February 8, 2010

Alan Solomon
Project Manager
California Energy Commission
1516 Ninth Street
Sacramento, CA 95814

RE: **Palen Solar Power Project, Docket No. 09-AFC-7**

Responses to January 14, 2010 CEC Workshop Queries – (Technical Area: Air Quality)

Agency Correspondence:
Request for Revised Construction Emissions Spreadsheet for the Palen Solar Power Project; and,
Refinement to Palen Solar Power Project Air Permit Applications

Dear Mr. Solomon:

During the January 14, 2010, CEC Workshop staff requested additional information and clarification on several matters in the technical area of Air Quality. Attached please find our responses to those specific questions. Additionally we are providing copies of submittals and correspondence to the SCAQMD and other agencies as requested in Data Request#29.

If you have any questions on these data responses to the staff's workshop queries or on the other submittals, please feel free to contact me directly.

Sincerely,

Alice Harron
Senior Director, Development

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STATE OF CALIFORNIA
ENERGY RESOURCES CONSERVATION AND DEVELOPMENT COMMISSION

In the Matter of: **APPLICATION FOR CERTIFICATION** **for the *PALEN SOLAR POWER PROJECT***	**Docket No. 09-AFC-7** **PROOF OF SERVICE** ***(Revised 12/28/2009)***

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DECLARATION OF SERVICE

I, Carl Lindner, declare that on, February 8, 2010, I served and filed copies of the attached Palen Solar Power Project Data Response materials:

Data Responses to January 14, 2010 CEC Workshop Queries (Technical Areas: Air Quality)

Agency Correspondence:
Request for Revised Construction Emissions Spreadsheet for the Palen Solar Power Project; and,
Refinement to Palen Solar Power Project Air Permit Applications

The original document, filed with the Docket Unit, is accompanied by a copy of the most recent Proof of Service list, located on the web page for this project at:

[http://www.energy.ca.gov/sitingcases/solar_millennium_palen]

The document has been sent to the other parties in this proceeding (as shown on the Proof of Service list) and to the Commission's Docket Unit, in the following manner:

(*Check all that Apply*)
For service to all other parties:

_____ sent electronically to all email addresses on the Proof of Service list;

__X__ by personal delivery or by overnight delivery service or depositing in the United States mail at Camarillo, California with postage or fees thereon fully prepaid and addressed as provided on the Proof of Service list above to those addresses **NOT** marked "email preferred."

AND

For filing with the Energy Commission:

__X__ sending an original paper copy and one electronic copy, mailed to the address below (preferred method);

OR

_____ depositing in the mail an original and 12 paper copies, along with 13 CDs, as follows:

CALIFORNIA ENERGY COMMISSION
Attn: Docket No. 09-AFC-7
1516 Ninth Street, MS-4
Sacramento, CA 95814-5512

docket@energy.state.ca.us

I declare under penalty of perjury that the foregoing is true and correct.

Responses to CEC Workshop, January 14, 2010

Air Quality

Palen Solar Power Project

Docket No. 09-AFC-7

Alice Harron
Senior Director of Project Development
1625 Shattuck Avenue, Suite 270
Berkeley, CA 94709-1161

Draft Air Quality Responses – CEC Workshop, January 14, 2010

Format Tables DR-4 & 13 in Palen to resemble Blythe.

As requested, the emissions tables presented in DR-AIR-4 and DR-AIR-13 of the PSPP Data Request responses have been reformatted below to present Project operation phase emissions in the same units as were used to present emissions for the comparable BSPP Data Request responses. The changes consist of deleting emission periods that the South Coast Air Quality Management District (SCAQMD) uses for permitting purposes: average hourly uncontrolled and controlled, maximum hourly and daily uncontrolled, and the 30-day average. In addition, the annual emissions are presented in units of tons per year (tpy) rather than pounds per year (lb/yr) as originally presented in the PSPP responses.

Table DR-AIR-4-3 Summary of Project Criteria Pollutant Emissions[1] (revised)

Emissions	NOx	VOC	CO	SOx	PM10	PM2.5
Hourly Emissions (lb/hr)	63.39	5.52	39.61	0.86	41.74	11.13
Daily Emissions (lb/day)	73.90	19.80	72.36	10.56	318.34	77.26
Annual Emissions (tpy)	2.27	2.28	3.14	0.29	19.06	4.63

1. Operating emissions were updated (compared to the emissions presented in the AFC) to address five Project refinements and/or data requests:

a) Silt content of soils (impacts PM10 and PM2.5 emissions only) per DR-AIR-3,

b) Model year 2013 vehicle emission standards (all pollutants) per DR-AIR-13,

c) the increase in onsite maintenance vehicle mileage per DR-AIR-15 and -16,

d) a larger diesel-fired emergency generator (all pollutants) per DR-AIR-21, and

e) the removal of the HTF heater and increase in auxiliary boiler emissions as explained in DR-AIR-23 and -24.

The emissions shown in this table reflect all five of these changes to emissions.

Table DR-AIR-13-2 Maintenance Vehicle Emissions for the Project1(revised)

Emissions	NOx	VOC	CO	SOx	PM10	PM2.5
Hourly Emissions (lb/hr)	0.060	0.006	0.033	0.001	0.002	0.002
Daily Emissions (lb/day)	0.393	0.041	0.237	0.004	0.012	0.011
Annual Emissions (tpy)	0.067	0.007	0.041	0.0007	0.002	0.002

1. Only exhaust PM10 and exhaust PM2.5 emissions are presented in this table; fugitive emissions are not included in these emissions estimates. These estimates also incorporate revised vehicle travel distances as discussed in the responses to DR-AIR-16 and DR-AIR-19. More detailed emissions calculations, including fugitive emissions can be found in Table E.3-7c in the spreadsheet with filename Palen DR Operating Emissions.xlsx on the CD-ROM in Attachment DR-AIR-2, Emission Calculations.

Off-site vehicle emissions of GHG at Palen are three times those at Blythe. Why?

The GHG emissions estimates for off-site vehicle uses for the PSPP and BSPP, as presented in the responses to DR-AIR-6-1 (BSPP) and DR-AIR-18-1 (PSPP) were incorrect and reflected the failure to update the referenced tables in the Data Request responses from earlier draft versions). The GHG

emissions in the spreadsheets provided with the Data Responses were computed correctly and are internally consistent. In addition, the GHG emission calculations for the two Projects are based on similar/the same assumptions, with the primary differences due to construction duration and distance traveled by specific vehicle types. Please note that, given the modular nature of the construction process, the peak construction activities for both Projects are roughly similar to each other. PSPP has a shorter construction period (39 months) compared to BSPP (69 months), but the PSPP site is more remote and so average trip distances for key vehicle types are greater than those for BSPP. These two factors tend to offset each other in the GHG calculations for each Project, so that the GHG emissions totals for the two Projects are surprisingly close to each other.

Tables DR-AIR-6-1 (BSPP) (revised) and DR-AIR-18-1 (PSPP) (revised) are presented below. Total construction phase CO2e emissions for BSPP from offsite vehicles are 31,400 metric tons CO2e, based on 56.3 million Project vehicle-miles. By comparison, PSPP construction phase GHG emissions and total offsite vehicle mileage are 29,300 metric tons CO2e based on 57.6 million Project vehicle-miles.

Table 1 presents a summary of the activity data assumed in the computations of Project GHG emissions. The first two data columns of the table present the assumed mileages per vehicle trip for each vehicle class for each Project. Subsequent columns show the average monthly vehicle mileage by vehicle class, the total construction phase vehicle mileage, the total GHG emissions, and the GHG emission contribution for each vehicle type as a percent of the total emissions. Due to its more remote location, there are greater worker commuting mileages for PSPP than for BSPP. The average worker commute round trip is assumed to be 110 miles for PSPP, compared to 57 miles for BSPP. The number of workers for a typical month is roughly similar between the two Projects, and thus so PSPP has approximately double the number of commuting vehicle miles on an average monthly basis compared to BSPP. However, this is counter balanced by the approximately 75 percent longer construction period for BSPP (69 months compared to 39 months for PSPP). Thus, over the projected construction periods, PSPP has 2.5 percent more worker commuting vehicle miles than BSPP. The worker commute vehicle miles are the predominant source of GHG emissions from off-site vehicles. The worker commute GHG emissions comprise 71 percent and 63 percent of total offsite vehicle GHG emissions for PSPP and BSPP construction projects, respectively.

The assumed vehicle trip mileages for equipment/material delivery truck and low-boy trucks are roughly equivalent between the two Projects, reflecting delivery of twice as much material (because the BSPP is twice the size of the PSPP) and approximately one-half the transport distance, as the BSPP site is closer to the railhead than is the PSPP site. Note that for the emission estimates for both BSPP and PSPP, it was assumed that materials will be delivered to the city of Blythe by rail, and transported by truck to the two Project sites. However, construction plans have not been finalized with our EPC Contractor. Our EPC Contractor may require a different rail delivery point for certain large equipment items based on final procurement arrangements. The refueling truck trip mileages for PSPP are four times that for BSPP, reflecting the greater remoteness from fueling stations for PSPP compared to BSPP. For all other vehicle types, the vehicle trip mileage for PSPP is assumed to be twice that for BSPP.

Table DR-AIR-6-1 BSPP Construction GHG Emissions (Revised)

Aspect of Construction	Project Construction Total (metric tons CO2e)
Construction Equipment Total	70,700
Onsite Motor Vehicle Total	1,800
Offsite Motor Vehicle Total	31,400
Construction Project Total	103,900
Annualized GHG Construction Emissions over Project Life (30 years) (metric tons CO2e/yr)	3,500
Note: All emission totals rounded to the nearest 100 metric tons	

Table DR-AIR-18-1 PSPP Construction GHG Emissions (Revised)

Aspect of Construction	Project Construction Total (metric tons CO_2e)
Construction Equipment Total	70,200
Onsite Motor Vehicle Total	1,500
Offsite Motor Vehicle Total	29,300
Construction Project Total	101,000
Annualized GHG Construction Emissions over Project Life (30 years) (metric tons CO2e/yr)	3,400
Note: All emission totals rounded to the nearest 100 metric tons	

Table 1 Activity Data Leading to Computation of Project CO2e Emissions for Construction of the PSPP and BSPP

Vehicle Type	Vehicle Average Round Trip Mileage (mi/veh/trip)		Monthly Average Mileage (miles/month)		Total Project Mileage (miles)		Construction GHG Emissions from Off-Site Vehicles (MT CO_2e)		Construction GHG Emissions from Off-Site Vehicles (%)	
	PSPP	BSPP	PSPP	BSPP	PSPP	BSPP	PSPP	BSPP	PSPP	BSPP
Off-site Construction Worker Commute	110	57	1,357,036	722,468	52,924,410	49,850,262	20,959	19,742	71%	63%
Off-site Equipment/Material Delivery Truck	77	70	39,596	50,704	1,544,235	3,498,600	2,889	6,544	10%	21%
Off-site Low Boy Trucks	300	300	2,100	2,191	81,900	151,200	153	283	1%	1%
Off-Site Dump Trucks	160	80	21,711	10,567	846,720	729,120	1,281	1,103	4%	4%
Off-site Flat Bed Trucks	80	40	6,117	1,948	238,560	134,400	361	203	1%	1%
Off-site Fuel Trucks	80	20	1,508	420	58,800	28,980	110	54	0%	0%
Off-site Concrete Trucks	80	40	48,978	27,026	1,910,160	1,864,800	3,573	3,488	12%	11%
Total	**---**	**---**	**1,477,046**	**815,324**	**57,604,785**	**56,257,362**	**29,326**	**31,418**	**100%**	**100%**

If GHG need to be adjusted, the criteria pollutants need to be adjusted as well.

As noted in the response above, the data reported in the DR responses related to GHG (DR-AIR-18 (PSPP) and DR-AIR-6 (BSPP) were incorrect; however, the GHG emission calculations and results found in the spreadsheets (Attachment DR-AIR-3 for both PSPP and BSPP) were correct. The criteria pollutant emission calculations reported in the DR responses, including the Project criteria pollutant emissions reported in DR-AIR-4 and -13 (PSPP) and DR-AIR-4, -16, and -19 (BSPP) were correct, as were the criteria pollutant emissions used in the air quality impacts analysis (DR-AIR-5 [PSPP] and DR-AIR-5 [BSPP]).

Confirm appropriate emissions standards for energy generator engines

At this time, the Applicant plans to order the equipment upon approval of the CEC license, anticipated in 2010. The appropriate design standard for 2010 model year engines greater than 750 Hp is the Tier 2 standard. The Applicant proposed a Tier 2 engine for the emergency generator based on the emission standards identified in 40 Code of Federal Regulations (CFR), Part 60, Subpart IIII, Standards of Performance for Stationary Compression Ignition Internal Combustion Engines. Pursuant to §60.4202(a)(2) of that subpart, engines with a maximum rating of more than 50 horsepower (Hp) must meet the emission standards listed in 40 CFR 89.112 for all pollutants beginning in 2007. The emission standards listed in 40 CFR 89.112 for engines with rated power greater than 560 kilowatt (kW) (750 Hp) are Tier 2 standards which are: 6.4 grams per kilowatt hour (g/kWh) for NOx and non-methane hydrocarbons (NMHC) combined, 3.5 g/kWh for CO and 0.20 g/kWh for PM.

If the equipment is not ordered until 2011, the appropriate design standard would be the Interim Tier 4 standards, in accordance with the California Airborne Toxic Control Measure (ATCM) for Stationary Compression Ignition Engines. According to the ATCM, new stationary emergency engines must meet the standards for off-road engines of the same model year and maximum rated power as specified in the Off-Road Compression Ignition Engines Standards (Title 13, California Code of Regulations (CCR), Section 2423). Title 13 CCR Section 2423 sets emission standards for the generator engine with model years 2011 and later. The Interim Tier 4 standard would apply to the Project generator engine as it would be larger than 900 kW (750 Hp) and would be manufactured between 2011 and 2014. The Interim Tier 4 Standards are 0.67 g/kWh for NOx, 0.40 g/kWh for NMHC, 3.5 g/kWh for CO and 0.10 g/kWh for PM.

The Tier 2 emissions were used in the emission calculations, ambient air quality impacts analysis (i.e., modeling) and health risk assessment. If the equipment is not ordered until 2011, the appropriate design standard would be the Interim Tier 4 standard and NOx, NMHC and PM10 emissions would be lower than the emissions from the Tier 2 engine. In that case, the air quality impacts would be lower than the impacts predicted for the Tier 2 engine. Thus use of the Tier 2 emissions in the analyses yields the worst-case predicted impacts for modeling, for predicting emission offset requirements, and for predicting health risk impacts.

Finalize SCAQMD data requests and reply to six items.

The Applicant submitted the additional information requested by the SCAQMD on February 3, 2010. A copy of the correspondence is provided as Attachment 1.

Need confirmation from SCAQMD that we are using the correct meteorological monitoring data set, and get response from SCAQMD regarding cumulative projects.

SCAQMD provided confirmation that the Blythe meteorological monitoring data set was appropriate and acceptable via e-mail. A copy of that correspondence is provided in Attachment 2. However, after several weeks of correspondence regarding cumulative modeling sources, SCAQMD staff is requiring a Public Records request in order to comply with the request for information related to cumulative sources. A copy of the Public Records request and the SCAQMD confirmation of the request, along with copies of subsequent correspondence are included in Attachment 3.

Confirm that SO_2 is higher for Palen than Blythe due to use of propane in stationary equipment.

The difference between the SOx emissions reported for PSPP and BSPP is the result of operational differences between the two projects. First, PSPP has proposed to use LPG in the auxiliary boiler, while BSPP has proposed to use natural gas. As shown in Table E.3-1b of the operating emissions spreadsheet previously provided in Attachment DR-AIR-2, the SOx emission factor differs greatly between the two fuel types. When compared in units of pounds of SOx emissions per MMBtu, the SOx emissions from LPG combustion are more than 41 times higher than SOx emissions from natural gas combustion. Secondly, PSPP has eliminated the use of the HTF heater and increased the usage of the auxiliary boiler from the operations as they were described in the AFC. The operations of BSPP remain as described in the AFC, using both an auxiliary boiler and HTF heater. The difference in operational usages has a minor effect on the SOx emissions between the two projects; these differences are summarized in Table 2.

Table 2 Summary of Operational Differences in SOx Emissions between PSPP and BSPP

Project Details	PSPP	BSPP
Auxiliary Boiler Fuel Type and emission factor	LPG (SOx = 1.13 E-2 lb/MMBtu)	Natural Gas (SOx = 2.72E-4 lb/MMBtu)
Auxiliary Boiler Operation	5,100 hours/year 12% at full load 88% at 25% load	5,000 hours/year 10% at full load 90% at 25%load
HTF Heater Operation	No HTF Heater at PSPP	500 hours/year 100% at full load

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Explain the difference in PM10 and PM2.5 ratios between Palen and Blythe.

The PM10 to PM2.5 ratio is consistent for all stationary sources and all vehicle (i.e., tailpipe) emissions for PSPP and BSPP. For the auxiliary boiler, HTF heater, emergency generator, fire water pump, and cooling tower, it was assumed that the PM2.5 emissions are equal to the PM10 emissions as footnoted in each table and discussed in Appendix E.3 of the AFC for each Project. The exhaust PM10 emissions for construction equipment, construction motor vehicles, operational on-site vehicles and operational offsite vehicles were taken from the EMFAC or OFFROAD model, and the SCAQMD mass fractions of PM2.5 in PM10, which is dependent on the type of fuel (diesel or gasoline), was used to calculate the PM2.5 emissions.

The difference between the PM10 to PM2.5 ratios used to calculate fugitive emissions for PSPP and BSPP is due to the methodologies used for fugitive emission calculations. The methodologies used reflect the different air quality agencies involved in the two Projects- the PSPP is in the SCAQMD's jurisdiction and the BSPP site is located in the Mojave Desert AQMD (MDAQMD). The PM10 to PM2.5 ratio was used to calculate operational fugitive emissions associated with onsite and offsite vehicle travel, and construction-phase fugitive emissions associated with soil handling, storage pile wind erosion, and bulldozing, scraping and grading activities.

For PSPP, a PM2.5 to PM10 fraction was applied to the calculated PM10 emissions in order to distinguish the PM2.5 emissions from the PM10 emissions. Since the PSPP site is located within the SCAQMD jurisdiction, the SCAQMD guidance document entitled: "PM2.5 Fraction of PM10 from Appendix A of the Final Methodology to Calculate Particulate Matter (PM) 2.5 and PM 2.5 Significance Thresholds" was used to estimate the PM2.5 emissions. These PM2.5 mass fractions are from PM profiles in the California Emission Inventory Data and Reporting System (CEIDARS) developed by the California Air Resources Board (ARB). This methodology was discussed in AFC Appendices E.2 and E.3 as well as noted in Tables E.2-3b, E.2-4b, E.2-4d, E.2-4f of the Construction Emissions and in Tables E.3 7b and E.3-8c in the Operation Emissions.

For BSPP, which is under MDAQMD jurisdiction, a combination of methods was used to calculate fugitive PM2.5 emissions including: EPA AP-42 Section 13.2.2 for onsite fugitive emissions, AP-42 Section 13.2.4 for soil handling operations, ARB "Emission Inventory Methodology for Entrained Paved Road Dust" for offsite vehicle travel, and MDAQMD "Emission Inventory Guidance Mineral Handling and Processing Industries" for storage pile wind erosion and bulldozing, scraping, and grading activities. These methodologies are discussed in AFC Appendices E.2 and E.3, as well as noted in Tables E.2-1, E.2-2a, E.2-2b, E.2-3b, E.2-4b, E.2-4d, E.2-4f of the Construction Emissions and in Tables E.3 7b and E.3-8c in the Operation Emissions.

Review OFFROAD model - were calculations based on Tier III construction engines for 2006 or for 2006 through 2008?

The emission factors developed from the OFFROAD model are not averaged over multiple years, but rather represent the Tier 3 emissions factors for a specifically defined year. The OFFROAD model provides activity (hours of operation per day) and emissions (total tons per day) for each of several engine size categories and model year for each type of equipment. For each Project, a spreadsheet database of the OFFROAD output was created, and using this database, an emission factor for each specific combination of model year, engine/equipment type, fuel type, and engine size used in the construction plan was created. The resultant emission factors are specific for a given engine model year. There is no averaging between model years other than any averaging performed within the OFFROAD model itself.

The PSPP and BSPP emission computation spreadsheets provided in response to DR-AIR-6 for PSPP included a tab in the Project spreadsheets entitled "OFFROAD GHG EF Documentation". These tabs present the engine type/size/fuel/year assumed for each equipment type assumed to be used during facility construction, along with the final emission factors from OFFROAD output.

