yes |
| SOx | Fuel with sulfur content less than or equal to 15 ppm by weight | Fuel with sulfur content less than or equal to 15 ppm by weight | Yes |

Emergency Electrical Generator, 2,922 bhp (bhp ≥ 750)

| Pollutant | Minor Source BACT (Tier 2) | Proposed BACT (Tier 2) | Comply (Yes/No) |
|---|---|---|---|
| NOx+NMHC | 4.8 gm/bhp-hr | 4.8 gm/bhp-hr | Yes |
| PM10 | 0.15 gm/bhp-hr | 0.15 gm/bhp-hr | Yes |
| SOx | Fuel with sulfur content less than or equal to 15 ppm by weight | Fuel with sulfur content less than or equal to 15 ppm by weight | Yes |

HTF Expansion Tank

| Pollutant | Minor Source BACT | Proposed BACT | Comply (Yes/No) |
|---|---|---|---|
| NOx | None | None | Yes |
| VOC | Vapor recovery system with an overall system efficiency of 95% | Two-stage carbon adsorption system with 98% control efficiency | Yes |
| PM10 | None | None | Yes |
| SOx | None | None | Yes |

Based on the above tables, the equipment will comply with the current minor source BACT requirements.

## Offsets

This facility is exempt from offsets under Rule 1304 (d)(1)(A) as allowed under SB 827, provided that the facility PTE for the PSPP is below the levels in Table 11 below:

Table 11: Facility Exemption Thresholds

| Pollutant | Facility PTE (TPY) | Exemption Thresholds (TPY) | Comply (Yes/No) |
|---|---|---|---|
| Nitrogen Oxides (NOx) | 2.19 | 4 | Yes |
| Volatile Organic Compounds (VOC) | 2.26 | 4 | Yes |
| Sulfur Oxides (SOx) | 0.29 | 4 | Yes |
| Particulate Matter < 10 microns (PM10) | 0.62 | 4 | Yes |
| Carbon Monoxide (CO) | 3.06 | 29 | Yes |

The facility PTE is less than the thresholds in Table 11 for each of the criteria pollutants. The facility will be conditioned to remain below the respective PTEs. Therefore, no offsets are required. Compliance is expected. Any future increase above the exemption thresholds above will trigger offsets for the specified pollutant.

Modeling

The applicant must substantiate with modeling that the new facility or modification will not cause a violation, or make significantly worse an existing violation according to Appendix A of Rule 1303, or other analysis approved by the Executive Officer or designee, of any state or national ambient air quality standards at any receptor location in the District. If the emission from the individual permit units are greater than the amounts in Table 12 below, then modeling is required. (Note that the emissions listed in Table 12 below are for a single auxiliary boiler rated at 35 MMBTU/hr. The emergency ic engines are exempt from modeling because they operate less than 200 hours/year and no emissions of NOx, CO, or PM10 are expected from the HTF expansion tank and associated equipment. There is also no modeling requirement for VOC or SOx).

Table 12: Auxiliary Boiler, 35 MMBTU/hr

| Pollutant | Emissions lb/hr | Screening Modeling Thresholds[4] lb/hr | Comply (Yes/No) |
|---|---|---|---|
| NOx | 0.39 | 1.31 | Yes |
| CO | 1.31 | 72.1 | Yes |
| PM10 | 0.35 | 7.9 | Yes |

The emissions from the boiler(s) are below the screening levels listed in the table above. Therefore, no modeling is required for the auxiliary boilers.

Rule 1401 – New Source Review of Toxic Air Contaminants

This rule specifies limits for maximum individual cancer risk (MICR), acute hazard index (HIA), chronic hazard index (HIC) and cancer burden (CB) from new permit units, relocations, or modifications to existing permits which emit toxic air contaminants. Rule 1401 requirements are summarized in Table 13 as follows:

Table 13 - Rule 1401 Requirements

| Parameters and Specifications | Rule 1401 Requirements |
|---|---|
| MICR, without T-BACT | ≤ 1EE-6 |
| MICR, with T-BACT | ≤ 1EE-5 |
| Acute Hazard Index | ≤ 1.0 |
| Chronic Hazard Index | ≤ 1.0 |
| Cancer Burden | ≤ 0.5 |

The applicant performed a Tier 4 health risk assessment using the Hot Spots Analysis and Reporting Program (HARP). The analysis included an estimate of the MICR for the nearest residential and commercial receptors, as well as the acute and chronic hazard indices. AQMD modeling staff reviewed the applicant's procedures and concluded that the appropriate modeling parameters were used and were consistent with AQMD HRA policies and procedures. Modeling staff re-ran the HARP model using the applicant provided data and reproduced the results in Table 14 below. Note that the results in Table 14 are cumulative for the entire facility. Table 15 below shows the applicant's HRA results performed on a permit unit basis. (Note that the emergency engines are exempt from the requirements of Rule 1401 because they are used exclusively for emergencies and will operate less than 200 hours/year).