Attachment 1
SCAQMD Correspondence Related to Six Data Adequacy Questions

AECOM Environment
1220 Avenida Acaso
Camarillo, CA 93012
tel 805-388-3775
fax 805-388-3577

February 3, 2010

Mr. Kenneth L. Coats
South Coast Air Quality Management District
21865 Copley Drive
Diamond Bar, CA 91765-4178

RE: Palen Solar Power Project; SAQMD Facility ID Nos. 161483 and 161484

Dear Mr. Coats,

In its October 23, 2009 letter, AQMD requested additional information in order to process the air permit applications for the Palen Solar Power Project (PSPP). In this correspondence and attachments, AECOM, on behalf of the Applicant (Solar Millennium) addresses each of the requested items. Please note that ownership of the project is now assigned to a project-specific entity known as Palen Solar I LLC (PSI), a wholly owned subsidiary of Solar Millennium LLC. The applicant submitted change of ownership applications to the District on February 1.

1. The specific manufacturer's emission performance warranty/guarantee for the boiler and heater treater which will indicate that this equipment will comply with the BACT emission limit for NOx of ≤ 9 ppmv corrected to 3% O_2, dry basis for equipment fired with propane fuel and configured with a low-NOx burner. Also, please provide the manufacturer's emission performance warranty/guarantee for the boiler and heater treater which will indicate that this equipment will comply with the BACT emission limit for CO of ≤ 50 ppmv corrected to 3% O_2, dry basis for firetube type boilers and heater treaters fired with propane fuel.

Response: Manufacturer's specifications and literature for the auxiliary boilers is provided in Attachment 1. As shown in the literature, the manufacturer guarantees the equipment to not exceed 9 ppmv NOx or 50 ppmv CO while using propane fuel. Note that while this equipment represents the facility design at the current time, final equipment selection is not anticipated until the CEC license has been issued. Should Solar Millennium select different equipment, it will advise AQMD.

Regarding the HTF heater, based on the system performance modeling, historical ambient temperature data and cost considerations, the Applicant has determined that the HTF heater will not be needed for Project operations. Instead, the heat required for HTF freeze protection will be provided by the auxiliary boiler. The Applicant has determined that 100 hours of operation per year by the auxiliary boiler will be sufficient for HTF freeze protection. Applications for changes in the hours of operation and emissions for the boilers to accommodate this change were submitted February 1.

2. The specific manufacturer's emission performance warranty/guarantee for the emergency electrical generator and the emergency fire pump internal combustion engines which will indicate that this equipment will comply with the following BACT emission limits/requirements for Tier III engines: CO ≤ 2.6 grams/bhp-hr; NOx+NMHC ≤ 3.0 grams/bhp-hr; and ≤ 0.15 gm/bhp-hr for control of particulate matter less than 10 microns is aerodynamic diameter (PM10).

Response: As represented in the DOC application, the Applicant is proposing to use a Tier III engine for the emergency fire water pump engine. A final engine/pump set has not yet been selected for the Project, and final selection is not anticipated until the CEC license has been issued. For the purpose of

permit processing, please use the specification sheet provided in Attachment 2. Should Solar Millennium select a different engine/pump, it will advise AQMD.

For the emergency generator engine, at this time, the Applicant plans to order the equipment upon approval of the CEC license, anticipated in 2010. The appropriate design standard for 2010 model year engines greater than 750 Hp is the Tier 2 standard. The Applicant proposed a Tier 2 engine for the emergency generator based on the emission standards identified in 40 Code of Federal Regulations (CFR), Part 60, Subpart IIII, Standards of Performance for Stationary Compression Ignition Internal Combustion Engines. Pursuant to §60.4202(a)(2) of that subpart, engines with a maximum rating of more than 50 horsepower (Hp) must meet the emission standards listed in 40 CFR 89.112 for all pollutants beginning in 2007. The emission standards listed in 40 CFR 89.112 for engines with rated power greater than 560 kilowatt (kW) (750 Hp) are Tier 2 standards which are: 6.4 grams per kilowatt hour (g/kWh) for NOx and non-methane hydrocarbons (NMHC) combined, 3.5 g/kWh for CO and 0.20 g/kWh for PM.

If the equipment is not ordered until 2011, the appropriate design standard would be the Interim Tier 4 standards, in accordance with the California Airborne Toxic Control Measure (ATCM) for Stationary Compression Ignition Engines. According to the ATCM, new stationary emergency engines must meet the standards for off-road engines of the same model year and maximum rated power as specified in the Off-Road Compression Ignition Engines Standards (Title 13, California Code of Regulations (CCR), Section 2423). Title 13 CCR Section 2423 sets emission standards for the generator engine with model years 2011 and later. The Interim Tier 4 standard would apply to the Project generator engine as it would be larger than 900 kW (750 Hp) and would be manufactured between 2011 and 2014. The Interim Tier 4 Standards are 0.67 g/kWh for NOx, 0.40 g/kWh for NMHC, 3.5 g/kWh for CO and 0.10 g/kWh for PM.

The Tier 2 emissions were used in the emission calculations, ambient air quality impacts analysis (i.e., modeling) and health risk assessment. If the equipment is not ordered until 2011, the appropriate design standard would be the Interim Tier 4 standard, and NOx, NMHC and PM10 emissions would be lower than the emissions from the Tier 2 engine. In that case, the air quality and public health impacts would be lower than the impacts predicted for the Tier 2 engine. Thus use of the Tier 2 emissions in the analyses yields the worst-case predicted impacts for modeling, for predicting emission offset requirements, and for predicting health risk impacts.

The specification information for the gen set current planned for the facility (i.e., the Tier 2 engine) is provided in Attachment 2, although final selection is not anticipated until the CEC license has been issued. Should Solar Millennium select a different gen set, it will advise AQMD.

3. With regard to the control equipment consisting of a 2-stage condensing system with carbon adsorption to be installed on the HTF expansion tank system, please provide justification for the expected 98 percent reduction efficiency in VOC emissions. Proper and complete justification should include the following items:

    a) Documentation from the manufacturer of the control equipment which substantiates the 98% reduction efficiency.

    b) The number of periodic carbon adsorption regeneration events which are necessary to maintain or exceed the expected 98% reduction efficiency.

Response: a) The control efficiency used in the emission calculations was an assumption based on a literature review of carbon systems and was used to estimate emissions. However, control efficiency is not really the issue with carbon control systems – according to a literature review conducted by AECOM, two carbon beds in series (as proposed) should routinely achieve better than 98 percent control, provided the carbon is changed-out prior to breakthrough.

We would propose monitoring for breakthrough between the first and second carbon beds using a hand-held VOC monitoring device (e.g., OVA, PID, FID) while the carbon system is in operation. As noted in the AFC, the Ullage vent operates for short periods of time, typically 2 hours per day, up to 400 hours per year (it does not have to operate every day). By monitoring between the first and second bed, when breakthrough of the first bed is detected, the second bed ensures that there would be no emissions to atmosphere. Carbon in the first bed is changed-out with fresh carbon before breakthrough could occur in the second bed.

Monitoring for these types of systems should be conducted at intervals not to exceed 20 to 25 percent of the predicted bed life, and we would expect a condition requiring a routine monitoring schedule. We would also expect a condition to require that the carbon in the first bed be changed-out within a reasonable time following detection of breakthrough. However, at this time, the carbon system design has not been finalized, so we cannot predict what the monitoring frequency would be in terms of operating days or operating hours, or what the appropriate schedule should be for carbon change-out. To address these uncertainties, we propose that the District impose a condition that requires us to prepare and submit a monitoring and change-out plan for District approval prior to start up. In this way, the District can issue a Permit to Construct / Preliminary Determination of Compliance that is complete and concise and ensures that you will have approval authority over the monitoring and change-out schedule, and the Applicant has the flexibility to design the most effective control system without having to design it around conditions that were adopted prematurely. This approach would also reduce the possibility of needing a change of conditions.

b) The carbon would not be regenerated onsite; the current plan would be to replace spent carbon upon saturation. Normal operating practice would be to monitor the effluent from the first carbon canister (call it "A") at a monitoring location after canister A and prior to the second carbon canister ("B"). Upon breakthrough, the canister B would become the primary and the carbon in the canister A would be replaced. Following carbon change-out, canister "A" would then become the polishing filter. Alternatively, the system may be designed with a spare canister ("C") so that when canister "B" becomes the primary, "C" becomes the polishing filter, and "A" is taken offline for carbon replacement.

Based on the adsorption isotherm for benzene (the constituent thought to be the primary constituent of the Ullage system vent), one pound of carbon would adsorb approximately 0.282 pounds of benzene. Based on an uncontrolled emission rate of 34,320 pounds per year, approximately 122,000 pounds of carbon would be consumed per year. Based on a preliminary design, each canister would hold 2,000 pounds of carbon; therefore, carbon replacement (one canister at a time) would be required 61 times per year, or about five times per month. However, as with the other equipment discussed in this correspondence, the information provided herein should be considered preliminary and final carbon system design is not anticipated until after the CEC license has been issued.

4. Please provide the calculations for determination of the fugitive VOC emissions from the facility, which should include an accurate assessment of the number of pumps, valves, flanges, seals, and compressors (if any) currently in use at the facility.

Response: The fugitive VOC emissions were calculated for the DOC application based on an estimate of the component counts and EPA-approved emission factors for heavy hydrocarbons. The emissions were summarized in Section 3.1 of the DOC application and detailed calculations were provided in Appendix D of the application. Appendix D of the DOC application is provided as Attachment 3 of this submittal.

For the purpose of the DOC application, the preliminary component counts were based on information obtained from the Beacon Solar Energy Project (BSEP), a solar power project of approximately 250 MW gross output (i.e., approximately one-half the output of the proposed PSPP) and similar thermal trough technology. For PSPP, the BSEP component counts were simply doubled. Please note that the BSEP component counts should also be considered preliminary, as the piping layout has not been finalized for that project.

The final component counts for the facility are dependent on the final facility piping layout which has yet to be developed. As a practical matter, during the course of Project development and licensing, the facility layout may change which would change the component counts. While we understand the AQMD's interest in accurate emissions, any component counts used to estimate emissions would be approximations until the final piping layout has been developed. We anticipate a final piping layout shortly before the start of construction, well after the CEC issues a license for the Project. We understand that the AQMD has in the past accepted preliminary component counts for the purpose of emission estimates for certain specific projects, with a condition in the Permit to Construct that the final Process and Instrumentation Diagram (P&ID) be submitted to the AQMD prior to issuance of the Permit to Operate. The Applicant would be willing to accept a similar condition.

5. Please provide a simplified plant layout which includes all proposed equipment and processes and their relative locations. This diagram should be submitted electronically, if possible.

Response: An electronic version of the plant layout diagram was provided via e-mail from Russ Kingsley of AECOM to Ken Coats of the AQMD in October 2009. It is our understanding that the submittal was acceptable, and that this information request was been satisfied.

6. Regarding the proposed Ullage system and land treatment units, please provide a thorough description and quantities of the types of equipment each system will be comprised of, such as storage tanks, vessels, heat exchangers, and/or other such devices as applicable.

Response: The HTF (eutectic mixture of diphenyl oxide and diphenyl) degrades over time in low and high boiling products, which must be separated and eliminated from the cycle. Low boiling degradation products are a mixture of benzene, toluene, xylene and phenol; the concentration of each component of the mixture can differ considerably from plant to plant depending on many factors, and it can be difficult to determine day-to-day concentrations. A high concentration of low boilers in the HTF changes the fluid properties and increases risk of cavitation for the pumps. In order to limit this effect, a mixture of nitrogen, degradation gases and HTF vapor is vented from the expansion vessel and the overflow vessels. To maintain sufficient pressure within the HTF cycle, nitrogen is introduced in the expansion vessel.

The gaseous mixture of nitrogen, low boiling products and HTF from the expansion vessel enters the Ullage system via first Ullage vessel, which contains a certain level of HTF at any time. HTF vapor within the mixture is condensed and is re-circulated to the HTF cycle via Ullage discharge pump. The HTF content of the first Ullage vessel is cooled by recirculation via a circulation pump and air cooler.

Leaving the first Ullage vessel, residual mixture of gaseous nitrogen and low boiling products enters the second Ullage vessel. The HTF content of the second Ullage vessel is also cooled by recirculation via a second recirculation pump and air cooler and the recovered HTF returned to the HTF loop. Residual gaseous components, consisting primarily of nitrogen and VOC are vented to atmosphere through controls.

To limit the concentration of high boiling degradation products in the HTF cycle, the high boilers are removed from HTF in the reclamation system. Therefore, a small flow of hot HTF is taken from the hot (and pressurized) main pipe which is leaving the solar field and transferred to the reclamation system. The hot HTF immediately vaporizes in the un-pressurized reclamation flash vessel. The HTF vapor is transferred to the first Ullage vessel (see above), condensed and returned back to the HTF cycle. The residual non-vaporizing high boilers are left behind in the reclamation flash vessel and collected by gravity in the reclamation drain vessel. Separation of high boiling byproducts is required when the concentration of high boiling byproducts reaches approximately 9 percent by weight. It can be up to ten years or more until separation of high boiling byproducts becomes necessary. These are removed as liquid to proper waste recovery handling via truck transport as necessary.

A list of the major vessels and components of the Ullage system is provided in Table 1. A simplified

process flow diagram is provided as Attachment 4.

Table 1 Ullage System Component List

Qty	Unit	Approx. Dimensions (height x dia) (Ft)	Installed capacity
1	Reclamation flash vessel	15 x 6	10 m^3
1	Reclamation drain vessel	15 x 7	12 m^3
1	Ullage vessel 1	15 x 8	16 m^3
1	Ullage cooler 1	t.b.d.	t.b.d.
1	Ullage circulation pump	NA	30 m^3/h
1	Ullage discharge pump	NA	10 m^3/h
1	Strainer in front of ullage pumps	t.b.d.	t.b.d.
1	Ullage cooler 2	t.b.d.	t.b.d.
1	Ullage vessel 2	15 x 8	16 m^3
1	Collecting tank	22 x 12	60 m^3
1	HTF storage tank	22 x 12	60 m^3
2	HTF Drain pump	NA	

The land treatment unit will consist of two rectangular areas, each 800 feet by 218 feet, for a total of 8 acres. Each LTU will be constructed with 3 feet of compacted natural soil, overlain by 2 feet of compacted clay, and will be surrounded by a 2 foot high clay berm. The contaminated soil will be placed in the LTU by backhoe or other earthmoving equipment appropriate for quantity of soil that has to be managed and, while undergoing treatment, will be periodically mixed in the LTU using a small tractor. The LTU has no stationary air emission units or other equipment associated with its operation.

7. Please provide a copy of the certified CEQA document for this project when such document becomes available.

Response: The CEQA document is an Application for Certification submitted to the California Energy Commission on August 24, 2009 (09-AFC-7). The Applicant expects that the AFC will be certified no later than December 2010. The AQMD will be provided with a copy of the Commission Decision as soon as it becomes available.

Yours sincerely,

Russell Kingsley
Program Manager
Russ.Kingsley@aecom.com

Arrie Bachrach
Sr. Program Manager
arrie.bachrach@aecom.com

Attachment 1

Auxiliary Boiler Specification

CB NEBRASKA BOILER®

The power of commitment.™

www.neboiler.com

D-TYPE

Proposal No: 24521-J2
Date: 12-10-2009
Prepared By: Jason Jacobi

TO:	FOR:
Kiewit Power Engineers Lenexa, KS **KPE Project No. 2008-045**	**Palen 240 MW Solar Project** Palen, CA

BOILERS - BURNERS - CONTROLS

TOTAL INTEGRATION

TABLE OF CONTENTS

1.0 INTRODUCTION

CB Nebraska Boiler & **CB Natcom** form the engineered boiler/burner division of the **Cleaver-Brooks** family of companies. We are committed to offering integrated boiler/burner solutions to the industry. This group of companies has been in this business for more than 80 years and continues to enjoy a large percentage of the market share. We maintain our leadership in the industrial watertube market by offering innovative solutions and a true single-source responsibility to our customers for boilers, burners, controls & auxiliary equipment. This commitment to overall system design ensures that your equipment operates efficiently and lasts for years to come.

For your unique application, we are offering a packaged solution with the following design features:

1.1 OUTLET STEAM CONDITIONS:

Capacity (net output):	25,000 LB/HR ¤
Capacity (gross output):	29,000 LB/HR including deaerator steam
Operating Pressure:	165 PSIG (at exit of non-return valve) ¤
Steam Temperature:	Superheated to 480°F ± 10°F (at 100% load) ¤
Steam Purity:	1 ppm TDS ¤

1.2 BOILER DESIGN:

Type:	D-Type Industrial Watertube
Model:	NB-201D-45-SH
Vessel Design Pressure:	300 psig

1.3 BURNER DESIGN:

Type:	Low-NOx Register
Main Fuel:	Propane/Air Mix (9 ppm NOx, 50 ppm CO)
Backup Fuel:	NA

1.4 ECONOMIZER DESIGN:

Type:	Rectangular Finned-Tube
Arrangement:	Vertical Gas Flow; Counter-Current Water Flow
Design Pressure:	350 psig
Inlet Feedwater Temp:	228°F

1.5 STACK DESIGN:

Type:	Freestanding Stub
Diameter (at exit):	36″
Height (from grade):	50 ft

In partnership with our authorized representative, **Trabue Industrial Systems** in Overland Park KS, we offer your true single-source solution for boiler, burner, controls & local support.

2.0 SCOPE OF SUPPLY

The following equipment is included for each steam generator system proposed:

*Note that items marked 'NO' may not be required and/or may not be specified:

Shipped Loose	ITEM	Size	Qty	Included YES	NO	ALT
X	**Model NB-201D-45-SH D-Type industrial watertube boiler**		1	X		
	- Fully membrane (watercooled) pressure vessel that is 100% welded gas-tight with no refractory corner seals			X		
	- Tubes will be SA178A			X		
	- Tubes will be SA192 (seamless)				X	
	- Tubes seal-welded to drum (for high-pressure or heavy cycling service)				X	3
	- Steam separators to provide steam purity of 1 ppm TDS based on water supply meeting attached limits.			X		
	- Boiler shall be painted SSPC - SP3			X		
	- Membrane front wall			X		
	- Membrane rear wall			X		
	- Factory hydrostatic test			X		
	- Factory air casing test			X		
	- Corrugated aluminum outer casing			X		
	- Welded steel outer casing – primed & painted				X	
	- Lower-drum steam heating coil				X	
	- Furnace access door (15x18")		1	X		
	- Convection inspection door		1	X		
	- Furnace observation ports (three 1 ½" on rear wall)		3	X		
	- 12x16" elliptical manways		4	X		
	- 14x18" elliptical manways (steam drum only)				X	
	- Hinged manways		4	X		
	Boiler Steam Trim:					
	- Water column		1	X		
	- Water column drain valve	0.75 in.	1	X		
	- Water column probe		1	X		
	- Water column gage glass		1	X		
	- Water column gage		1	X		
	- Water column gage drain valve	0.75 in.	1	X		
	- Auxiliary Low water cutout		1	X		
	- Auxiliary Low water cutout drain valve	0.5 in.	1	X		
	- Low water cutouts bypass		1	X		
	- Continuous (surface) blowdown stop valve	0.75 in.	1	X		
	- Continuous (surface) blowdown control valve	0.75 in.	1	X		
X	- Bottom (intermittent) blowdown stop valve	1.5 in.	1	X		
X	- Bottom (intermittent) blowdown control valve	1.5 in.	1	X		
	- Chemical feed stop valve	0.5 in.	1	X		
	- Chemical feed check valve	0.5 in.	1	X		
X	- Drum vent valve	0.5 in.	1	X		

Shipped Loose	ITEM	Size	Qty	Included YES	Included NO	Included ALT
	- Drum vent stack		1		X	
	- Steam pressure gage	8.5 in.	1	X		
	- Steam gage drain valve	0.5 in.	1	X		
	- Steam gage test valve	0.25 in.	1	X		
	- Drum Level Transmitter Isolation Valve	1.5 in.	2	X		
	- Drum Level Transmitter Isolation Drain Valve	0.5 in.	2	X		
X	- Main steam non-return valve	6.0 in.	1	X		
X	- Main steam stop valve	6.0 in.	1	X		
X	- Spool piece – 3 ft	6.0 in.	1	X		
X	- Spool piece drain valve	0.5 in.	1	X		
X	- Safety valves - set at: 300 PSIG	300 psig	1	X		
X	- Safety valves - set at: 295 PSIG	295 psig	1	X		
	- Safety valve silencers		2		X	
	- Safety valve vent stacks		2		X	
	- Safety valve silencer/stack support		2		X	
	- Safety valve drip pan elbow		2		X	
	- Steam sample cooler		1		X	
	- Lower-drum steam heating coil trim including isolation valves, drain valves & steam trap temperature regulator	1.5 in.			X	
	Boiler Feedwater Trim:					
X	- Feed control valve	2.0 in.	1	X		
X	- Feed stop valve	2.0 in.	1	X		
X	- Feed check valve	2.0 in.	1	X		
X	- Feed control system drain valve	0.5 in.	2	X		
X	- Feedwater bypass valves – globe	2.0 in.	1	X		
X	- Feedwater bypass valves – gate	2.0 in.	2	X		
X	- Feedwater piping	2.0 in.	1	X		
	Boiler Sootblowers:					
	- Boiler wall boxes & bearings		1	X		
	- Sootblower Manual assembly				X	
	- Sootblower Electric assembly				X	
	- Sootblower element (calorized/dialoy)				X	
	- Sootblower steam piping from boiler				X	
	- Sootblower shutoff valve				X	
	- Sootblower drain valve				X	
	Economizer:					
X	- Rectangular finned-tube economizer with corrugated outer lagging		1	X		
	- Economizer sootblower wall boxes & bearings		1	X		
	- Economizer sootblower assembly				X	
	- Steam supply pipe and steam stop and drain valves for economizer sootblower assembly				X	
	Economizer Trim:					
	- Economizer feedwater bypass				X	
	- Economizer safety relief valve				X	
	- Economizer safety relief valve vent stack				X	
	- Economizer safety relief valve drip pan elbow				X	

Shipped Loose	ITEM	Size	Qty	Included YES	NO	ALT
X	- Header vent valve	1.0 in.	1	X		
X	- Header drain valve	1.0 in.	2	X		
X	- Temperature gauges – feedwater inlet/outlet		2	X		
	- Temperature thermowell - feedwater inlet/outlet		2	X		
X	- Temperature gauges – flue gas inlet/outlet		2	X		
	- Temperature thermowell - fluegas inelt/outlet		2	X		
	Superheater:					
	- Inverted-loop, drainable-type, single stage convection primary superheater, designed for a final temperature 480°F±10°F at 100% MCR		1	X		
	- Secondary superheater - used in dual stage superheaters				X	
	Superheater Trim:					
X	- Saturated steam piping from boiler steam outlet to superheater inlet with vent and drain connections. Shipped loose.	6.0 in.	1	X		
X	- Superheated steam outlet pipe with safety valve connection, vent connection, drain connection, and temperature/pressure gauge connections	6.0 in.	1	X		
X	- Drain and valves	1.0 in.	2	X		
X	- Vent valves	1.0 in.	1	X		
X	- Sample valve	0.75 in.	1	X		
X	- Temperature gauge		2	X		
X	- Pressure gauge		2	X		
X	- Superheater safety relief valve		1	X		
	- Superheater safety relief valve silencer		1		X	
	- Superheater safety relief valve stack		1		X	
	- Superheater safety relief valve silencer/stack supports		1		X	
	- Superheater safety relief valve drip pan elbow		1		X	
	- Start-up vent valve		1	X	X	
	- Start-up vent valve silencer		1		X	
	- Start-up vent valve stack		1		X	
	- Start-up vent valve silencer/stack supports		1		X	
	Attemperator:					
	- Variable-orifice feedwater spray-injection type desuperheater assembly with integral spray nozzle				X	
	- Spray water control valve				X	
	- Steam piping between superheater stages				X	
	Boiler Instrumentation:					
X	- Steam flow element - Orifice plate		1	X		
X	- Feed water flow element - Orifice plate		1	X		
	Boiler Transmitters: - all transmitters include a 3 valve manifold					
X	- Steam flow transmitter		1	X		
X	- Feedwater flow transmitter		1	X		
X	- Steam outlet pressure transmitter		1	X		
X	- Furnace pressure transmitter for draft control		1	X		

Shipped Loose	ITEM	Size	Qty	Included YES	NO	ALT
	- Drum level transmitter		1	X		
X	- Eyehye Remote Drum level transmitter		1	X		
X	- Economizer feedwater inlet temperature transmitter - including RTD		1	X		
X	- Economizer feedwater outlet temperature transmitter - including RTD		1	X		
X	- Economizer flue gas inlet temperature transmitter - including RTD		1	X		
X	- Economizer flue gas outlet temperature transmitter - including RTD		1	X		
	Stack:					
X	- Freestanding Stub stack 36 inch diameter (at the exit) and 50 ft in height (from grade) with sampling ports as required. Made from 0.25 inch carbon steel.		1	X		
X	– Ladders to access sampling ports		1	X		
X	- Platforms to access EPA ports		1	X		
	- 1/16" corrosion allowance on stack wall.				X	
	- Rub plates and all hardware for guiding the stack at the roof				X	
	- Rain hood				X	
X	- Personnel protection - from grade:	8 ft	1	X		
	- External insulation & lagging for stack				X	
	- FAA warning lights		1		X	
	Deaerator:					
	- Spray-type deaerator				X	
	- Tray-type deaerator		1			***1***
	- Storage tank		1			***1***
	- Simplex (one(1) 100% capacity) feedwater pumpset				X	
	- Duplex (two(2) 100% capacity) feedwater pumpset		2			***1***
	- Triplex (three(3) 50% capacity) feedwater pumpset				X	
	- Deaerator support stand		1			***1***
	- Deaerator platforms & ladders		1			***1***
	- Local deaerator control panel		1			***1***
	SCR:					
	- Catalyst to Reduce NOx by 90%				X	
	- Catalyst to Reduce CO by 80%				X	
	- Reactor housing				X	
	- Ammonia Injection Grid (AIG)				X	
	- Ammonia Flow Control Unit (AFCU)				X	
	- Ammonia Dilution and Flow Skid				X	
	- Ammonia storage tank				X	
	- Flow model test				X	
	Boiler Platforms & Ladders:					
X	- Platforms & ladders to access boiler Drum Length		1	X		
X	- Platforms & ladders to access boiler Drum End		1	X		
	- Platforms & ladders to access Economizer		1		X	
X	- Platform construction: Angle Iron handrails, Exp flooring		1	X		

Shipped Loose	ITEM	Size	Qty	Included YES	NO	ALT
	- Platform & ladder finish: Primed & Painted		1	X		
	Miscellaneous:					
	- P.E. stamp (structural only)		1		X	
X	- Blowdown tank		1	X		
	- Blowdown conductivity control system		1		X	
	- Chemical feed system		3		X	
	- C.E.M.S. (continous emissions monitoring system)		1		X	
X	- Inlet air preheater with trim (steam supply req'd)		1	X		
	- Motor starters		1		X	
	- Spreader bars for rigging		1		X	
	- Oil fuel atomizing steam stop and drain valves and supply piping from steam header/drum to entrance to atomizing steam train				X	
	- Superheater piping field welds				X	
	- Piping insulation				X	
	- Piping supports				X	
	- Field cuts/welds for field alignment, between major pieces of equipment. (Ducting flanges are tack welded. Prefab piping is completed for hydrotest at factory)				X	
	- Design & supply of interconnecting piping, wiring, conduit, tubing, and fittings, between boiler/boiler controls and auxiliary equipment e.g. D.A., blowdown, chem. feed, drains, vents, field mounted electronics, etc…				X	
	- Unloading and installation of equipment				X	
	- Interconnecting large-bore (> 2") piping between skids. Small-bore piping (≤ 2") by others				X	
	- Disposal of boil-out chemicals				X	
	- Required chemicals and fuels for boil-out, start-up, and testing				X	
	- Foundation and anchor bolts				X	
	- Export Packing/Crating				X	
	- Bonding or LOC				X	
X	- O&M manuals - Submitted Electronically		10	X		
	Ductwork:					
X	- Boiler-to-economizer transition duct		1	X		
X	- Economizer outlet transition duct with FGR port		1	X		
X	- Expansion Joint		1	X		
	- Misc. Duct		1		X	
	Structural Support:					
X	- Economizer support steel structure		1	X		
	- Misc. Support		1		X	
	Service:					
	- Including: 20 Days 4 Trips				X	
	- 5 days and 1 trip of installation supervision				X	
	- 2 8-hour training sessions				X	
	- Materials for training sessions (manuals, presentations, cut sheets, etc…)				X	

Shipped Loose	ITEM	Size	Qty	Included YES	NO	ALT
	Freight:					
	- Equipment is offered Ex-Works (Incoterms 2000)			X		
	- Freight, via truck/rail, is included FCA jobsite (Incoterms 2000)				X	*2*
	- Rigging & offloading at designated point of delivery				X	
	- Transport from point of delivery to jobsite				X	

BURNER SCOPE OF SUPPLY

Shipped Loose	ITEM	Size	Qty	Included YES	NO	ALT
	Burner (Totally shop assembled and dry tested):					
	Burner outer front plate.		1	X		
	Combustion air tube and inlet shroud.		1	X		
	Air Swirler assembly.		1	X		
	Guide tube center-ring support.		1	X		
	Observation port with sight glass.		1	X		
	Scanner port swivel mount.		2	X		
X	Flame Detector; Microprocessor Fireye Insight 95UV1 Ultraviolet.		2	X		
	Stainless steel Cylindrical burner throat assembly.		1	X		
	Engineering, drawings and instruction manuals.		10	X		
	Igniter:					
	Bluff body Igniter support.		1	X		
	Pilot Spark Igniter; Interruptible (NFPA Class 3)		1	X		
	Gas firing system:					
	Gas manifold with positioning system.		1	X		
	Stabilization gas injector.		1	X		
	Gas injectors / lances.		12	X		
	Windbox:					
	Complete prefabricated windbox to suit new burner and boiler front configuration with necessary structural reinforcement ¼" carbon steel primer and finish paint. Vibration free.		1	X		
	Flanged connection for air inlet.		1	X		
	Access door (flanged).		1	X		
	The following miscellaneous equipment is mounted on the windbox and pre-wired to a NEMA-4 junction box, which is also mounted on the windbox:					
	Ignition transformer 120V / 6,000V with insulated spark plug connector.		1	X		
	Steam Pressure Transmitter		2	X		
	High furnace pressure switch. (Dwyer)		1	X		
	Instrument Air valves train:					
	Manual shutoff valve.		1	X		
	Pressure gauge 4" dial c/w shutoff valve.		1	X		
	Pressure Regulator.		1	X		
	Low pressure switch. (United Electric)		1	X		
	Lot of shutoff valves on air supply connection to valves (c/w 1 spare connection).		1	X		

Shipped Loose	ITEM	Size	Qty	Included YES	NO	ALT
	Plant Air valves train supply to Igniter and Scanner(s):					
	Manual shutoff valve with locking device.		1	X		
	Automatic Safety shutoff valve.		1	X		
	Air flow orifice union.		2	X		
	Lot of flexible and fitting.		1	X		
	Combustion Air Fan and FGR assembly system:					
X	Combustion air inlet Preheater c/w Steam Coil heat exchanger. Steam Flow Control Valve w/ pneumatic actuator Temperature sensor and Temperature Transmitter. Main shutoff valve and strainer. Pressure gauge and shutoff valve. Steam FCV Bypass and isolating valves. Condensate steam trap w/ bypass and isolating valves. Piping.		1	X		
X	Combustion air fan will be windbox mounted, arr't 4, downblast with High Efficiency TEFC Motor and quick release access door.		1	X		
	Noise reduction equipment to achieve 85 dBA at 3 feet.		1	X		
	Combustion airflow measurement device.		1	X		
	Combustion air flow Differential Pressure transmitter.		1	X		
	Temperature transmitter for temperature compensation.		1	X		
	Combustion air flow control Pre-Spin Inlet Box Damper (// blades) c/w 4 to 20 mA pneumatic actuator.		1	X		
	Combustion air flow switch. (Dwyer)		1	X		
	Purge air flow switch. (Dwyer)		1	X		
	Combustion air and FGR Mixing Box.		1	X		
	FGR flow control damper c/w 4 to 20 mA pneumatic actuator and 4 to 20 mA position feedback.		1	X		
	FGR flow measurement device.		1	X		
	FGR flow Differential Pressure transmitter.		1	X		
	Temperature transmitter for temperature compensation.		1	X		
	Inlet Windbox mounted Combustion air flow control Damper (opposed blades) c/w 4 to 20 mA pneumatic actuator.		1	X		
	Pilot gas valve train:					
	Complete prefabricated gas pilot train, schedule 40 piping, is mounted on the windbox per NFPA standards and wired to the junction box located on the windbox.		1	X		
	Pilot manual shutoff valve.		1	X		
	Strainer.		1	X		
	Pressure regulator.		1	X		
	Upstream gas pressure gauge 2½" dial c/w shutoff		1	X		

Shipped Loose	ITEM	Size	Qty	Included YES	NO	ALT
	valve.					
	Automatic safety shutoff valve.		2	X		
	Automatic vent valve.		1	X		
	Downstream gas pressure gauge 2½" dial c/w shutoff valve.		1	X		
	Flexible hose.		1	X		
	Main gas valve train:					
	Complete prefabricated main gas valve train based on fully metered type combustion control, schedule 40 piping per NFPA standards. All fuel train components are wired to the junction box. Fuel train and Junction Box are windbox mounted.		1	X		
X	Main burner manual shutoff valve.		1	X		
X	Strainer.		1	X		
X	Gas Pressure Regulator.		1	X		
X	Flow element & transmitter.		1	X		
	Pressure gauge 4" dial c/w shutoff valve.		1	X		
	Low gas pressure switch. (United Electric)		1	X		
	Automatic Safety Shutoff Valve and switches. (Maxon)		2	X		
	Automatic Safety Vent Valve. (Asco)		1	X		
	Manual lockable vent valve.		1	X		
	High gas pressure switch. (United Electric)		1	X		
	Flow control valve c/w 4 to 20 mA pneumatic actuator.		1	X		
	Pressure gauge 4" dial c/w shutoff valve.		1	X		
	Main Burner test firing manual shutoff valve c/w position limit switch.		1	X		
	Flexible hose; Main natural line inlet.		1	X		
	Stabilizer gas Orifice valve.		2	X		
	Stabilizer gas injector pressure gauge c/w shutoff valve.		1	X		
	Flexible hose; stabilizer gas injector.		1	X		
	Burner Management System:					
	Complete package pre-wired and tested burner management system for single fuel operation. Non-recycling operation. The system is based on a PLC in conjunction with Fireye scanner designed as per NFPA standards.		1	X		
	Control panel 36" W x 72" H x 24" D NEMA 12, Free Standing		1	X		
	Water Level Relay		4	X		
	Push button: Burner Start, Emergency Stop, Burner Stop, Silence Horn, Alarm Silence Push Button		4	X		
	Flame scanner; refer to burner description					
	Control circuit breaker		1	X		
	Alarm horn		1	X		
	Lot of Pilot light: Power ON, Ignition ON, Purge in Progress, Lock Out		1	X		

Shipped Loose	ITEM	Size	Qty	Included YES	NO	ALT
	Alarm, Low Water Level Alarm, High Water Level Alarm, Main Gas Valve Energized.					
	Selector switch: FD Fan On-Auto-Off.		1	X		
	Processor - Allen Bradley CompactLogix 1769-L35E c/w Ethernet/IP Including wire, connectors, Panduit.		1	X		
	Base mounted power supply		1	X		
	16 ch 120 VAC Discrete Input module		4	X		
	16 ch 120 VAC Discrete Output module		2	X		
	4 ch 4–20 mA Analog Input module		1	X		
	HMI 10" color touchscreen display. (Shared with Combustion Control System) Panelview 1000 Plus 2711P-T10C4D2		1	X		
	The HMI includes one Graphic and one Alarm/Status display to show the following operational status (hi-lighted words): Power-On, Ignition-On, Limits Satisfied Light, Purge In Progress, Purge Complete, Flame Detected, Low Fire, Fan Hand/Off/Auto, High/Low Water Alarm, Reset Required, Main Gas-On Light.		1	X		
	Lot of Alarms shown on HMI: Flame-Out, High Steam Pressure, Minimum Air Flow, Water Level Alarm (High/Low), Low Water Cut-out, Low Gas Pressure, High Gas Pressure.		1	X		
	Lot of Discrete Input from Field Switches: Purge Air Flow, Minimum Air Flow, Low Instrument Air Pressure, High Furnace Pressure, Low Water Cut-Out, Low Water Alarm, Auxiliary Low Water Cut-Out, High Water Cut-Out, High Water Alarm, High Gas Pressure, Low Gas Pressure.		1	X		
	Lot of Analog Input: Steam Drum Pressure (2).		1	X		
	Lot of Discrete Input from Buttons: Alarm Silence, System Reset, Emergency Stop, Burner Start, Burner Stop, Low Water Bypass.		1	X		
	Lot of Discrete Input from Valves: Main Shut-Off Gas Valves Closed, Gas FCV On Low Fire, Main Shut-Off Oil Valves Closed.		1	X		
	Lot of Discrete Input from Field Devices: FD Fan Interlock, Flame On, FD Fan Damper Close Position, FD Fan Damper Open Position, FGR Damper Close Position, FGR Damper Open Position, Stack Damper Open Position, Stack Damper Close Position		1	X		
	Lot of Discrete Output to Field Devices: FD Fan Start, Ignition Transformer, Plant Air Igniter Shut-Off Valve, Pilot Safety Shutoff Gas Valves, Pilot Vent Gas Valve, Main Safety Shutoff Gas Valves, Main Vent Gas Valve.		1	X		
	Lot of Other Discrete Output:		1	X		

Shipped Loose	ITEM	Size	Qty	Included YES	NO	ALT
	Common Trouble Alarm, Boiler Shutdown Alarm, High Purge Position, Release For Modulation, Alarm Horn					
	Panel Design and Drawings, BMS Logic Implementation, Panel Assembly and Test, FAT-3 days at NATCOM shop.		1	X		
	Combustion Control System:					
	Combustion control consists of one Fully Metered, Cross Limited, PLC based system mounted and wired in the BMS panel.		1	X		
	Processor Allen Bradley CompactLogix 1769-L35E c/w Ethernet/IP. Cables, wire, connectors, Panduit.		1	X		
	Base mounted power supply		1	X		
	16 ch 120 VAC Discrete Input module		1	X		
	8 ch 4–20 mA Analog Input module		3	X		
	8 ch 4–20 mA Analog Output module		1	X		
	The HMI includes one Graphic and one Alarm/Status display to show the following operational status (hi-lighted words): Boiler Master – an A/M with Bias control Air Flow Control with Oxygen trim Three (3) elements feedwater control Draft control		1	X		
	Lot of Analog Input: Steam Drum Pressure, Drum Level, Combustion Air Flow, Windbox Damper Position Feedback, VFD Feedback, Feedwater Flow, Steam Flow, Combustion Air Temperature, Flue Gas Oxygen Content %, Boiler Demand (from DCS), Furnace Pressure, Fuel Gas Pressure, Natural Gas Temperature, FGR Flow, FGR Temperature, Fuel Gas Flow.		1	X		
	Lot of Analog Output: Feedwater Flow Control Valve, Combustion Air Control Flow Damper, Fuel Gas Flow Control Valve, FGR Damper, Draft Control Damper, Windbox Damper, Preheater Steam Flow Control Valve.		1	X		
	Lot of Discrete Input: Release For Modulation, High Purge Position		1	X		
	Plant Master				X	
X	Oxygen Analyzer. Yokogawa In-Situ Zirconia oxygen detector model ZR22G with model ZR402G analyzer, NEMA-4X with LCD display and interconnecting cable.		1	X		
	Panel Design and Drawings, CCS Logic Implementation, Panel and PLC Assembly and Test, FAT-3 days at NATCOM shop.		1	X		

END OF SCOPE OF SUPPLY

3.0 BOILER DESIGN DATA

Boiler Dimensions:		**Units**
Height to Main Steam Outlet	13’ 8”	FT
Overall Width of Unit	10’ 11”	FT
Overall Length of Unit*	15’ 6”	FT
**Add approximately 6-8 ft length for burner.*		
Weight of Unit (Dry)	60,000	LBS
Weight of Unit (Wet)	85,000	LBS
Surface Area / Volume:		**Units**
Furnace Volume	818	FT3
Furnace Projected Area	531	FT2
Evaporator Area	2,022	FT2
Total Area	2,553	FT2
Economizer Area	4,439	FT2
Superheater Area	126	FT2
Tubing Data:		**Units**
Tube OD	2.0	IN
Tube Wall Thickness – Furnace Section	0.105	IN
Tube Wall Thickness – Convection Section	0.105	IN
Tube Material	SA178A	
Corrosion Allowance	NA	IN
Steam Drum:		**Units**
Inside Drum Diameter:	36 In	IN
Drum Length	15’ 6” Seam/Seam	FT
Drum Material:	SA516 Grade 70	
Corrosion Allowance:	1/16”	IN
Water Drum:		**Units**
Drum Diameter:	24 In	IN
Drum Length	15’ 6” Seam/Seam	FT
Drum Material:	SA106 Grade B	
Corrosion Allowance:	1/16”	IN
Standard Drum Connections:	**Quantity**	**Type**
Main Steam Outlet:	One	Flanged
Safety Valves:	Per ASME Code	Flanged
Feedwater Inlet:	One	Flanged
Bottom Drum Blowoff:	Two	Flanged
Water Column:	Two	Threaded (NPT)
Feedwater Regulator:	Two	Flanged
Vent:	One	NPT
Continuous Blowdown:	One	NPT
Chemical Feed:	One	NPT
Sootblower:	Two	Flanged
Auxiliary L.W. Cutouts:	One	NPT