[4] From Appendix A, Table A-1 of Rule 1303.

Table 14 - AQMD Modeling Staff Results

| Parameters | Results | Rule 1401 Requirements | Comply (Yes/No) |
|---|---|---|---|
| MICR, resident | 0.07EE-6 | ≤ 1EE-6 | Yes |
| MICR, worker | 0.01EE-6 | ≤ 1EE-6 | Yes |
| Acute Hazard Index | 0.0002 | ≤ 1.0 | Yes |
| Chronic Hazard Index | 0.00004 | ≤ 1.0 | Yes |

Table 15 - Applicant's Results

| Permit Unit | MICRr | MICRw | HICr | HICw | HIAr | HIAw |
|---|---|---|---|---|---|---|
| Auxiliary Boiler No 1 | 6.10EE-11 | 1.34EE-11 | 1.05EE-09 | 1.26EE-09 | 1.10EE-07 | 1.45EE-07 |
| Auxiliary Boiler No 2 | 3.76EE-10 | 7.18EE-11 | 6.45EE-09 | 6.74EE-09 | 1.66EE-07 | 1.66EE-07 |
| Cooling Tower No.1 | 9.56EE-10 | 2.07EE-10 | 5.79EE-07 | 6.34EE-07 | 4.15EE-04 | 4.17EE-04 |
| Cooling Tower No.2 | 9.57EE-10 | 2.07EE-10 | 5.80EE-07 | 6.35EE-07 | 4.15EE-04 | 4.23EE-04 |
| Cooling Tower No.3 | 1.27EE-10 | 3.99EE-11 | 7.72EE-08 | 1.23EE-07 | 3.58EE-04 | 3.46EE-04 |
| Cooling Tower No.4 | 1.27EE-10 | 4.02EE-11 | 7.71EE-08 | 1.23EE-07 | 3.57EE-04 | 3.49EE-04 |
| Ullage Tank No.1 | 1.56EE-08 | 2.25EE-09 | 8.99EE-06 | 6.56EE-06 | 8.42EE-03 | 8.06EE-03 |
| Ullage Tank No.2 | 7.94EE-08 | 1.45EE-08 | 4.57EE-05 | 4.22EE-05 | 1.99EE-02 | 1.64EE-02 |

The results in Table 15 above are all below the Rule 1401 thresholds. Compliance is expected.

Rule 1470-Requirements for Stationary Diesel-Fueled Internal Combustion and Other CI Engines:
Paragraph (c)(1) requires the use of CARB Diesel fuel. The use of No. 2 diesel fuel will satisfy this requirement. Paragraph (c)(2)(A) imposes operating requirements for engines located within 500 feet from a school. Since the engine is located greater than 500 feet to the nearest school, the requirements of this section are not applicable.

Paragraph (c)(2)(B) allows operation of this device during an impending rotating electric power outage only if:

1. The permit specifically allows this operation
2. The utility company has actually ordered the outage
3. The engine is in a specific location covered by the outage.
4. The engine is operated no more than 30 minutes prior to the outage, and
5. The engine operation is terminated immediately after the outage.

AQMD will require a condition to limit the maintenance and testing to less than 50 hours per year. This engine is expected to meet these requirements.

Paragraph (c)(2)(C) limits hours for maintenance and testing to 50 hours per year for $PM_{10}$ emissions up to 0.15 gm/bhp-hr, and a maximum of 100 hours per year for $PM_{10}$ emissions up to 0.01 gm/bhp-hr. Therefore, the engine will comply with paragraph (c)(2)(C). Also, part (iv) of paragraph (c)(2)(C) requires that the engine meet the standards for off road engines in Title 13, CCR section 2423. This engine will comply with the 0.15 gm/bhp-hr PM10 emission requirements of this rule and can therefore operate for up to a maximum of 50 hours/year for maintenance and testing. Therefore, compliance with Rule1470 is expected.

REGULATION XVII-Prevention of Significant Deterioration

On July 25, 2007 AQMD and EPA have signed a new Partial PSD Delegation Agreement intended to delegate the authority and responsibility to AQMD for issuance of initial PSD permits and for PSD permit modifications where the applicant does not seek to use the emissions calculation methodologies promulgated in 40 CFR 52.21 (NSR Reform) but not set forth in AQMD Regulation XVII. The Partial Delegation agreement also does not delegate authority and responsibility to AQMD to issue new or modified PSD permits based on Plant-wide Applicability Limits (PALS) provisions of 40 CFR 52.21. Therefore, consistent with the Partial Delegation Agreement, for all new and modified PSD permits, AQMD will only use Regulation XVII as the bases for the PSD analysis. The Salton Sea Air Basin where the project is to be located is in attainment for NOx, $SO_2$, and CO emissions. Therefore PSD applies to these pollutants. For the proposed project a significant emission increase is 40 tpy or more of NOx or $SO_2$ or 100 tons per year or more of CO. The emissions from the proposed PSPP will not exceed these thresholds. Therefore a PSD analysis is not required.