**The above information is preliminary and shall be confirmed at time of engineering submittal.*

4.0 BOILER PERFORMANCE DATA

Fuel: Propane/Air Mixture (9 ppm NOx Emissions)

Boiler load - %	100%	75%	50%	25%		Units
Net Steam Flow - ¤	25,000	18,750	12,500	6,250		Lb/Hr
Steam Pressure – Operating - ¤	165.0	165.0	165.0	165.0		PSIG
Steam Temperature - ¤	484.0	465.0	464.0	458.0		°F
Fuel Input (HHV)	35.8	26.5	17.7	8.9		MMBTU/Hr
Ambient Air Temperature	80.0	80.0	80.0	80.0		°F
Relative Humidity	60	60	60	60		%
Excess Air	20	20	20	20		%
Flue Gas Recirculation	30	30	30	30		%
Steam Output Duty	31	23	15	8		MMBTU/hr
Heat Release Rate	43,728	32,440	21,611	10,860		BTU/FT3-Hr
Heat Release Rate	67,344	49,960	33,283	16,725		BTU/FT2-Hr
Deaerator Pegging Steam	4,000	3,000	2,000	1,000		Lb/Hr
Feed Water Temperature	228	228	228	228		°F
Water Temp. Leaving Economizer	334	319	305	290		±10°F
Blow Down	3.0	3.0	3.0	3.0		%
Boiler Gas Exit Temperature	573	520	468	413		±10°F
Economizer Gas Exit Temp.	297	279	263	248		±10°F
Air Flow	30,633	22,725	15,139	7,607		Lb/Hr
Flue Gas to Stack	32,974	24,462	16,297	8,189		Lb/Hr
Flue Gas Including FGR	42,867	31,801	21,186	10,646		Lb/Hr
Fuel Flow	2,341	1,737	1,157	581		Lb/Hr
Flue Gas Losses/Efficiency-%						
Dry Gas Loss	4.4	4.0	3.7	3.4		%
Air Moisture Loss	0.1	0.1	0.1	0.1		%
Fuel Moisture Loss	8.6	8.6	8.5	8.5		%
Casing Loss	0.5	0.7	1.0	2.0		%
Margin	0.5	0.5	0.5	0.5		%
Efficiency - LHV	93.3	93.6	93.6	92.9		%
Efficiency – HHV - ¤	85.9	86.2	86.2	85.6		%
Total Pressure Drop Including Economizer	3.73	2.06	0.91	0.23		IN WC
Products of Combustion - CO2	9.7	9.7	9.7	9.7		%
- H2O	14.8	14.8	14.8	14.8		%
-N2	72.4	72.4	72.4	72.4		%
-O2	3.1	3.1	3.1	3.1		%
-SO2	-	-	-	-		%
GAS- % volume	**NG**					
propane	61.00					
nitrogen	31.00					
oxygen	8.00					
LHV-Btu/lb	14,064					
HHV-Btu/lb	15,275					

**The above information is preliminary and shall be confirmed at time of engineering submittal.*

5.0 BURNER DESIGN DATA

Boiler Conditions			Site Conditions		
Boiler model	NB-201D-45		Burner location		Indoors
Capacity	PPH	25,000	Code compliance		NFPA 85
Operating conditions	psig / °F	165 / 488	Control panel enclosure	NEMA	12
Furnace dimensions W	ft	6.69	Area classification burner/fuel train		Non-Hazardous
H	ft	8.34	Area classification control panel		Non-Hazardous
L_{Total}	ft	14.66	Altitude ASL	ft	< 1,000
L_{EFF}	ft	11	Instrument air supply	psig	60 - 125

Burner	Model	P-37-G-22-1117 (preliminary) (do not use for air permit purposes)		
Estimated windbox dimensions W x H x D	in.	60 x 60 x 54		
Estimated FD Fan motor (T.B. margin: 10% vol., 21% static, 25°F temp.)	HP	50 480V / 3 ph / 60 cy		
Fuel		**Propane / Air Mixture**		
Ignition fuel		Propane/Air Mixture		
Heat Input	MMBTUH	36.7		
Furnace pressure	in. WC	3.97		
Burner & windbox pressure drop	in. WC	6		
Combustion air temperature	° F	80		
Excess air	%	25		
FGR rate	%	25		
FGR temperature	° F	301		
Turndown ratio		6 to 1		
Available fuel pressure at train inlet	psig	25 - 40		
Guarantee		**Natural Gas**		
NO_x	ppm	9		
CO	ppm	50		
SO_x (Not burner dependant)	lb /MMBtu	0.00055		
PM_{10}	lb /MMBtu	0.01		
VOC	lb /MMBtu	0.005		
Opacity	%	< 5		

Guaranteed emission from 25% to 100% MCR corrected to 3 $\%O_2$ based on **NATCOM** technician is required for start-up and adjustments. Particulate is exclusive of any particulates in combustion air or other sources of residual particulates from material.

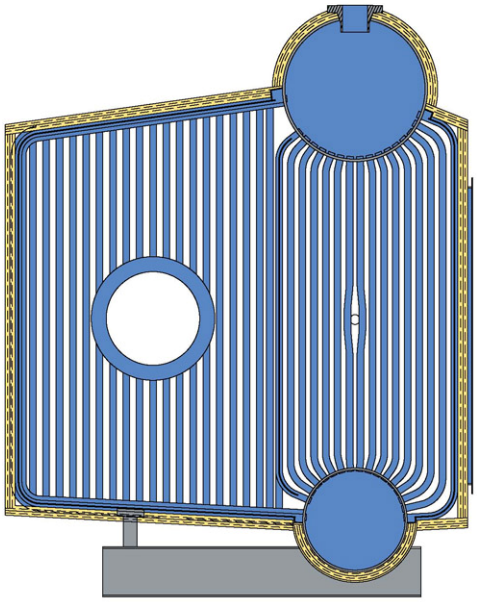
Fuel Gas Analysis	% Vol	N.G.	Propane			
Methane	CH_4	93.8				
Ethane	C_2H_6	3.2				
N & I-Butane	C_4H_{10}	0.2				
Nitrogen	N_2	2.1				
Carbon Dioxide	CO_2	0.7				
Hydrogen Sulfide	H_2S	0.2 grains/100SCF				
HHV	Btu/SCF	1,009				
Supply temperature	^0F	60				
Supply pressure	psig	25-40				

Above information is preliminary only and will be confirmed on drawings issued for construction.
Do not use the above Burner model designation for emission permit application.

6.0 BOILER DESIGN FEATURES

6.1 D-TYPE BOILER

CB-Nebraska Boiler's proven D-Type boiler series is an ideal solution to almost any steam need. Our unique design incorporates a 100% membrane watercooled furnace with minimal refractory. This feature greatly eliminates the costly & time consuming annual maintenance associated with older refractory boiler designs. In fact, the membrane front & rear walls (including all of the corner gas seals) are completely refractory-free, including the burner throat (when paired with our exclusive Natcom burner).



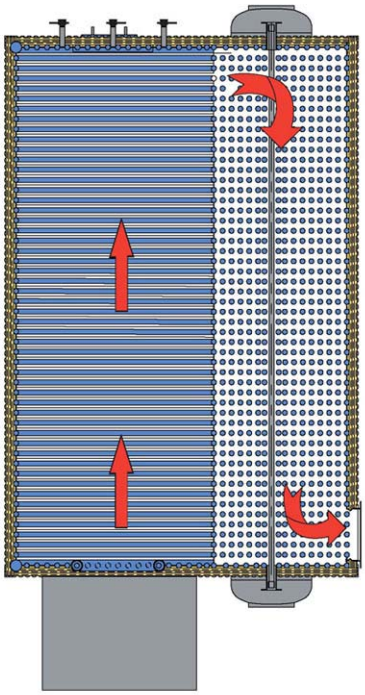
Cross-section view

6.2 DESIGN STANDARDS

The design, material, and workmanship of all pressure parts is in strict conformance with the rules and regulations in effect at the date of contract as required by:

1. THE ASME BOILER AND PRESSURE VESSEL CODE.
2. The Laws of the State in which the equipment is to be installed (as applicable).
3. Requirements of the Hartford Steam Boiler Inspection and Insurance Company, under whose inspection the pressure parts of each unit shall be constructed.
4. Specified codes & standards.
5. Structural components supplied with the boiler package will be designed in accordance with the following codes:

   INTERNATIONAL BUILDING CODE (2000)
   AISC – LRFD (Latest Edition)
   ASME STS-1 STEEL STACKS 2001



Plan view showing gas flow

6.3 FACTORY TESTS

A hydrostatic test at one and one-half times the design pressure is applied to the pressure parts in accordance with the ASME Code. For some applications, a casing pressure test is also performed to ensure gas-tight design.

6.4 DATA REPORTS & BOILER REGISTRATION

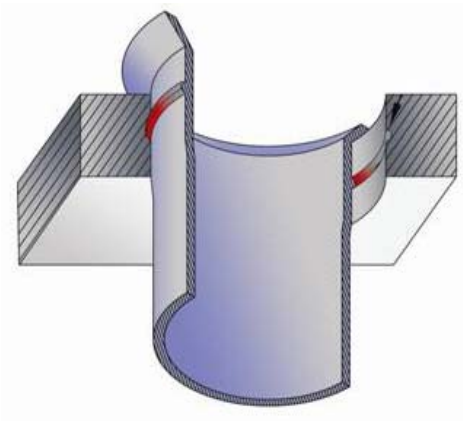
Two(2) copies of the Manufacturer's Data Report are provided. Each boiler is registered with the National Board of Boiler & Pressure Vessel Inspectors and with the State Boiler Inspection Department in the State in which the boiler will be installed (as applicable).

6.5 BOILER DRUMS

Boiler drums are fusion welded in accordance with the latest ASME Boiler and Pressure Vessel Code Section I covering power boilers, including x-raying and stress-relieving as required and under the inspection of Hartford Steam Boiler Inspection and Insurance Company.

All tubes holes are drilled true and radially, to afford full parallel bearing of tubes through the drum plate. Each tube hole is serrated with single or multiple grooves, as required by the design pressure. This insures a seal that is tight when expanded and stays leak-free when in operation. For some severe-duty applications, the tube-to-drum connections are also seal-welded.

All drums have an elliptical manway with cover in each head. Lifting lugs are provided on the drums to facilitate rigging.



Serrated and rolled tube-to-drum connection

6.6 LOWER DRUM BLOW OFF

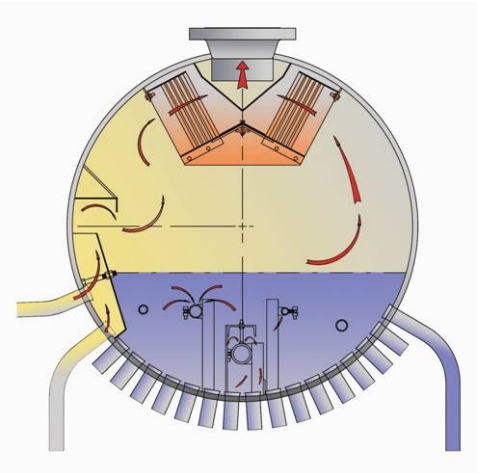
The lower drum is provided with one or two connections at the lowest point for draining and discharge of precipitates. A slotted collector angle of proper proportion is provided for blowing the unit down. These blow-off valves also serve as boiler drains.

6.7 STEAM BAFFLE SYSTEM

All boiler tubes shall discharge into the upper steam drum inside a baffled compartment designed to act as a primary steam-water separator system. Steam discharge from the baffle outlet shall be horizontal above the normal water level.

Secondary steam separation shall be effected by use of a chevron or labryinth steam drier from which dry steam is delivered to the steam outlet connection.

The steam after the boiler outlet shall contain not more than 0.5% moisture if saturated steam or 1 ppm TDS if superheated steam. The solids concentration of the boiler water shall not exceed the recommended values as recommended by the ABMA guidelines (included in this proposal). Higher steam purity is available for certain applications.



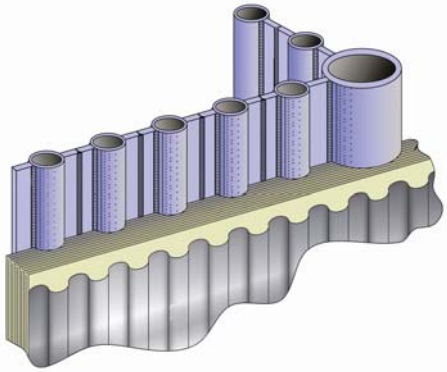
Steam drum cross-section showing typical internals

6.8 BOILER TUBES

Tube bends shall be made on an 8" radius with mandrel inserted during bending to prevent distortion at the bend. Tube arrangement shall be in line. Tubes shall be in proper alignment with tube holes and shall be exact length for proper expanding and flaring. All tubes shall be 2" O.D. on 4" centers. All tubes in the furnace shall be membrane (watercooled) tubes except those where the gases leave the furnace and enter the convection section. The last row in the convection section shall be membrane (watercooled) tubes except in the area where the flue gases leave the boiler. Membrane fins shall be ¼" by 1" steel, fused continuously to opposite sides of the tubes by electric welding. All tubes in both the furnace and convection section shall be 2" O.D. electric resistance-welded carbon steel boiler tubes.

6.9 BOILER WELDED WALLS

The adjacent membrane fins of each outboard furnace and convection tube shall be continuously seal-welded together, forming a water-cooled, gas tight inner seal. The inboard row of membrane tubes between the furnace and convection zone shall also be seal-welded together to prevent short-circuiting of flue gas from the furnace to the boiler flue gas outlet. Super plastic refractory shall be installed to protect the entire length of water and steam drums from radiant heat where exposed to the furnace between the two rows of furnace tubes.



Membrane wall construction

6.10 BOILER FRONT & REAR WALLS

The front & rear walls of the boilers are of membrane tube construction. The watercooled burner throat shall be of the ring header design. The walls will be backed with mineral wool and ceramic fiber blanket. Corner gas seals are welded and refractory-free.

6.11 BOILER CASING

CB-Nebraska Boilers are available with 2 types of outer casings. The aluminum casing uses 0.04" pebble grain lagging. The welded steel outer casing is constructed of 12-gauge SA36 steel that is primed & painted.

Our standard offering guarantees an average casing surface temperature of 140°F in an ambient temperature of 90°F and a surface wind velocity of two(2) feet per second while the boiler is operated continuously at full load.

6.12 BURNER THROAT

CB-NATCOM burners do not require a traditional refractory burner throat. Instead, a cylindrical stainless steel sleeve is installed into the watercooled furnace frontwall in an effort to reduce the costly & time-consuming maintenance and repair associated with refractory burner throats. The burner unit is then inserted into this sleeve as part of a fully integrated boiler/burner package. The burner throat is refractory-free.

6.13 BOILER BASE

The boiler base is constructed of heavy I-beams or welded heavy beams & channels. The boiler weight shall be uniformly distributed over the entire area of the boiler base. Material is SA-36.

6.14 BOILER PAINT FINISH

All non-aluminum portions of the outer casing shall be finished as follows:

Surface Preparation: SSPC-SP3 or as specified

Casings: One (1) coat primer
One (1) coat of industrial enamel, color: Boiler Blue or equal.

Drum Heads: One (1) coat high-temp paint, color: Boiler Black, Silver or equal.

6.15 OBSERVATION PORTS

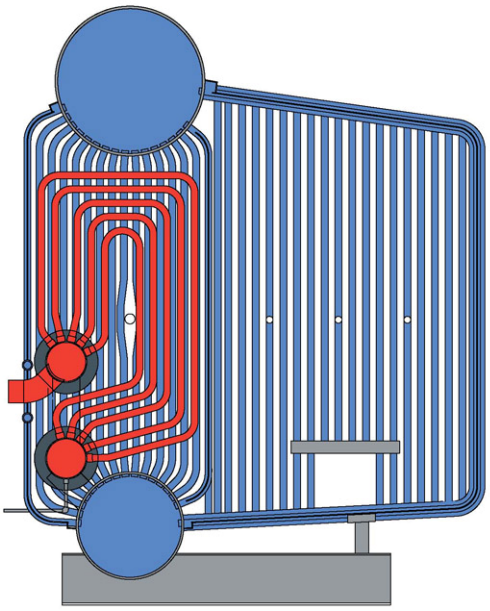
Each boiler includes three(3), air-cooled observation port assemblies, located in the furnace target wall. Additional observation ports are included in the windbox register area.

6.16 SUPERHEATERS

If applicable, an integral inverted-loop convection-type superheater system will be provided. Nebraska Boiler offers both single and dual stage superheater systems with feedwater spray attemperation to maintain steam temperature over turndown.

Superheater elements consist of seamless steel tubes arranged in multiple passes where necessary to obtain the desired mass flow and pressure drop. All necessary braces, spacers, hangers and supports of carbon or alloy steel corresponding to temperature requirements shall be furnished for spacing and supporting of elements and headers.

Saturated steam piping from the steam drum to the superheater inlet is provided along with the outlet piping with safety valve & start-up vent system. Superheater piping shall be shipped loose. Superheater piping is to be field welded by others. The steam connection to the drum on superheater units shall be a welded connection.



Cross-section showing integral superheater arrangement

6.17 ECONOMIZERS

Finned tube with extended surface

CB-Nebraska Boiler furnishes rectangular finned-tube economizers to increase the thermal efficiency of the system by recovering heat from the flue gas to heat the incoming feedwater. These assemblies come complete with structural steel supports (some field assembly and welding is required), interconnecting single-cased duct with fabric type expansion joint from boiler gas outlet to economizer gas inlet and interconnecting feedwater piping from the economizer feedwater outlet to the boiler feedwater inlet.

Economizers are double-cased and insulated. The internal casing is carbon steel, seal-welded and gas-tight. It is externally insulated with 2" heavy duty blanket insulation and externally lagged with corrugated lagging.

Economizers are designed so that access for tube inspection can be achieved by either access doors in the economizer or from adjacent ductwork incorporating access doors. The gas side connections on the economizer are plate flange-type with drilling for bolt holes for aligning to adjacent components. The water side connections are flanged. The economizer unit shall include vent and drain connections, and appropriate closures. Lifting lugs are provided to facilitate loading and unloading.

The design, fabrication and construction of economizers shall be in accordance with ASME Code Section I.

7.0 Start-Up & Freight

7.1 START-UP SERVICE

CB-Nebraska Boiler offers the services of our qualified service technicians, trained in all aspects of boiler room equipment, to supervise boil-out, start-up, and/or operator instruction for equipment furnished. Additional services, beyond those stated in the scope of supply above, are available at our per diem rate in effect at time of start-up (see attached for current rates).

Note that the emissions guarantee is contingent upon our trained field service engineer(s) being present at time of start-up to fine tune the burner as required, and observe the operation of auxiliary equipment to assure that performance guarantees will be met prior to final testing. Approximate time required for setup is twenty(20) days per unit, however, this will vary depending upon the size of the equipment, number of fuels, site readiness, controls system complexity, emission levels required, etc.

7.2 FREIGHT

CB-Nebraska Boiler can offer freight for the equipment in our scope of supply per INCOTERMS 2000. Shipment is via either truck or railcar, depending on the size of the equipment and shipping clearances. Any freight pricing offered is subject to clearance availability at the time of shipment. Rigging & offloading at the designated point of delivery is by others.

8.0 Auxiliary Equipment

8.1 DEAERATOR & FEEDWATER PUMPS

Cleaver-Brooks Model TM30 spray type tray deaerator, pressurized, horizontal deaerator is rated at 29,000 pounds per hour. The system shall be guarantee oxygen removal to not more than 0.005 CCS/liter in the effluent throughout all load conditions between 5 and 100 percent. The deaerator shall be designed for operation at 5 psig, but shall be suitable for use from 2 to 15 psig. Collected water from the surge tank and then transferred to the deaerator. The collected water shall be admitted to the deaerator through a multiple spring-loaded, self-cleaning, adjustable stainless steel spray valves, which shall provide proper internal vent condensing and water distribution at any load between 5 and 100 percent of rated capacity.

The water temperature in the primary heating and vent concentrating section is to be raised within 2 or 3 deg F of steam saturation temperature and most of the gases released. The water then cascade down to strike a 16 gauge stainless steel trays constructed of 430 material, which separates water and steam. Hot, gas-free water is to then drop to the storage compartment to complete the cycle. The steam and non-condensables are to flow upward, through the primary heating spray, into the internal vent concentrating section, where they contact the cold influent water. Here, the steam is to be condensed to continue the cycle. Released gasses are discharged to atmosphere through the vent outlet. Automatic vent valve shall be thermostatically controlled to provide a fast means of venting when a sudden buildup of gases occurs, such as seen at start up. The manual vent valve shall have an orifice for continuous minimum venting. Venting rate shall not exceed 0.1 of 1% of the rated deaerator capacity at 5 psig.

The deaerator shall be two-section unit. There shall be a deaerator and storage section connected by flanges. The heater section shall be 36" diameter and 90" high. A 16” round davited manway shall be provided for access to tray box. All nozzles 3" and under shall be 3000 lbs. forged steel couplings and over 2" shall be 150 lbs. flat face flanges. Heads to be ASME torispherical type constructed of ASTM A516 GR 70 carbon steel with a minimum thickness of 0.25 inches. Shell plate to be fabricated of ASTM A516 GR 70 carbon steel with a minimum thickness of 0.25 inches. The tank shall be designed in accordance with ASME, Section VIII of the Pressure Vessel Code for 50 psig at 650 delta-F and stamped accordingly. Certification shall be required. Joint efficiencies to be 70% circumferential per Table UW-12, which does not require stress relieving or nondestructive examination.

The deaerated water storage section shall have 20 minutes of storage and have a capacity of 600 gallons measured to overflow. The storage section shall be 42" diameter and 120.5" long. A 12” x 16” elliptical manway shall be provided for access. All nozzles 3" and under shall be 3000 lbs. forged steel couplings and over 2" shall be 150 lbs. flat face flanges. Heads to be ASME torispherical type constructed of ASTM A516 GR 70 carbon steel with a minimum thickness of 0.25 inches. Shell plate to be fabricated of ASTM A516 carbon steel with a minimum thickness of 0.25 inches. The tank shall be designed in accordance with ASME, Section VIII of the Pressure Vessel Code for 50 psig at 650 delta-F

and stamped accordingly. Certification shall be required. Joint efficiencies to be 70% circumferential per Table UW-12, which does not require stress relieving or nondestructive examination.

The deaerator shall have a gauge glass assembly that covers the entire tank diameter. The gauge glass shall be quartz, 0.625-inch diameter by 24-inch maximum length. Each length of glass shall be furnished with a bronze gauge cock set and protector rods. The deaerator storage vessel shall be supplied with a pressure gauge that has a 4.5-inch dial with a 0-15 PSIG range for operating range and 4.5-inch dial 0-200 PSIG for design pressure for up set conditions. Each pressure gauge to be included with a pulsation dampener and over pressure relief device. A 4.5" dial thermometer deaerator storage and one 5-inch dial bimetallic thermometer for deaerator section both with a 50 to 300 F range.

Boiler Feedwater Pump And Motor Set
Included

Suction Piping
Included

Discharge piping
Included

Support Stand
The stand shall elevate the deaerator tank to provide the net positive suction head required by the pump at the rated condition to prevent cavitation plus a 1-1/2 foot safety factor. The stand shall be constructed of heavy square steel tubing for the legs

UL Control Panel
Control panel shall be in a NEMA 1 enclosure and wired to the National Electric Code. The wire shall be black number coded. The assembly is to contain individual motor starters with 120 Volt holding coil and fuse protection. Individual green IEC (IP66) pump run lights shall be provided. All switches and lights to have nameplate identification. The assembled panel shall be given a factory continuity test prior to shipment.

Make-up Valve
Fisher, Model 657EZ with DVC6010HC

When the Level Control Selector Switch is in auto mode, the PLC will control operation of the make-up valve

The tank level transmitter indicates to the PLC via a 4-20 ma signal the water level in the deaerator tank. The PLC compares it to the operator input set point, and varies the position between the full open and full closed points to control the incoming flow of water.

Steam Pressure Reducing Station
The diaphragm actuated valve manufacturer shall be Fisher, Model #667EZ with DVC6010 positioner.

Overflow Drainer
Included

Single Tank ADAC Electric Control System
Deaerator PLC Controller, Control Logix L32 processor with 6" HMI display and programming for pump control Pump alternating, Pump lead lag, Low discharge header pressure. Alarm indication provided by bell and Stack light. Stack light has a green light for all systems normal, a yellow light for non-critical alarm like High water, a red light for critical alarms like pump failure. Full text of each alarm

condition is provided on the Panelview operator interface including a "last in, first out" 100 event history. Alarm silence function is provided on the Panelview operator interface. Control circuit transformer to supply 110-120 Volts, single-phase power supply. The transformer shall be mounted, wired and fused. Auxiliary contacts shall be furnished for chemical feed pump initiation. Contacts shall be normally open

Deaerator Vessel Level Transmitter
Differential Pressure transmitter for deaerator level 4-20 mA Rosemount 3051

Deaerator Vessel Pressure Transmitter
Pressure transmitter for deaerator pressure 4-20 mA Rosemount 3051

Boilerfeed Pump Manifold Transmitter
Feedwater and transfer discharge pressure transmitter 4-20 mA Rosemount 3051

Deaerator Vessel Temperature Transmitter
Temperature transmitter for deaerator Rosemount 4-20 mA

Low–Low Level Pump Cut-Off
This control shall be an externally mounted float type switch. The switch shall make contact on fall and break on rise. The float cage construction shall be cast iron. The float switch manufacturer shall be Magnetrol model #W25-1BO-CLA for the deaerator $5,225

Support Stand
Stand will be a one-piece design. Supporting structural calculations will be furnish per the International Building Code (I.B.C.). No anchor bolt calculations furnished.

Finish Coat
The deaerator is to be hand cleaned with a solvent to SSPC- SP-1 standards prior to painting. Prime coated to not less than 1 mil thick and finish coated with enamel paint to not less than 1 mil thick prior to shipment. Unit is to be knocked down for shipment. Piping is to be matched marked.

9.0 Pricing

Alternate	Item	Unit Price	Qty	Total Price
Base Bid	CB-Nebraska Boiler model NB-201D-45, including equipment and accessories as described herein and as noted in the scope above.	$985,000.00	1	$985,000.00
Option Adders/ Deducts				
1	Provide Cleaver-Brooks tray-type deaerator and duplex feedwater pumpset (all manufacturer's standard)	+$234,000.00	1	+$234,000.00
2	Provide freight, via truck, FCA jobsite (rigging & offloading to jobsite by others)	+$56,000.00	1	+$56,000.00
3	Provided welded tube-to-drum connections for severe-duty cycling service	+$65,000.00	1	+$65,000.00
4	Provide a C-B Profire low-NOx burner (manufacturer's standard) in lieu of base bid C-B Natcom	-$105,000.00	1	-$105,000.00

All pricing is in US dollars

9.1 Proposal Type:

This proposal is a **FIRM** proposal.

- A **FIRM** proposal is priced and designed such that CB-Nebraska Boiler would be willing to enter into a contract based off the proposal.
- A **BUDGET** proposal is priced and designed to give the Buyer a reasonable estimate of the cost and design of the equipment. CB-Nebraska Boiler is not obligated to enter into a contract based on a budget proposal.

9.2 Bid Validity:

This proposal is valid for 30 days.

9.3 Shipping Terms:

Equipment is offered Ex-Works (INCOTERMS 2000). All shipments are subject to clearance availability.

9.4 Payment Terms:

Payment terms, subject to credit approval, are as follows:

Upon Receipt of Order 10%
Upon Drawing Submittal #1 .....30% (Net 30 days)
Upon Completion of Hydrostatic Test .....35% (Net 30 days)
Upon date of shipment or date equipment is ready to ship. .....25% (Net 30 days)

9.5 Cancellation Schedule:

Up to14 days after receipt of purchase order 0%
14 days after receipt of purchase order to drawing approval 25%
Up to 30 days after drawing approval 45%
31-60 days after drawing approval 55%
61-90 days after drawing approval 75%
Over 90 days after drawing approval 100%

9.6 Guarantees:

All data in the proposal marked with an ¤ is considered a guaranteed point. All other data provided is predicted only and will be finalized at time of submittal. Guarantees are based on the unit being operated per the requirements of the operation and maintenance manual. Guarantee points are also based on the unit operating at 100% MCR, unless otherwise stated. It is the Buyer's responsibility to have the equipment tested during the stated warranty period. If equipment passes such tests or the tests are not performed before the end of the warranty period, it will be assumed that the equipment is accepted. The cost of all tests is the responsibility of the Buyer.

9.7 Production Time:

Item	Start	Finish
Order Entry	0	1
Submittal of Nebraska Boiler Standard Drawings (see table below)	1	12
Review of submittals by buyer*	12	14
Manufacturing/Procurement of equipment described herein	14	35
Total – All time is in calendar weeks	0	35

*If review of submittals lasts longer than 2 weeks, the shipment of the equipment may be delayed. Any changes to design made after PO date may affect delivery.

The above schedule is an estimate and may be subject to change +/- based on new order input between the date of this proposal and the date of project award.

9.8 General Terms of Sale:

Equipment warranty and other conditions of sale shall be as per our standard "Terms and Conditions of Sale," a copy of which is attached to this proposal.

Any Purchase Order issued must reference this proposal (or subsequent revisions provided prior to award) and must include a tax exemption certificate, direct pay permit or a statement to the effect that Purchaser will be responsible for the payment of taxes. The prices quoted do not include any use, excise, sales, or other like taxes, which may be applicable to this transaction.

We trust that the above meets with your favorable consideration and ask that you do not hesitate to contact our office if you have any questions.

Best Regards,

Jason Jacobi
Proposal Manager

10.0 FIELD SERVICE RATES

	United States	Other
Start-Up, Troubleshooting, Field Inspection Service, Service Technician, Boilermaker*	$1,250.00/day	$1,550.00/day
Combustion/Control Technician	$1,250.00/day	$1,550.00/day
Combustion Engineer	$1,550.00/day	$2,000.00/day

Regular time hours:	Monday to Friday	8:00 a.m.	4:30 p.m.
Over-time hours (x 1.5):	Monday to Friday	4:30 p.m.	8:30 p.m.
	Saturday	8:00 a.m.	4:30 p.m.
Double-time hours (x 2.0):	Monday to Friday	8:30 p.m.	8:00 a.m.
	Saturday	4:30 p.m.	8:00 a.m.
	Sunday	0:00 a.m.	12:00 p.m.
	Statutory/Legal Holidays	0:00 a.m.	12:00 p.m.

*Holiday pay for Union Boilermakers is x 3.0

Stand-By/Waiting time: At rates shown above

Travel time: Travel time is chargeable at rates shown above. Transportation other than service vehicle (taxi, airline, rental vehicle, welding rig, etc., are charged at cost + 10% for administration) Company and private automobile use will be billed at a rate of $.55 per mile/km

Accommodations & Travel: Chargeable at cost + 10% for administration

Meals: $60.00/day minimum

Miscellaneous Expenses: Shipping charges, rental of any special tools, miscellaneous expenses such as securing passports or visas, inoculations, entry and exit fees and all other expenses incurred in making required travel arrangements in connection with the work will be invoiced at cost + 10% for administration

Minimum charge of two (2) days per call

Terms: Pre-payment through pro-forma invoicing

Prices quoted in U.S. Funds

Service rates are subject to change without notice

11.0 STANDARD SUBMITTAL PACKAGE

CB-Nebraska Boiler utilizes a **3-stage submittal process** as described below:

The first stage, or "Submittal #1", consists of the general arrangement & foundation drawings for the **boiler pressure vessel**. This initial submittal allows the customer to begin foundation design & piping layout as quickly as possible without waiting for the full mechanical submittal. It also keeps the project moving forward by allowing the customer to approve and/or mark-up the boiler connection locations and return the drawings to CB-Nebraska Boiler (within 2 weeks) with a release to purchase/manufacture. This process ensures an on-time delivery date by not delaying the longest-lead item, which is the boiler itself.

The second stage, or "Submittal #2", contains the full **mechanical package** including general arrangements, foundation drawings, cut sheets & other data for all equipment (burner, fan, economizer, controls, P&IDs, ductwork, etc…).

The third stage, or "Submittal #3", contains the full **electrical package** including control panel arrangements, wiring diagrams, instrumentation details, logic diagrams, field wiring schematics, etc…

Unless agreed otherwise, CB-Nebraska Boiler shall submit its standard submittal package as follows:

ITEM	DESCRIPTION	SUBMITTAL NUMBER	DUE DATE
1	TRIM LIST OF BOILER ONLY	1	8 WKS ARO
2	GENERAL ARRANGEMENT OF BOILER ONLY	1	8 WKS ARO
3	BASE LOADING OF BOILER ONLY	1	8 WKS ARO
4	BOILER TRIM LIST [EQUIPMENT LIST]	2	10 WKS ARO
5	GENERAL ARRANGEMENT	2	10 WKS ARO
6	BASE-LOADING [FOUNDATION PLAN]	2	10 WKS ARO
7	PREDICTED PERFORMANCE	2	10 WKS ARO
8	P&ID*	2	10 WKS ARO
9	ECONOMIZER ARRANGEMENT*	2	10 WKS ARO
10	BURNER BILL OF MATERIALS*	2	10 WKS ARO
11	BURNER ARRANGEMENT*	2	10 WKS ARO
12	BURNER FUEL TRAIN SCHEMATICS*	2	10 WKS ARO
13	BURNER PANEL ARRANGEMENT*	3	12 WKS ARO
14	BURNER WIRING DIAGRAMS*	3	12 WKS ARO
15	BURNER SEQUENCE OF OPERATION*	3	12 WKS ARO
16	CONTROL PANEL ARRANGEMENT*	3	12 WKS ARO
17	CONTROL PANEL WIRING DIAGRAM*	3	12 WKS ARO
18	CONTROL PANEL SAMA LOGIC*	3	12 WKS ARO

* If applicable.

Drawings must be returned within 2 weeks of submittal. Delivery may be delayed day-per-day or week-per-week upn late return of submittals. Any deviation from the above standard submittal package may result in additional cost and/or delay in final shipment.

12.0 ASME WATER QUALITY

Suggested Water Chemistry Limits
Industrial Watertube, High Duty,
Primary Fuel Fired, Drum Type

Makeup water percentage: Up to 100% of feedwater
Conditions: Includes superheater, turbine drives, or process restriction on steam purity
Saturated steam purity target: See tabulated values below.

Drum Operating Pressure (1) (11)	**Psig 0-300 (MPa) (0-2.07)**	**301-450 (2.08-3.10)**	**451-600 (3.11-4.14)**	**601-750 (4.15-5.17)**	**751-900 (5.18-6.21)**	**901-1000 (6.22-6.89)**	**1001-1500 (6.90-10.34)**	**1501-2000 (10.35-13.79)**
Feedwater (7)								
Dissolved oxygen ppm (mg/l)O_2 - measured before chemical oxygen scavenger addition (8)	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007
Total iron ppm (mg/l) Fe	≤ 0.1	≤ 0.05	≤ 0.03	≤ 0.025	≤ 0.02	≤ 0.02	≤ 0.01	≤ 0.01
Total copper ppm (mg/l) Cu	≤ 0.05	≤ 0.025	≤ 0.02	≤ 0.02	≤ 0.015	≤ 0.01	≤ 0.01	≤ 0.01
Total hardness ppm (mg/l)*	≤ 0.3	≤ 0.3	≤ 0.2	≤ 0.2	≤ 0.1	≤ 0.05	ND	ND
pH @ 25^{0}C	8.3-10.0	8.3-10.0	8.3-10.0	8.3-10.0	8.3-10.0	8.8-9.6	8.8-9.6	8.8-9.6
Chemicals for preboiler system protection	NS	NS	NS	NS	NS	VAM	VAM	VAM
Nonvolatile TOC ppm (mg/l) C (6)	< 1	< 1	< 0.5	< 0.5	< 0.5	< 0.2	< 0.2	< 0.2
Oily matter ppm (mg/l)	< 1	< 1	< 0.5	< 0.5	< 0.5	< 0.2	< 0.2	< 0.2
Boiler Water								
Silica ppm (mg/l)	≤ 150	≤ 90	≤ 40	≤ 30	≤ 20	≤ 8	≤ 2	≤ 1
Total alkalinity ppm (mg/l)*	< 700(3)	< 600(3)	< 500(3)	< 200(3)	< 150(3)	< 100(3)	< NS(4)	< NS(4)
Free OH alkalinity ppm (mg/l)* (2)	NS	NS	NS	NS	NS	NS	ND(4)	ND(4)
Specific conductance (12) µmhos/cm (µS/cm) 25^{0}C without neutralization	5400-1100(5)	4600-900(5)	3800-800(5)	1500-300(5)	1200-200(5)	100-200(5)	≤ 150	≤ 80
Total Dissolved Solids in Steam (9)								
TDS (maximum) ppm (mg/l)	1.0-0.2	1.0-0.2	1.0	0.2	0.5-0.1	0.5-0.1	0.1	0.1

* as $CaCO_3$
NS = not specified
ND = not detectable
VAM = Use only volatile alkaline materials upstream of attemperation water source. (10)

Notes to Table:

(1) With local heat fluxes >1.5 x 10^5 Btu/hr/ft^2 (>473.2 kW/m^2), use values for at least the next higher pressure range.
(2) Minimum hydroxide alkalinity concentrations in boilers below 900 psig (6.21 MPa) must be individually specified by a qualified water treatment consultant with regard to silica solubility and other components of internal treatment. See section 6.6 of this document.
(3) Maximum total alkalinity consistent with acceptable steam purity. If necessary, should override conductance as blowdown control parameter. If makeup is demineralized quality water and boiler operates at less that 1000 psig (6.89 MPa) drum pressure, the boiler water conductance should be that in table for 100-1500 psig (6.9-10.34 MPa) range. In this case, the necessary continuous blowdown will usually keep these parameters below the tabulated maximum values. Alkalinity values in excess of 10% of specific conductance values may cause foaming.
(4) Not detectable in these cases refers to free sodium or potassium hydroxide alkalinity. Some small variable amount of total alkalinity will be present and measurable with the assumed congruent or coordinated phosphate-pH control or volatile treatment employed at these high pressure ranges.
(5) Maximum values are often not achievable without exceeding maximum total alkalinity values, especially in boilers below 900 psig (6.21 MPa) with >20% makeup of water whose total alkalinity is >20% of TDS naturally or after pretreatment by lime-soda, or sodium cycle ion exchange softening. Actual permissible conductance values to achieve any desired steam purity must be established for each case by careful steam purity measurements. Relationship between conductance and steam purity is affected by too many variables to allow its reduction to a simple list of tabulated values.
(6) Nonvolatile TOC is that organic carbon not intentionally added as part of the water treatment regime. See Section 6.4 of this document.

(7) Boilers below 900 psig (6.21 MPa) with large furnaces, large steam release space, and internal chelant, polymer, and/or antifoam treatment can sometimes tolerate higher levels of feedwater impurities than those in the table and still achieve adequate deposition control and steam purity. Removal of these impurities by external pretreatment is always a more positive solution. Alternatives must be evaluated as to practicality and economics in each individual case.

(8) Values in the table assume existence of a deaerator.

(9) Achievable steam purity depends on many variables, including boiler water total alkalinity and specific and specific conductance as well as design of boiler steam drum internals and operating conditions [(Note 5)]. Since boilers in this category require a relatively high degree of steam purity for protection of the superheaters and turbines, more stringent steam purity requirements such as process steam restrictions on individual chemical species or restrictions more stringent than 0.1 ppm (mg/l) TDS turbine steam purity must be addressed specifically.

(10) As a general rule, the requirements for attemperation spray water quality are the same as those for steam purity. In some cases boiler feedwater is suitable; however, frequently additional purification is required. In all cases the spray water should be obtained from a source that is free of deposit forming and corrosive chemicals such as sodium hydroxide, sodium sulfite, sodium phosphate, iron, and copper. The suggested limits for spray water quality are < 30 ppb (µg/l) TDS maximum, < 10 ppb (µg/l) Na maximum, < 20 ppb (µg/l) SiO_2 maximum, and it should be essentially oxygen free.

(11) Low pressure boilers frequently use feedwater that is suitable for use in higher pressure boilers. In these cases the boiler water chemistry limits should be based on the pressure range that is mose consistent with the feedwater quality. See Sections 1 and 6.2 of this document regarding blowdown.

(12) Conversion from ppm (mg/l) TDS values in the ABMA standards [12] used a factor of 0.65. See Section 6.7 of this document.