Rule 1703(a)(2) requires each permit unit be constructed using BACT for each attainment air contaminant for which there is a net emission increase. The BACT requirements for CO as well as the applicant's BACT proposals for the CTGs are listed below: As shown below, the equipment will comply with PSD BACT requirements for major sources.

Auxiliary Boiler, 35 MMBTU/hr

| Pollutant | Minor Source BACT | Proposed BACT | Comply (Yes/No) |
|---|---|---|---|
| CO | ≤50 ppmv @ 3% O2, dry | ≤50 ppmv @ 3% O2, dry | Yes |

Emergency Fire Pump, 300 bhp (300≤ bhp < 750)

| Pollutant | Minor Source BACT (Tier 3) | Proposed BACT (Tier 3) | Comply (Yes/No) |
|---|---|---|---|
| CO | 2.6 gm/bhp-hr | 2.6 gm/bhp-hr | Yes |

Emergency Electrical Generator, 2,922 bhp (bhp ≥ 750)

| Pollutant | Minor Source BACT (Tier 2) | Proposed BACT (Tier 2) | Comply (Yes/No) |
|---|---|---|---|
| CO | 2.6 gm/bhp-hr | 2.6 gm/bhp-hr | Yes |

HTF Expansion Tank

| Pollutant | Minor Source BACT | Proposed BACT | Comply (Yes/No) |
|---|---|---|---|
| CO | None | None | Yes |

CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA)

The California Energy Commission (CEC) in conjunction with the Bureau of Land Management are the lead agencies for the PSPP (09-AFC-7) and will be addressing CEQA compliance.

REGULATION XXX – Title V

Not applicable

OVERALL EVALUATION / RECOMMENDATION(S)

Issue Permits to Construct with the following permit conditions.

PERMIT CONDITIONS

Auxiliary Boiler
1&2. Standard Conditions

3. This equipment shall be fired exclusively with propane.

4. The operator shall conduct source test(s) for the pollutant(s) identified below.

| Pollutant to be tested | Required Test Method(s) | Averaging Time | Test Location |
|---|---|---|---|
| NOx emissions | District Method 100.1 | 1 hour | Stack |
| CO emissions | District Method 100.1 | 1 hour | Stack |
| SOX emissions | Approved District method | District approved averaging time | Fuel Sample |
| VOC emissions | Approved District method | 1 hour | Stack |
| PM10 emissions | Approved District method | District approved averaging time | Stack |

The test shall be conducted after AQMD approval of the source test protocol, but no later than 180 days after initial start-up. The AQMD shall be notified of the date and time of the test at least 10 days prior to the test.

The test shall be conducted to determine the oxygen levels in the exhaust. In addition, the tests shall measure the fuel flow rate (CFH), the flue gas flow rate.

The test shall be conducted in accordance with AQMD approved test protocol. The protocol shall be submitted to the AQMD engineer no later than 45 days before the proposed test date and shall be approved by the AQMD before the test commences. The test protocol shall include the proposed operating conditions of the turbine during the tests, the identity of the testing lab, a statement from the testing lab certifying that it meets the criteria of Rule 304, and a description of all sampling and analytical procedures.

The test shall be conducted when this equipment is operating at maximum, average, and minimum loads.

5. The operator shall limit the fuel usage to no more than 393 mmcf in any one year. For the purpose of this condition, one year shall be defined as a period of twelve (12) consecutive months determined on a rolling basis with a new 12 month period beginning on the first day of each calendar month.

For the purpose of this condition, fuel usage shall be defined as the total propane usage of a single boiler. The operator shall maintain records in a manner approved by the District to demonstrate compliance with this condition.

6. The operator shall install and maintain a(n) flow meter to accurately indicate the fuel usage being supplied to the boiler. The operator shall also install and maintain a device to continuously record the parameter being measured

7. The operator shall provide to the AQMD a source test report in accordance with the following specifications:

   Source test results shall be submitted to the AQMD no later than 60 days after the source test was conducted.

   Emission data shall be expressed in terms of concentration (ppmv) corrected to 3 percent oxygen (dry basis), mass rate (lb/hr), and lb/MMCF. In addition, solid PM emissions, if required to be tested, shall also be reported in terms of grains/DSCF.

   All exhaust flow rate shall be expressed in terms of dry standard cubic feet per minute (DSCFM) and dry actual cubic feet per minute (DACFM).