13.0 STANDARD VENDOR / MANUFACTURER LIST

Unless otherwise specified by the customer, CB-Nebraska Boiler shall utilize the following vendors for major components:

Item	Size / Rating	Standard Vendor / Manufacturer	Alternate Vendors / manufacturer
Water Column	<900#	NBC	Clark-Reliance, Yarway
Water Column	>900#	Clark-Reliance	Yarway
Water Gage		Clark-Reliance	Yarway
Water Column Trycocks		Clark-Reliance	Yarway
Water Gage Valves		Vogt	Crane, Velan
Gate and Globe valves	< 2"	Vogt	Crane, Velan
Gate and Globe valves	>2"	Velan	Edward, Powell
Steam Gage		Ashcroft	
Steam Gage Valve		Marsh	
Steam Gage Valve		Marsh	
Main Steam NRV		Powell	Edward
Main Steam Stop Valve		Powell	Edward, Crane, Velan
Check valves	< 3"	Vogt	Crane, Edward
Check valves	> 3"	Crane	Edward, Powell
Flow control valves	< 300#		
Flow control valves	> 300#	Fisher	
Safety relief valves	<300#	Kunkle	Crosby, Consolidated
Safety relief valves	> 300#	Crosby	Consolidated, Kunkle
Drip pan elbows		Kunkle	
Low water cut outs		Clark-Reliance	
Low water cut-out by-pass switch		Allen-Bradley	Square-D
Transmitters		Rosemount	Foxboro, Siemens, ABB
PLC's/Controller		Allen-Bradley	Moore

NOTE:

The standard vendor/manufacturer list is generated by CB-Nebraska Boiler based on our stringent quality requirements and vendor performance over the years. In principle, we have no objection to using vendors/manufacturers on the alternate list. However the cost and delivery impact in using the alternate vendors has to evaluated and agreed upon. We reserve the right to provide items of equal or better quality from vendor/manufacturers listed above based on project execution needs.

14.0 Comments

14.1 TECHNICAL CLARIFICATIONS

Equipment as offered is per CB-Nebraska Boiler's standard design & construction. Scope of supply shall be as outlined in this proposal. This proposal is based on information from the specifications received. CB-Nebraska Boiler makes the following comments to the above specifications:

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1.5	Equipment as offered is designed for indoor installation.
1.9	Turn down ratio is 17% to 100% load (6 to 1).
1.10	If the boiler is to be cycled routinely, we recommend that the tube-to-drum connections be seal-welded. An option price is provided for your review.
3.1	Emissions guarantees are from 25% to 100% load.
3.2	We are offering 9 ppm NOx emissions which is typical for California location.
5.3	Individual electrical devices included in our scope are UL and FM approved. The entire system is not approved.
5.4	The burner could fire a mixture of propane and air having the same Wobbe index equal to natural gas without any change to the burner or valves setting. Air Mixed propane system excluded from our scope of supply.
5.6	Maximum turn down ratio with 9 ppm burner is 6 to 1.
8.14	We have offered our standard 15x18 furnace access door.
11.16	FAA lighting is not currently included.
13.27	Start-up spares are included in our base bid. Operational spares are determined after award during detailed engineering.
13.33	Supervision, start-up an training are not included but are available at per Diem rate plus traveling expenses.

General Notes:

The Cleaver-Brooks deaerator and feedwater pumpset is manufacturer's standard equipment. Specification compliance is not offered at this time.

An option is offered for our proprietary C-B Profire low-NOx burner. Emissions performance and turndown are the same as the base bid C-B Natcom burner. This is a manufacturer's standard design that is proven and economical. Additional details can be provided upon request.

Boiler safety valves shall be set at the design pressure of the boiler. Lower set pressures can be provided for a price adder available upon request.

Start-up & commissioning spare parts are included in our base bid. Recommended operational spare parts list with pricing shall be provided after award during detailed engineering.

All submittals shall be electronic.

Saturated & superheated steam piping connections shall be butt-welded in the field by others. The gas seals for superheater inlet & outlet piping penetrations through the casing shall be welded in the field by others.

The steam purity numbers listed in this proposal are the purity levels of the saturated steam at the outlet of the steam drum. If applicable, the quality of the spray water used to control the steam temperature should be the same or better than the saturated steam quality to ensure that the purity of the superheated steam is not compromised. Use of spray water with impurity levels higher than that of the saturated steam may compromise the operating life of the down stream equipment including the final superheater.

CB-Nebraska Boiler shall comply with the specified national codes & standards unless noted otherwise. We shall be responsible for local laws, codes & ordinances only to the extent we are made aware by Purchaser and/or Enduser.

CB-Nebraska Boiler is certified ISO 9001:2000.

14.2 COMMERCIAL CLARIFICATIONS

Terms & conditions shall be as mutually agreed-upon between Buyer & Seller.

We have offered our standard five(5) year limited pressure vessel warranty. See attached for details. Additional warranty and bonding are not included at this time. Erection supervision, start-up service & training are available at our per diem rates.

Optional freight pricing is offered FCA Jobsite (INCOTERMS 2000).

END OF COMMENTS SECTION

15.0 Terms & Conditions

CB Nebraska Boiler (the "Company") agrees to sell the Equipment described herein upon the following terms and conditions of sale which, accordingly, supersede any of Purchaser's additional or inconsistent terms and conditions of purchase.

1. TERMS AND PRICES

(a) All orders are subject to the approval of the Company's home office and shall not be binding upon the Company unless signed by a duly elected and acting officer of the Company. Unless otherwise stated, terms of payment shall be as proposed in the Company's firm proposal. If partial shipments are made, payment shall become due upon the earlier of date of shipment or date of invoice.

(b) The prices agreed upon herein are exclusive of any present or future Federal, State, Municipal or other excise, sales or use tax with respect to the Equipment or services covered hereby. If the Company is required by applicable law or regulation to pay or collect any such tax or taxes on account of this transaction or the Equipment or services covered hereby, then such amount of tax shall be paid by the Purchaser in addition to the prices provided herein.

(c) Prepaid freight, if applicable, will be added to the purchase price and invoiced separately. Where the price includes transportation or other shipping charges, any increases in transportation rates, any demurrage, special detention charges or other shipping charges shall be for the account of and paid by Purchaser.

(d) If Purchaser requests changes in the Equipment or delays progress of the manufacture or shipment of the Equipment, the contract price shall be adjusted to reflect increases in selling price caused thereby.

(e) Prices are subject to revision because of increases in material and labor cost during the period of manufacture if a price adjustment schedule is part of the proposal. Typographical errors are subject to correction

(f) The Company shall not be called upon to make any allowance to Purchaser for material, labor, repairs or alterations made for its account unless authorized in writing by a duly elected and acting officer of the Company.

(g) The Purchaser shall furnish the Company with all information, instructions and drawings requisite to the execution of the work.

(h) The Company shall not furnish any drawings other than general arrangement drawings as are necessary for the work. The Company shall furnish its drawings promptly and the Purchaser shall check, approve and return one set without delay.

2. WITHDRAWAL OR CANCELLATION OF PROPOSAL

(a) The price and terms quoted herein are subject to acceptance by the Purchaser within a period of 30 days from the date hereof, except that the Company shall have the right to withdraw this Proposal at any time before formal acceptance by the Purchaser and written acknowledgment by a duly elected and acting officer of the Company.

(b) Orders accepted by the Company are not subject to cancellation except by mutual agreement and at cancellation charges as determined by the Company. Changes in specifications after acceptance of Purchaser's order are subject to a charge to be determined by the Company.

3. SHIPMENT

Shipment is F.O.B. Company's plant or point of shipment, unless otherwise specified. Risk of loss of or damage to the Equipment shall pass to the Purchaser upon delivery of the Equipment or any portion thereof by the Company to a common carrier at Company's plant or point of shipment, in the case of shipments F.O.B. point of destination, risk of loss or damage to the Equipment shall pass to the Purchaser when the Equipment arrives at the nearest rail siding to point of destination, subject to clearance availability.

However, when the Equipment is ready for shipment and shipment is delayed or postponed through any causes beyond the control of the Company, the Purchaser shall arrange for storage of the Equipment covered by this Proposal other than at the works of the Company, unless by separate written agreement Company shall agree to store the Equipment. After shipment and when the Equipment is ready for erection, if erection is delayed or postponed through any causes beyond the control of the Company, the Purchaser shall protect the Equipment against damage from the weather or other causes, and in any case the Purchaser shall assume the risk of loss or damage to the Equipment and shall be responsible for any charges in connection with storage or reconditioning.

4. DELIVERY

(a) The Company will endeavor to make shipment of orders as scheduled. However, all shipment dates are approximate only, and the Company reserves the right to readjust shipment schedules.

(b) UNDER NO CIRCUMSTANCES WILL THE COMPANY BE RESPONSIBLE OR INCUR ANY LIABILITY FOR COSTS OR DAMAGES OF ANY NATURE (WHETHER GENERAL, CONSEQUENTIAL, AS A PENALTY OR LIQUIDATED DAMAGES, OR OTHERWISE) ARISING OUT OF OR OWING TO (i) ANY DELAYS IN DELIVERY OR (ii) FAILURE TO MAKE DELIVERY AT AGREED OR SPECIFIED TIMES DUE TO CIRCUMSTANCES BEYOND ITS REASONABLE CONTROL.

(c) If shipment is delayed or suspended by Purchaser, Purchaser shall pay (i) Company's invoice for the Equipment as per payment terms, (ii) Company's handling and storage charges then in effect, and (iii) demurrage, special detention, and any related charges if loaded on rail cars.

5. LIMITED WARRANTY; WARRANTY ADJUSTMENT; EXCLUSIONS; LIMITATION OF LIABILITY

(a) Limited Warranty

The Company warrants that at the time of shipment, the Equipment manufactured by it shall be merchantable, free from defects in material and workmanship and shall possess the characteristics represented in writing by the Company. The Company's warranty is conditioned upon the Equipment being properly installed and maintained and operated within the Equipment's capacity under normal load conditions with competent supervised operators and with proper water conditioning. Equipment, accessories and other parts and components not manufactured by the Company are warranted only to the extent of and by the original manufacturer's warranty to the Company, and in no event shall such other manufacturer's warranty create any more extensive warranty obligations of the Company to the Purchaser than the Company's warranty covering Equipment manufactured by the Company. Refractories installed in Equipment manufactured by the Company are excluded from this Limited Warranty for the reason that Company has no control over the conditions to which the refractories are subjected in service.

(b) Exclusions from Warranty

(i) THE FOREGOING IS IN LIEU OF ALL OTHER WARRANTIES, ORAL OR EXPRESSED OR IMPLIED, INCLUDING ANY WARRANTIES THAT EXTEND BEYOND THE DESCRIPTION OF THE EQUIPMENT. THERE ARE NO EXPRESS WARRANTIES OTHER THAN THOSE CONTAINED IN THIS PARAGRAPH 5 AND TO THE EXTENT PERMITTED BY LAW THERE ARE NO IMPLIED WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE. THE PROVISIONS OF THIS PARAGRAPH 5 AS TO DURATION, WARRANTY ADJUSTMENT AND LIMITATION OF LIABILITY SHALL BE THE SAME FOR BOTH IMPLIED WARRANTIES (IF ANY) AND EXPRESS WARRANTIES.

(ii) The Company's warranty is solely as stated in (a) above and does not apply or extend, for example, to expendable items, ordinary wear and tear, altered units, units repaired by persons not expressly approved by the Company, materials not of the Company's manufacture, or damage caused by accident, the elements, abuse, misuse, temporary heat overloading, or by erosive or corrosive substances. The treatment of feedwater and the conditioning of boiler water are beyond the control of the Company. Therefore, the Company shall not be held responsible for any damage, direct or consequential, due to the presence of oil, grease, scale or deposits on the internal surfaces of the Equipment, or for damage resulting from foaming caused by chemical conditions of the water; or for damage resulting from corrosion or caustic embrittlement, or from any other cause which results because of improper or inadequate treatment of feedwater or conditioning of boiler water.

(c) Warranty Adjustment

The Company shall repair or shall replace F.O.B. point of shipment, any parts of the Equipment within one (1) year from the date of initial firing, but not to exceed eighteen (18) months after date of shipment or date of invoice, whichever is earlier, found to be defective in design, workmanship, or material, provided the Equipment is operated by the Purchaser in accordance with generally approved practice and in accordance with the conditions of service, if any, herein specified, and provided the Purchaser notifies the Company in writing within thirty (30) days of discovery of any alleged defect. Any warranty adjustments made by the Company shall not extend the initial warranty period set forth above. The warranty period for replacements to the Equipment made by the Company shall terminate upon the termination of the initial warranty period set forth above. Expenses incurred by Purchaser for labor to replace or repair or expenses to return the Equipment or any part or parts to Company will not be reimbursed by the Company.

(d) Spare and Replacement Parts Warranty Adjustment

The Company sells spare and replacement parts. This subparagraph (d) sets forth the Warranty Adjustment for such parts. Purchaser must make claim of any breach of any spare or replacement parts warranty by written notice to the Company's home office within thirty (30) days of discovery of any alleged defect for all such parts manufactured by the Company. The Company agrees at its option to repair or replace, but not install, F.O.B. Company's plant, any part or parts it manufactures which, within one (1) year from the date of shipment shall prove to the Company's satisfaction (including return to the Company's plant, transportation prepaid, for inspection, if required by the Company) to be defective within this Parts Warranty. The Warranty and warranty period for spare and replacement parts not manufactured by the Company (purchased by the Company from third party suppliers) shall be limited to the Warranty and Warranty Adjustments extended to the Company by the original manufacturer of such parts; in no event shall such other manufacturer's warranty create any more extensive warranty obligation of the Company to the Purchaser for such parts than the Company's Warranty Adjustment covering parts manufactured by the Company as set forth in this subparagraph (d). Expenses incurred by the Purchaser for labor to replace or repair or expenses to return the spare or replacement parts will not be reimbursed by the Company.

(e) Limitation of Liability

The warranty adjustment provision set forth in this paragraph shall be Purchaser's exclusive remedy and the extent of the Company's liability for breach of implied (if any) and express warranties, representations, instructions or defects from any cause in connection with the sale or use of the Equipment. THE COMPANY SHALL NOT BE LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, OR FOR LOSS, DAMAGE OR EXPENSE, DIRECTLY OR INDIRECTLY ARISING FROM THE USE OF THE EQUIPMENT, SPARE OR REPLACEMENT PARTS, OR FROM ANY OTHER CAUSE WHETHER BASED ON WARRANTY (EXPRESSED OR IMPLIED) OR TORT OR CONTRACT, regardless of any advices or recommendations that may have been rendered concerning the purchase, installation or use of the Equipment.

6. PATENTS

(a) Patent Indemnity and Conditions

The Company shall defend at its own expense and hold Purchaser harmless in the event of any suits instituted against Purchaser based on a claim that the Equipment, or any part thereof, furnished hereunder constitutes an infringement of any claim of any United States Patent covering the Equipment as originally manufactured by the Company per the Company's specifications and without modification by the Purchaser, provided Purchaser shall (i) have given the Company immediate notice in writing of any such claim or institution or threat of such suit; and (ii) have permitted the Company to defend or settle the same, and have given all needed information, assistance and authority to enable the Company to do so. Purchaser shall defend and indemnify the Company against all expenses, costs and loss by reason of any real or alleged infringement by the Company's incorporating a design or modification requested by Purchaser.

(b) Limitation of Liability

The Company's total liability hereunder is expressly limited to an amount not to exceed the sales price of the Equipment and may be satisfied by the Company's refund to Purchaser, at the Company's option, of the sales price of the Equipment. In the event the Company elects to defend any such suit and the Equipment is held to infringe any such United States Patent and if the Purchaser's use thereof is enjoined, the Company shall, at its expense and at its option: (i) obtain for the Purchaser the right to continue using the Equipment; or (ii) supply non-infringing Equipment for installation by Purchaser; or (iii) modify the Equipment so that it becomes non-infringing; or (iv) refund the then-market value of the Equipment.

7. PRIOR USE

(a) If damage to the Equipment or other property or injury to persons is caused by use or operation of the Equipment prior to being placed in initial operation ("Start-up") by the Company where Start-up is included in the purchase price, then Purchaser shall indemnify and hold the Company harmless from all liability, costs, and expenses for all such damage or injury.

(b) Inasmuch as representatives of the Company are authorized only to advise and consult with the Purchaser, and no representative of the Company is authorized or licensed to operate the Equipment, all preliminary operations and demonstration of capacity and performance guarantees, if required, prior to final acceptance, shall be performed by the Purchaser.

8. EQUIPMENT CHANGES

The Company may, but shall not be obligated to, incorporate in the Equipment any changes in specifications, design, construction, arrangement or components.

9. SECURITY INTEREST; INSURANCE

(a) To secure payment of the purchase price, Purchaser agrees that the Company shall retain a security interest in the Equipment until Purchaser shall have paid in cash the full purchase price when due, interest at the highest lawful contract rate until so paid and the costs of collection, including reasonable attorneys' fees. The Equipment shall at all times be considered and remain personal property and Purchaser shall perform all acts necessary to assure and perfect retention of the Company's security interest against the rights or interests of third persons. In the event Purchaser defaults in payment of any part of the purchase price when due, or fails to comply with any provisions of this contract, the Company shall have the remedies available under the Uniform Commercial Code.

(b) From the date that risk of loss of and damage to the Equipment passes to the Purchaser as provided above, and until the Equipment is finally accepted and the Contract Price paid in full, or until all obligations of the Company hereunder have terminated, the Purchaser shall provide and maintain insurance in the names of the Purchaser and the Company as interest may appear to the total value of the Equipment and of all work performed in the erection thereof against risk of fire, lightning, windstorm, aircraft and explosion, including inherent dangers and boiler explosion and the proceeds of such insurance shall be applied to the cost of repairing and replacing the Equipment and work destroyed or damaged.

(c) In the event the Purchaser furnishes workmen for the unloading, transportation, loading, handling or erection of the Equipment to be furnished by the Company hereunder, or if the Company or its Erection Supervisor utilizes workmen paid directly by the Purchaser to perform the work covered by this contract, or in the event preliminary operations of the Equipment are performed by the Purchaser prior to final acceptance, then the Purchaser shall indemnify and hold harmless the Company from any and all liability, claims, suits or expenses in connection with bodily injuries, including death, at any time resulting therefrom, and in connection with any damage to or loss of property sustained by any person or persons including such workmen, occurring during the performance of such work or resulting from the operation of such Equipment by the Purchaser prior to final acceptance, except such injury, death, damage or loss as may result from negligent acts or omissions of the Company or its employees. The Purchaser shall at his own expense defend any and all suits brought against the Company alleging any such injury, death, damage or loss, even if such suit or suits are groundless, false or fraudulent. The Company shall not be responsible for damage to or loss of the Equipment furnished or work done by the Company if so caused by employees of the Purchaser or if resulting from such preliminary operations.

(d) The Company shall provide and maintain until completion of the work the following forms of insurance in respect of its own employees (but not in respect of any employee paid directly by the Purchaser, but utilized by the Company):

Workers' Compensation Insurance including Employer's Liability Insurance in accordance with the laws of the State in which the Company may be required to pay compensation; and

Comprehensive General Liability Insurance, excluding products, with a combined bodily injury and property damage liability limit of $1,000,000 for each occurrence and $1,000,000 in the aggregate.

10. LOSS, DAMAGE OR DELAY

The Company shall not be liable for loss, damage or delay resulting from causes beyond its reasonable control or caused by strikes or labor difficulties, lockouts, acts or omissions of any governmental authority or the Purchaser, insurrection or riot, war, fires, floods, Acts of God, breakdown of essential machinery, accidents, priorities or embargoes, car and material shortages, delays in transportation or inability to obtain labor, materials or parts from usual sources. In the event of any delay from such sources, performance will be postponed by such length of time as may be reasonably necessary to compensate for the delay. In the event performance by the Company of this agreement cannot be accomplished by the Company due to any action of governmental agencies, or any laws, rules or regulations of any governmental agency, the Company (at its option) may cancel this agreement without liability. In no event shall the Company be liable for any loss or damage of any kind, including consequential or special damages of any nature.

11. WORK BY OTHERS

(a) The Company, being only a supplier of the Equipment, shall have no responsibility for labor or work of any nature relating to the installation or operation or use of the Equipment all of which shall be performed by Purchaser or others. It is the responsibility of Purchaser to furnish such accessory and safety devices as may be desired by it and/or required by law or OSHA standards respecting Purchaser's use of the Equipment. Purchaser shall be responsible for ascertaining that the Equipment is installed and operated in accordance with all code requirements and other applicable laws, rules, regulations and ordinances.

(b) The Company shall provide the Purchaser with General Arrangement drawings showing the Equipment with reference to foundations, including loading diagrams and showing location of anchor bolts in the foundations. The Company shall not be responsible for the depth of the footings, size or accuracy of the foundations, or the character of the materials selected for their construction. Adequate foundations, having plan measurements in accordance with such drawings including foundation bolts and plates, concrete work, all grouting, and excavation, shall be furnished in place in due time by the Purchaser. The Company shall not be responsible for any damages, or repairs necessary to the Equipment furnished by it, caused by or resulting from defects in or settlement of the foundations.

(c) Unless otherwise stated, any supporting steel to be furnished by the Company as specified in this Proposal will be designed to support the Equipment which the Company proposes to furnish and will be designed in accordance with the latest Rules of the American Institute of Steel Construction. If the Company is required to increase the size or weight of its supporting structures to conform to other than these Rules or because of additional loadings imposed by the Purchaser, the Purchaser shall reimburse the Company for the additional steel required.

(d) It is mutually agreed that where State laws or Municipal ordinances require permits to install Equipment covered by this Proposal, or the approval of the plans and specifications for this installation, the Purchaser assumes the responsibility for securing the approval of said plans and specifications from the proper State or Municipal authorities and for any required fees. If any changes are required in the Equipment covered by this Proposal to meet the approval of said State or Municipal authorities, the Purchaser shall inform the Company of such changes and shall reimburse it for changes actually made to comply with the requirements of said authorities.

12. GOVERNING LAW AND RECOVERY OF FEES AND EXPENSES

This Agreement is made and entered into in the State of Nebraska, County of Lancaster, and shall be construed in accordance with the laws of the State of Nebraska. With regard to any disputes which arise hereunder, jurisdiction and venue shall be proper in the State or Federal Courts located in Lancaster County.

In the event suit is brought or an attorney is retained by Company to enforce these Terms and Conditions or to collect any money hereunder, or to collect any money damages for breach hereof, Company shall be entitled to recover, in addition to other remedy, reimbursement for reasonable attorneys' fees, court costs, costs of investigation and other related expenses incurred in connection therewith.

13. COMPLETE AGREEMENT; NON-WAIVER

THE COMPLETE AGREEMENT BETWEEN THE COMPANY AND PURCHASER IS CONTAINED HEREIN AND NO ADDITIONAL OR DIFFERENT TERM OR CONDITION STATED BY PURCHASER SHALL BE BINDING UNLESS AGREED TO BY THE COMPANY IN WRITING, EXECUTED BY A DULY ELECTED AND ACTING OFFICER OF THE COMPANY. No course of prior dealings and no usage of the trade shall be relevant to supplement or explain any terms used in this Agreement. This Agreement may be modified only by a writing signed by both the Company and Purchaser. The failure of the Company to insist upon strict performance of any of the terms and conditions stated herein shall not be considered a waiver of any such term or condition or any of the Company's rights.

END OF STANDARD TERMS & CONDITIONS

Attachment 2

Emergency Generator and Emergency Fire Water Pump Specifications

12502 Exchange Drive, Suite 404
Stafford, TX 77477 - USA
Phone: (281) 240-5335
Fax: (281) 240-4774
bschultz@hitecusa.com

February 11, 2009

Mark Freyenberger
Kiewit Power Engineers

Subject: Budgetary Quotation 09 -066 -HPP
KPE 2008045

Dear Mark.

We are pleased to offer the following budgetary proposal for the supply of one (1) 2200kVA, single output, Hitec CPS systems to provide uninterrupted, continuous and conditioned power to your critical applications.

As you will see, I have assumed our PGM and the GDP disconnect breaker are to be installed in the enclosure, and that the switchgear, line reactor, controls, etc will be installed in an existing building. The PGM module will include high deflection vibration mounts. We will design the enclosure for a seismic zone 4 application, but neither the enclosure nor other equipment has any seismic certifications or stamps. This standard Hitec equipment, as proposed, has been installed successfully by users at numerous locations in California.

Delivery time after receipt of a technically cleared purchase order is indicated on the proposal. A detailed project schedule will be developed by our assigned project manager upon receipt of the purchase order.

We hope that this proposal meets your requirements. Should you have any questions after your review, please contact us. We will be pleased to meet with you to discuss any of the features outlined in the following pages.

Best regards,

Bob Schultz
Hitec Power Protection, Inc.

cc: Jaime Hummer, Air Power Consultants, Lenexa, KS

Budgetary Quotation: 09-066-HPP
Date: February 11, 2009

12502 Exchange Drive, Suite 404
Stafford, TX 77477 - USA
Phone: (281) 240-5335
Fax: (281) 240-4774
bschultz@hitecusa.com

One Hitec Diesel Rotary CPS System rated 2200kVA (1760kW), Single Output, 480Vac, 60 Hz at 0.8pf in accordance with Hitec standard specification.

Item	Qty	Description
A1		CPS system to include
	1	Power Generating Module (PGM) with • Diesel engine • Free Wheel Clutch • Induction coupling • 480Vac, 60Hz alternator • PGM will have high deflection vibration mounts
	1	Unit Control Panel (UCP) – interface and controls for CPS
	1	Unit Reactor Panel (URP) – Line reactor Dry-type core and coil construction with bus stub connection at coils and Hitec standard enclosure.
	1	Redundant Diesel Starting System comprising: • Dual, redundant, starting motors • Batteries and external charger for redundant starting motors • Redundant Starting Panel (RSP) - rectifier to supply 24VDC from generator for redundant starting motors
	1	Daily fuel tank, UL142, 150 gallon with automatic and manual transfer pumps, level alarms, rupture basin and control
	1	Remote radiator (110°F max ambient) with single electric fan and motor starter
	1	Exhaust silencer, critical grade
	1	Main Power Board (MPB) - 480V Switchgear according to single line, Q1, Q2, Q3
	1	Generator Disconnect Panel (GDP) - 480V manually operated circuit breaker
	1	First fluid fill - includes engine oil, clutch oil, coolant and greases
	1	Black start control to allow starting of unit without presence of utility power
	1	Remote monitoring software package (QMS) with modem
	NOTE:	Load bank and LB breakers are not included. Fuel oil is not included; #2 diesel fuel to be supplied by others
A2	1	Sound attenuated drop-over enclosure for field installation by others of PGM Module and GDP. Included in enclosure are: • Day tank • Exhaust silencer • Ventilation louvers with controls • Enclosure lights, receptacles and service panel • Roof mounting structure for radiator • Radiator motor starter • Open bottom for mounting by others on belly tank • UL142 belly tank (approx 2500 gallon) - PGM, GDP and drop-over enclosure to be mounted on tank by others at site.
	NOTE:	Enclosure and tank quoted are Hitec's standard construction designed as zone 4 seismic. Seismic certification or engineer stamp not included.

Item	Qty	Description
A3	1	Factory witness testing of PGM per Hitec specification and procedure. Costs for travel expenses are not included in this quotation. Lodging and meals while at the factory for one trip of two individuals are included.
A4	1	Packing, loading and transport of the equipment according to Incoterms 2000, DDP (Delivered Duty Paid), Job Site or designated receiving location, contiguous 48 states.
A5	1	Start-up and commissioning of the Diesel CPS system at site after the electrical and mechanical installation work are completed by others. Customer is responsible for supplying one certified electrician to assist full time in installation review and correction as needed. Load banks and connection/disconnection are to be provided by others.
A6	1	Site Acceptance Testing per standard Hitec specification and procedures.
A7	1	Project Management and Application Engineering to assist with technical support, Hitec documentation and specifications, installation guidelines, data sheets, electrical drawings, etc.
A8	1	Training during 2 to 3 days at site following immediately after the start-up and commissioning
A9	1	Third party certification of all control panels supplied by Hitec to UL standards.
A10	1	All components - exclusive of the enclosure-mounted PGM and GDP - to be mounted and wired by others in existing building. Power and control wiring between enclosures and buildings by others. Electrical and mechanical work for installation of equipment is excluded. Compliance to state and local codes is the responsibility of the customer. Seismic certifications or stamps are not included.

Total Budgetary Price Items A1 - A10 **$2,175,000.00** **Lot net**

Prices are DDP, Job Site or designated receiving location, contiguous 48 states.
Prices do not include sales, use, excise or any similar taxes, fees, or permits that are not part of Incoterms 2000 DDP.

DELIVERY
Delivery is estimated 28 to 30 weeks ARO.

TERMS of PAYMENT
Prices are based on the following payments, subject to credit approval. All invoices are payable net 30 days from the date of the invoice.

- 30% invoiced at date of order.
- 30% invoiced at date of transmittal of submittal documents.
- 30% invoiced at date of factory acceptance test.
- 10% invoiced at date of site acceptance testing, not to exceed 45 days after date of delivery at designated receiving location.

Quotation is budgetary.

TERMS AND CONDITIONS OF SALES

GENERAL

The equipment materials and services (collectively, "Products") which are set forth on the face hereof will be sold by Hitec Power Protection, Inc. ("Company") only upon the following terms and conditions of sale. These terms are intended to cover all transactions of Company and Customer hereunder, including sales and use of Products and all related matters, including technical advice and services. This document, together with any additional writing signed by an officer of Company, represents a complete and exclusive statement of the agreement between the parties and may not be modified or supplemented by oral representations, Customer's purchase order or any other document submitted by Customer, a course of dealing, Company's performance or delivery of Products, or in any way other. Objection is made to any such attempted modification or supplementation. References on the face hereof to Customer's purchase order or to Customer's specification and similar requirements are solely to describe the Products and such purchase order or other communications are not incorporated herein. Catalogues, circulars, and similar pamphlets of Company are issued for general information purposes only and do not modify the provisions hereof. None of the Standard Terms and conditions of Sale herein set forth may be added to, modified, superseded, or otherwise altered, except by a written instrument, signed by an officer of Company. To the extent not otherwise provided herein, the terms of this agreement shall be those provided by the Uniform Commercial Code in effect in the State of Texas on the date hereof which would be provided if the parties were silent as to those terms.

QUOTATIONS

All purchase orders issued by Customer based on Company's quotations are subject to credit approval and final approval and acceptance by Company, and shall not constitute a contract of sale until such approval and acceptance is made in writing by Company's order acknowledgment or sales confirmation. Company's quotations are based on Company's understanding of the specifications and data submitted by Customer. Customer bears the responsibility for any ambiguity in such specifications and data. In the event any terms or provisions of a purchase order as accepted are inconsistent with these Standard Terms and Conditions of Sale, the terms and provisions of these Standard Terms and Conditions of Sale shall control.

SALES CONFIRMATIONS

A sales confirmation or order acknowledgment issued by Company pursuant to Customer's purchase order constitutes an expression of acceptance of such purchase order, but such expression of acceptance is expressly conditioned upon Customer's assent to the Standard Terms and Conditions of Sale as herein set forth, which assent will be deemed to have been given unless notice cancellation of the purchase order is received by Company within 10 days following the sales confirmation date. Where Company does not issue either a quotation or sales confirmation, and ships Products pursuant to Customer's purchase order, such sale shall be subject to Company's Standard Terms and Conditions of Sale, as set forth on Company's invoice. Each accepted purchase order shall constitute an independent transaction and Customer shall pay for same in accordance with the terms specified therein.

CANCELLATIONS AND POSTPONEMENTS

Purchase orders with respect to which Company has issued a sales confirmation or order acknowledgment may be canceled by Customer in writing within 10 days following the sales confirmation date; thereafter, no such purchase order may be canceled by Customer without written consent of Company (which consent Company may withhold in its sole discretion). Company's consent may, at its option, be predicated upon a cancellation charge. Any delays or postponements in work to be performed by Company, caused wholly or in part by or at the request of Customer, will allow Company to invoice Customer for the work performed up to the date of the delay or postponement.

PRICES

All quotations and sales prices are FOB Company's plant in Stafford, Texas unless otherwise noted. Prices are subject to adjustment by Company after 30 days from the date of the quotation unless otherwise stated. Except as provided on the face hereof, or as hereinafter provided, prices include packing and crating for Products destined within the continental United States, excluding Alaska. An additional charge will be made for export packing and crating. If Customer requests any modification of an accepted purchase order which change causes, in Company's sole discretion, an increase or decrease in the cost of or time required for performance of the affected purchase order by Company, an equitable adjustment shall be made in the applicable price or delivery schedule, or both, and the affected purchase order, as the case may be, shall be modified accordingly in writing. Nothing in this provision shall require Company to implement any change or to continue to perform under this agreement or any affected purchase order until mutual agreement has been reached in writing regarding any such equitable adjustments.

TAXES

Quotations and the prices set forth on the face hereof do not include sales, use, excise or other similar taxes. Unless Customer provides Company with a tax exemption certificate acceptable to the applicable taxing authorities, an amount equal to any sales, use, excise, or other tax which may be imposed upon the sales or use of the items covered by the quotation or this order acknowledgment, shall be added to the prices set forth on the face hereof. Customer shall be responsible for all sales, use, excise or other similar taxes imposed on this transaction, whether or not

included in Company's invoice, and whether or not such amount would, in the absence of this agreement, be due and payable by Customer or Company. If Customer fails to timely submit resale exemption information or if Customer's resale exemption is rejected by a taxing authority, Customer shall pay any tax due as a result.

ITEMS FURNISHED BY CUSTOMER

Prices and delivery dates for Products for which Customer furnishes components, plans, patterns, tools, or other items are based upon such items being received in usable condition, within the required time, and in such quantities as may be required, with transportation charges prepaid to Company's plant in Stafford, Texas. If defects are found in items furnished by Customer, Company will notify Customer and may charge additional expenses incurred, and extend the delivery dates of the Products, as a consequence of such defects. Company assumes no responsibility for loss or damage to items furnished by Customer where such loss or damage is due to circumstances beyond its control.

TERMS OF PAYMENT

Invoices shall be paid to Company at its offices in Stafford, Texas without setoffs or deductions of any kind. Payments on invoices shall be due thirty (30) days from the date of the invoice, unless otherwise specified on the face hereof. All invoices shall be dated (i) the date of shipment, unless Customer requests shipment to be delayed, in which case the invoice shall be dated the date of completion of manufacture of the Products or (ii), if milestones are specified, the date of the milestone event to which progress payments have been indexed in the quotation, specification, on the face hereof or in other contract documents. All purchase orders shall be accompanied by irrevocable standby letters of credit in the amount of the order, issued by a bank and in a form satisfactory to Company and valid for a period of 90 days after the last scheduled delivery date. Amounts not timely paid, whether related to a purchase order or any other indebtedness, shall bear interest thereafter at the rate of the lesser of (i) eighteen percent per annum or (ii) the maximum no usurious contract rate of interest permitted by law. Whenever reasonable grounds for insecurity arise with respect to performance by Customer, Company may demand modified terms of payment from those specified on the face hereof or on any invoice including without limitation accelerated payment terms, full payment prior to delivery, the provision of additional collateral or additional letters of credit, and Company may refuse to make delivery pending satisfactory modification of the terms of payment. Company retains title in all equipment sold, for security purposes only, until full payment is received. Customer grants Company a security interest in the Products sold hereunder, replacements therefore and additions thereto and all other equipment heretofore or hereafter sold by Company to Customer to secure Customer's present or future obligations to Company and the proceeds of all the foregoing. Company may file this instrument as a financing statement. Upon Company's request, Customer will execute financing statements evidencing the security interest granted herein. Customer appoints Company as it's attorney-in-fact to execute any such financing statement. Upon Company's request, Customer will execute financing statements evidencing the security interest granted herein. Customer appoints Company as its attorney-in-fact to execute any such financing statement. If Customer intends to relocate the Products sold hereunder prior to full payment therefore, Customer will give Company thirty (30) days' prior written notice thereof including therein the new address where such items will be kept. In the event Customer does not pay an invoice when due, Customer agrees to pay Company interest as provided above and any collection costs (including without limitation reasonable attorney fees) incurred by Company to obtain payment.

DELIVERY AND ACCEPTANCE

Unless otherwise specified herein, all shipments are FOB Company's plant in Stafford, Texas with Customer paying all shipping costs. In the absence of written shipping instructions from Customer, Company may ship the products collect freight to Customer by any common carrier which it deems in its sole discretion satisfactory. All delivery dates which may be set forth are estimates of the time normally required to deliver such Products and are subject to change without limitation by Company notwithstanding negotiations between Company and Customer. Delivery dates will be calculated from the date that Company has received all information necessary to permit Company to proceed with work immediately and without interruption. Company will make all reasonable efforts to conform to delivery estimates but will not be liable for delays resulting from its failure to deliver in accordance with delivery estimates. Company may make partial deliveries and invoice separately for each delivery. Customer shall inspect and accept or reject the Products within twenty (20) days after delivery. Failure to timely reject shall be deemed an acceptance. Acceptances are irrevocable. All claims whatsoever by Customer, except claims under applicable warranties, shall be made within such 20-day period or are waived.

TITLE: RISK OF LOSS

Customer shall obtain and maintain insurance coverage on the Products against all risks of loss or damage in an amount equal to at least the unpaid balance of the purchase price, if any. If Company shall so request, all such policies shall name Company as an additional insured and Customer will deliver to Company a completed certificate or certificates of insurance signed by an authorized representative of each of Customer's insurance carriers involved, certifying that such insurance has been issued and is in full force and that if such insurance is canceled or changed so as to affect the coverage, at least thirty days prior written notice of such cancellation of change will be sent to Company. Company's responsibility terminates upon the delivery of Products to a common carrier or Customer-furnished carrier for transportation, FOB Company's plant in Stafford, Texas. The Products herein referred to, the title thereto (except for security purposes as provided above), and any risk of loss, shall be considered as being transferred

to Customer upon delivery to the common carrier for transportation, Customer or Customer's designee. No claims for shortages, damages, or other failure in transit may be made by Customer against Company. Notwithstanding the foregoing, Products held by Company at Customer's request beyond the scheduled delivery date shall be at Customer's risk.

WARRANTY: LIABILITY LIMITATION

Company warrants that the Products and parts of its own design and manufacture shall be, at the time of delivery, free from defects in material and workmanship under normal use and service preventive maintenance performed per Hitec factory and manufacturers instructions within the Warranty Period (as defined). All claims for defective products or parts under this warranty must be made in writing immediately upon discovery and, in any event, within the Warranty Period. The term "Warranty Period" refers to the period prior to the first to occur of (i) the date on which the Product is sold or transferred by Customer to any party, or (ii) eighteen (18 months) from shipment of the Products or (iii) twelve (12) months after the date of start-up. In the case of parts which are purchased from Company separately by Customer and are not installed by Company, claims must be made within ninety (90) days from shipment of the applicable item because Company has no control over the installation of such part or the equipment on which it is installed. Customer must notify Company in writing of any defect or warranty claim immediately upon discovery and shall permit Company to inspect the Product so Company may determine its warranty obligations. Failure of Customer to give Company written notice of nonconformance of Products to Company's warranty immediately upon discovery and, in any event, prior to expiration of the Warranty Period, shall be conclusive of (i) Customer's final acceptance of and full satisfaction with the Products and (ii) Company's fulfillment of its warranty in all respects. Company does not warrant any Products or parts which are used, rebuilt or not new or not manufactured by Company however, Company will assign to Customer whatever warranties Company has received from the manufacturer of any products or parts not manufactured cy Company to the extent such warranties can be assigned to Customer. Company's warranty covers parts, labor , travel and living expenses of Company personnel (within North America). Items not covered by this warranty are expendables such as fuses, light bulbs, fuel filters, etc. Customer shall be responsible for all third party charges associated with warranty services, including, but not limited to, rigging, drayage, and taxes. Company shall not be responsible for providing warranty service to remedy any defect caused by any replaced parts or by repairs, alterations, modifications or changes unless made by Company's authorized service personnel. Repairs or replacements are warranted as described herein for the remainder of the original Warranty Period. Company shall not be responsible for damages or defects resulting from shipment, improper handling, storage, installation, operation or maintenance. The determination of the cause and existence of a defect by Company shall be conclusive. Repairs and/or replacements not covered by the warranty shall be charged to Customer at Company's standard field service rates. Company's warranty does not guarantee that its Products will be electrically compatible with any other electrical or electronic equipment, when sold as an individual item. Customer's sole and exclusive remedy and Company's sole and exclusive liability under this warranty is expressly limited, at the sole option of Company, to the repair, replacement or refund of the purchase price of any Products which upon examination Company determines to its sole satisfaction to be defective within the Warranty Period. If Company elects to repair or replace Product which fail to conform to Company's warranty, Company shall have a reasonable time in which to make the repair or replacement and shall deliver the repaired or replaced Products to Customer, FOB, Company's plant in Stafford, Texas. Upon settlement of its obligations, if any, under this warranty, Company, at its option shall be entitled to the return of the defective Product or parts(s). **COMPANY DISCLAIMS ALL OTHER WARRANTIES, WHETHER EXPRESS, IMPLIED OR STATUTORY (INCLUDING, WITHOUT LIMITAITON, WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE), AND ANY AGREEMENTS, REPRESENTATIONS, AFFIRMATION OR WARRANTIES, WHETHER ORAL OR WRITTEN, MADE BY ANY AGENT, EMPLOYEE OR REPRESENTATIVE OF COMPANY OR AS SET FORTH IN ANY PURCHASE ORDER OF CUSTOMER UNLESS AND EXCEPT AS SPECIFICALLY SET FORTH HEREIN.** Company shall not be liable for losses based on downtime, overhead, the negligence of Customer or Company or any of their employees or agents, property damage, lost production or profits or for incidental, consequential or special damages of any kind arising from or attributable to this agreement, the Products or the manufacture, assembly, sale, use, repair, maintenance, claim, whether in contract, tort (including negligence) or otherwise, arising out of, connected with or resulting from the manufacture, assembly, delivery, sale, use, repair, maintenance, replacement or operation of any Product sold hereunder will not exceed the price allocable to the Product or any part thereof which give rise to the claim. Every cause of action based on this agreement or the items sold hereunder by Customer against Company shall be brought not later than the expiration of the applicable Warranty Period. If Customer has assets of at least $5 million, Customer waives all provisions of the Texas Deceptive Trade Practices – Consumer Protection Act to the extent which such waiver is effective pursuant to Section 17.42 of the Texas Business and Commerce Code.