   All moisture concentration shall be expressed in terms of percent corrected to 3 percent oxygen.

   Source test results shall also include the oxygen levels in the exhaust, fuel flow rate (CFH), the flue gas temperature.

8. The 9 PPM NOx emission limits shall not apply during start-up and shutdown periods. Written records of start-ups and shutdowns shall be maintained and made available upon request from the Executive Officer.

9. The 50 PPM CO emission limits shall not apply during start-up and shutdown periods. Written records of start-ups and shutdowns shall be maintained and made available upon request from the Executive Officer.

10. The operator shall limit emission from this equipment as follows:

| CONTAMINANT | EMISSION LIMIT |
|---|---|
| $PM_{10}$ | 569 LBS IN ANY ONE YEAR |
| NOx | 632 LBS IN ANY ONE YEAR |
| SOx | 283 LBS IN ANY ONE YEAR |
| VOC | 284 LBS IN ANY ONE YEAR |

The operator shall calculate the monthly emissions for VOC, PM10 and SOx using the equation below and the following emission factors: NOx: 1.27 lb/mmcf; VOC: 0.57 lb/mmcf; PM10: 1.15 lb/mmcf; and SOx:1.30 lb/mmcf.

Yearly Emissions, lb/year = X (E.F.)

Where X = yearly fuel usage in mmscf/year and E.F. = emission factor indicated above.

For the purpose of this condition, the yearly emission limit shall be defined as a period of twelve (12) consecutive months determined on a rolling basis with a new 12 month period beginning on the first day of each calendar month.

11. The operator shall limit the annual operation of this equipment to no greater than 5,000 hours in any one year.

12. The operator shall limit the fuel usage to no more than 172 mmcf in any one calendar year. The operator shall maintain records in a manner approved by the District to demonstrate compliance with this condition.

<u>Emergency Fire Pump</u>

1&2. Standard Conditions

3. The operator shall limit the operating time to no more than 199.99 hours in any one year. For the purposes of this condition, the operating time is inclusive of time allotted for maintenance and testing

4. The operator shall install and maintain a(n) non-resettable elapsed meter to accurately indicate the elapsed operating time of the engine.

5. The operator shall install and maintain a(n) non-resettable totalizing fuel meter to accurately indicate the fuel usage of the engine.

6. The operator shall only use diesel fuel containing sulfur less than or equal to 15 ppm by weight.

7. The operator shall operate and maintain this equipment according to the following requirements:

   a. This equipment shall only operate if utility electricity is not available.
   b. This equipment shall only be operated for the primary purpose of providing a backup source of power to drive an emergency fire pump.
   c. This equipment shall only be operated for maintenance and testing, not to exceed 50 hours in any one year.
   d. This equipment shall only be operated under limited circumstances under a Demand Response Program (DRP).

e. An engine operating log shall be kept in writing, listing the date of operation, the elapsed time, in hours, and the reason for operation. The log shall be maintained for a minimum of 5 years and made available to AQMD personnel upon request.

f. The operator shall keep records in a manner approved by the Executive Officer, for the date of operation, the elapsed time, in hours, and the reason for operation of the engine.

<u>Emergency Electrical Generator</u>

1&2. Standard Conditions

3. The operator shall limit the operating time to no more than 199.99 hours in any one year. For the purposes of this condition, the operating time is inclusive of time allotted for maintenance and testing

4. The operator shall install and maintain a(n) non-resettable elapsed meter to accurately indicate the elapsed operating time of the engine.

5. The operator shall install and maintain a(n) non-resettable totalizing fuel meter to accurately indicate the fuel usage of the engine.

6. The operator shall only use diesel fuel containing sulfur less than or equal to 15 ppm by weight.

7. The operator shall operate and maintain this equipment according to the following requirements:

   a. This equipment shall only operate if utility electricity is not available.
   b. This equipment shall only be operated for the primary purpose of providing a backup source of power to drive an emergency electrical generator.
   c. This equipment shall only be operated for maintenance and testing, not to exceed 50 hours in any one year.
   d. This equipment shall only be operated under limited circumstances under a Demand Response Program (DRP).
   e. An engine operating log shall be kept in writing, listing the date of operation, the elapsed time, in hours, and the reason for operation. The log shall be maintained for a minimum of 5 years and made available to AQMD personnel upon request.
   f. The operator shall keep records in a manner approved by the Executive Officer, for the date of operation, the elapsed time, in hours, and the reason for operation of the engine.

<u>Storage Tanks</u>

1&2. Standard Conditions

3. The operator shall monitor for breakthrough between the first and second carbon beds while the carbon system is in use using an OVA or other monitoring device as approved by the Executive Officer. The carbon in the first bed shall be replaced with fresh carbon at least 5 times per month as necessary, prior to occurrence of breakthrough in the second carbon bed.