INDEMNITY

Customer hereby agrees to indemnify, defend and hold harmless Company, its affiliates, and their respective agents and employees (indemnities") from all claims, suits or proceedings based on a claim of personal injuries or death property damage, product liability or any other liability of any kind under any legal theory of liability arising out of or attributable to the manufacture, assembly, delivery, sale, use, repair, maintenance, replacement or operation of the Products without regard to whether the Products are alleged to have contributed to or caused the basis for such claim or whether such claim was alleged to be contributed to or caused by an indemnities sole or concurrent negligence,

defective products, or other breach of duty on the part of an indemnity, whether such claims suits or proceedings are by Customer or by third parties. Customer shall indemnify and hold harmless indemnities from and against any and all claims, damages, losses, liabilities, judgments, settlements, costs, and expensed (including but not limited to attorney's fees) incurred or awarded in such claims, suits or proceedings.

FORCE MAJEURE

Company shall not be liable for any losses, delays, or failure to deliver Products, repair or replace Products, or otherwise perform under this agreement resulting in whole or in part from any causes beyond its control. Such causes include without limitation strikes or other labor disputes involving its employees, the employees of common carriers, or the employees of suppliers, inability to obtain material or transportation, commercial impracticability, acts of God, acts of government, war, riot, insurrection, sabotage, fire, explosion, floods, weather, governmental orders or regulations, inability to secure any necessary governmental or other permits, court orders, breakdown of machinery, accidents, defects in part or equipment of whatever cause, actions or inactions of Customer or its agents, employees or representatives, or other causes, similar or dissimilar, over which the Company has no control.

MISCELLANEOUS

All notices, demands and other communications which may or are required to be given hereunder or with respect hereto shall be in writing, shall be given either by personal delivery, facsimile transmission or by registered or certified mail, return receipt requested, and shall be deemed to have been given or made when personally delivered, or when received as evidences by return receipt or confirmation of facsimile transmission addressed to the respective parties at the address shown on the front of this order acknowledgment. This agreement and the rights and obligations hereunder shall not be assignable by any party hereto without the prior written consent of all other parties. All of the terms and provisions of this agreement shall be binding upon and inure to the benefit of and be enforceable by the heirs, successors and permitted assigns of the signatories hereto.

The captions used in this agreement are for convenience only and are not to be construed in interpreting this agreement. This agreement may be signed and delivered in two or more counterparts, each of which shall be deemed an original and all of which together will constitute one and the same instrument. This agreement may be amended only by a written instrument signed by each party hereto. This agreement shall be governed by and construed in accordance with the substantive laws of the State of Texas without regard to principles of conflicts of law. Each party hereto hereby submits to the jurisdiction of the courts of the State of Texas and the federal courts in and for the Southern District of Texas in connection with any matter relating to this agreement and any other document executed in connection herewith.

THE TRADE TERMS OF THE INTERNATIONAL CHAMBER OF COMMERCE

WHAT IS A TRADE TERM?

A trade term is a combination of letters or words, which specifies certain obligations within the sales contract.

WHAT OBLIGATIONS DOES A TRADE TERM SPECIFY?

The trade term specifies the

1. Transfer of risk
- when the seller has the right to claim for the contract price even if the goods are lost, damaged or short-delivered.

2. Transfer of obligations
- where and how the seller must make the goods available to the buyer and how the buyer must take delivery of the goods.

3. Division of costs
- how the normal costs relating to the export and import of goods should be divided between the seller and the buyer.

WHAT ARE INCOTERMS?

INCOTERMS are a set of international rules for the interpretation of the 13 trade terms published by the International Chamber of Commerce (ICC).

Responsibilities are simply and clearly defined by referring to one of the ICC INCOTERMS. Thus the risk of misunderstanding and subsequent disputes is eliminated.

TRADE TERMS AND NAMED POINT OF DELIVERY

After the chosen trade term one should state
- the named point where the costs transfer and
- "...Incoterms 2000"

For instance "CIF Hamburg Incoterms 2000".

TRADE TERMS AND MODE OF TRANSPORT

The use of trade terms in connection with different modes of transport in the export and import of goods is described below.

\+ = recommended
\- = not recommended

TRADE TERM / MODE OF TRANSPORT

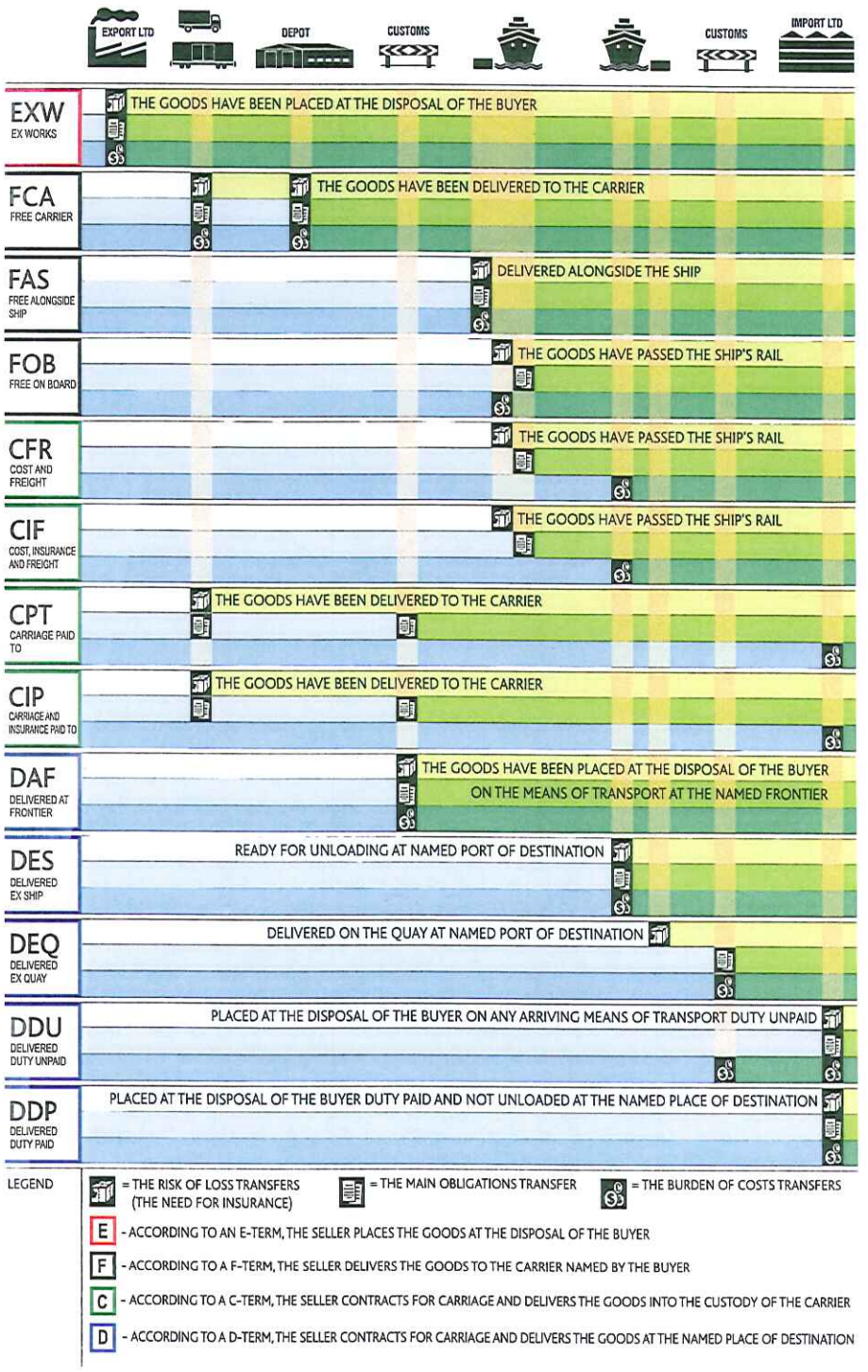
	Sea	Road	Rail	Air	Container	Combined transport
EXW	+	+	+	+	+	+
FCA	+	+	+	+	+	+
FAS	+	-	-	-	-	-
FOB	+	-	-	-	-	-
CFR	+	-	-	-	-	-
CIF	+	-	-	-	-	-
CPT	+	+	+	+	+	+
CIP	+	+	+	+	+	+
DAF	-	-	-	-	-	-
DES	+	-	-	-	-	-
DEQ	+	-	-	-	-	-
DDU	+	+	+	+	+	+
DDP	+	+	+	+	+	+

TRADE TERMS AND CARGO INSURANCE

The need for cargo insurance follows the risk of loss or damage, i.e. each party arranges for insurance for the part of the carriage when the goods are at his risk.

According to the terms CIF and CIP the seller must arrange cargo insurance in favour of the buyer.

This brochure is our summary of the contents of the trade terms.



	THE SELLER MUST		THE BUYER MUST	
EXW	- provide appropriate packing and marking - place the goods at the disposal of the buyer at the named place of delivery - on request assist the buyer with the export documentation		- take delivery of the goods and contract for the carriage to the final destination	EXW
FCA	- provide appropriate packing and marking - load the goods on the means of transport nominated by the buyer (delivery at the seller's premises) or place the goods at the disposal of the carrier nominated	by the buyer, not unloaded, in the seller's means of transport (delivery at the depot or elsewhere) - carry out the export procedures and provide the buyer with the document received for the delivery of the goods	- take delivery of the goods, loaded, on the means of transport (delivery at seller's premises) or take delivery of the goods on the arriving means of transport, not unloaded, and carry out unloading, storage, and loading of the goods (delivery at depot or elsewhere) - carry out import procedures and contract of carriage to the final destination	FCA
FAS	- provide appropriate packing and markin - place the goods at the disposal of the buyer alongside the ship - carry out the export procedures	- provide the buyer with the document received for the delivery of the goods	- take delivery of the goods alongside the ship - carry out the import procedures and the carriage to the final destination	FAS
FOB	- provide appropriate packing and marking - deliver the goods on board the ship at the port of shipment - carry out the export procedures	- provide the buyer with the document received for the delivery of the goods	- take delivery of the goods on board the ship at the port of shipment - carry out the import procedures and the carriage to the final destination	FOB
CFR	- provide appropriate packing and marking - contract for the carriage and pay the freight to the port of destination - deliver the goods on board the ship at the port of shipment	- carry out the export procedures - provide the buyer with the transport document without delay	- accept delivery of goods at the port of shipment and receive them from the carrier at the port of destination - carry out the import procedures and the carriage to the final destination	CFR
CIF	- provide appropriate packing and marking - contract for the carriage and pay the freight to the port of destination - deliver the goods on board the ship at the port of shipment	- carry out the export procedures - contract and pay for agreed cargo insurance in favour of the buyer - provide the buyer with the transport document and cargo insurance document without delay	- agree on the cargo insurance with the seller - accept delivery of goods at the port of shipment and receive them from the carrier at the port of destination - carry out the import procedures and the carriage to the final destination	CIF
CPT	- provide appropriate packing and marking - contract for the carriage and pay the freight to the place of destination - deliver the goods to the carrier	- carry out the export procedures - provide the buyer with the transport document without delay	- accept delivery of goods at the place of dispatch and receive them from the carrier at the place of destination - carry out the import procedures and the carriage to the final destination	CPT
CIP	- provide appropriate packing and marking - contract for the carriage and pay the freight to the place of destination - deliver the goods to the carrier	- carry out the export procedures - contract and pay for agreed cargo insurance in favour of the buyer - provide the buyer with the transport document and cargo insurance document without delay	- agree on the cargo insurance with the seller - accept delivery of goods at the place of dispatch and receive them from the carrier at the place of destination - carry out the import procedures and the carriage to the final destination	CIP
DAF	- provide appropriate packing and marking - place the goods at the disposal of the buyer on the arriving means of transport at the frontier not unloaded	- carry out the export procedures - provide the buyer with the document received for the delivery of the goods	- take delivery of the goods on the arriving means of transport, not unloaded - carry out the unloading of the goods from the means of transport of the seller, storage, import procedures and carriage to the final destination	DAF
DES	- provide appropriate packing and marking - carry out the export procedures - place the goods at the disposal of the buyer on board the ship at the named port of destination	- provide the buyer with the document received for the delivery of the goods	- take delivery of the goods on board at the port of destination - carry out the unloading of the goods - carry out the import procedures and carriage to the final destination from the named port of discharge	DES
DEQ	- provide appropriate packing and marking - carry out the export procedures - place the goods at the disposal of the buyer on the quay at the named port of destination	- provide the buyer with the document received for the delivery of the goods	- take delivery of the goods on the quay at the port of destination - carry out the import procedures and the carriage to the final destination	DEQ
DDU	- provide appropriate packing and marking - carry out the export procedures	- place the goods at the disposal of the buyer at the named place of destination not unloaded - provide the buyer with the document received for the delivery of the goods	- take delivery of the goods at the final destination - carry out the unloading of the goods - carry out the import procedures	DDU
DDP	- provide appropriate packing and marking - carry out the export and import procedures	- place the goods at the disposal of the buyer at the named place of destination not unloaded	- take delivery of the goods at the final destination - carry out the unloading of the goods	DDP

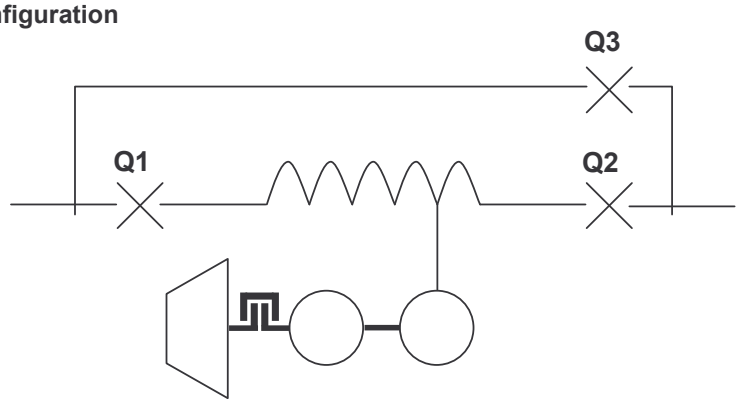
Typical Customer Provided Activities

The following items summarize some typical activities to be provided by customer's selected electrical, rigging and mechanical contractors.

- Crane rigging for placement of equipment at site and securing equipment in its final fixed location.
- Installation of the cooling system, including piping and flexes
- Installation of the exhaust system
- Installation of all fuel system and piping
- Installation of room ventilation system in existing building
- Installation of the PGM and GDP on base tank
- Electrical connections internal to the existing building
- Electrical connections internal to enclosure
- Field connections between PGM enclosure and components in existing building

Single UPS system

Configuration



Circuit breakers
Q1 : NB utility circuit breaker
Q2 : NB Load circuit breaker
Q3 : NB Bypass circuit breaker

Operation modes:
Utility mode
Utility mode is the operation mode that is also named “power conditioning”. Circuit breakers Q1 and Q2 are closed and the diesel engine is not running. The NB load is fed by conditioned power of the utility, via the reactor. The UPS is improving power factor, filtering harmonics, correcting utility anomalies and keeping output voltage at a constant level.

Diesel mode
If utility is out of tolerance, the diesel engine is supplying the NB load. Only circuit breaker Q2 is closed and the diesel engine is running at constant speed.

Bypass mode
In bypass mode, Q3 is closed and Q2 is open, Q1 can be either open or closed. Utility is feeding the load.

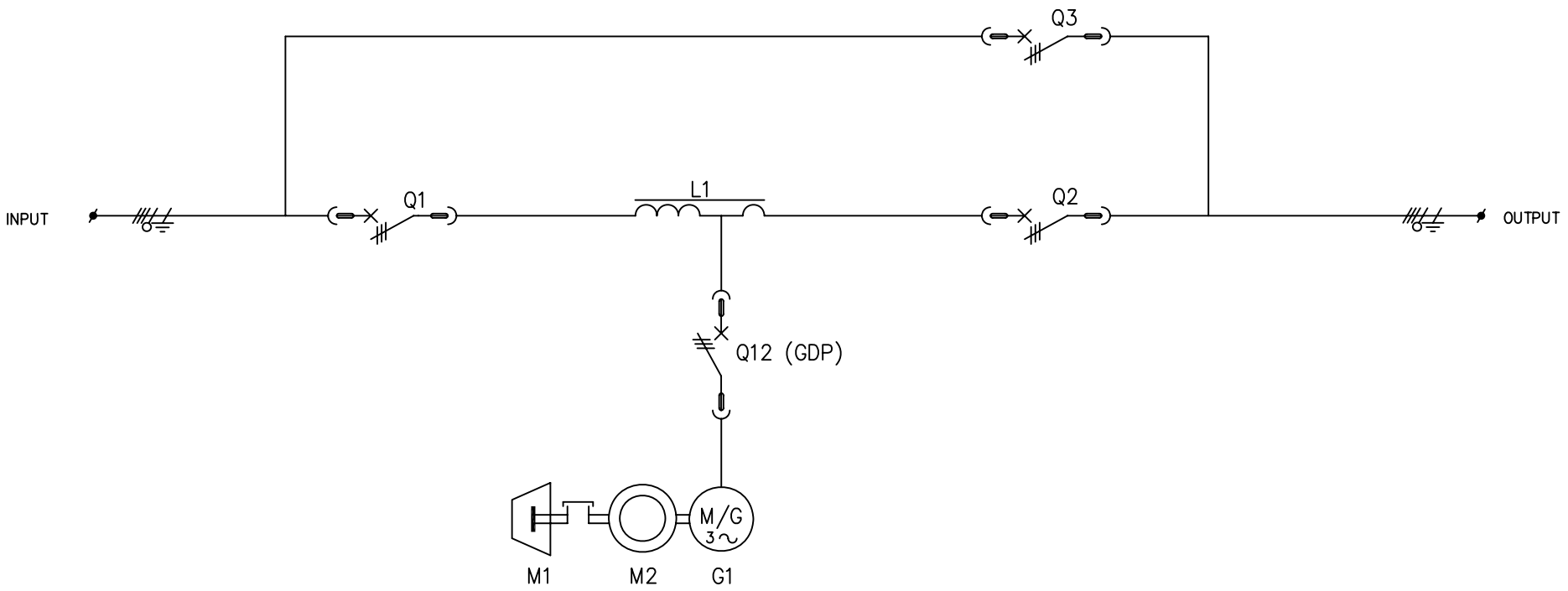
Utility failure / Diesel mode
With a utility outage the NB utility circuit breaker Q1 will open and the diesel engine will start. The UPS will continuously monitor the utility for voltage and frequency for return of these (parameters) within tolerances to retransfer to utility mode.

Retransfer, synchronizing and paralleling
If the utility returns within tolerances the generator will synchronise with the utility. It will run in synchronism with the utility during utility acceptance time and then parallel with the utility by closing NB utility circuit breaker Q1.

Bypass mode
The bypass circuit breaker is closed if the unit is taken out of operation. Switching over to bypass mode from utility mode (from Q2 to Q3) will be make-before-break.

Table

Mode	Q1	Q2	Q3	Diesel
Utility mode	Closed	Closed	Open	Stop
Bypass mode	Open or Closed	Open	Closed	Stop or Running
Diesel mode	Open	Closed	Open	Running



title	SINGLE LINE DIAGRAM UPS–SYSTEM SINGLE OPERATION	HITEC Power Protection	UEG97063		
			drawn	97-07-31	W.HEMMER	sheet 1
			ch'd			
revision		Hitec Power Protection bv – The Netherlands	app'd			of

AutoCAD version: 10.0 Menufile: SETUP.MNU DOS filename: UEG97063.DWG

HITEC STANDARD ENCLOSURES

All Hitec enclosures are NEMA 3R, walk-in type, designed to the following standards unless specified under a separate document. Other parameters are available upon request.

Sound Attenuation	85dBA @ 23 feet, clear field environment, 5 ft above ground level
Wind Load	Designed for 80 MPH
Rain	Designed for 4" per hour
Roof Load	Designed for 30PSF
Ambient Temp	PGM Operating: 32º to 104ºF PGM Non-Operating: -4º to 158ºF
Relative Humidity	PGM Operating: 0 to 95% for 32º to104ºF PGM Non-Operating: 0 to 95% including condensation
Barometric Pressure	Sea level to 3280ft.
Seismic Zone	None
Fire Proofing	None

Codes and Standards; applicable sections of

UBC	ASME B31
NEC	NFPA-30
ANSI	CSA

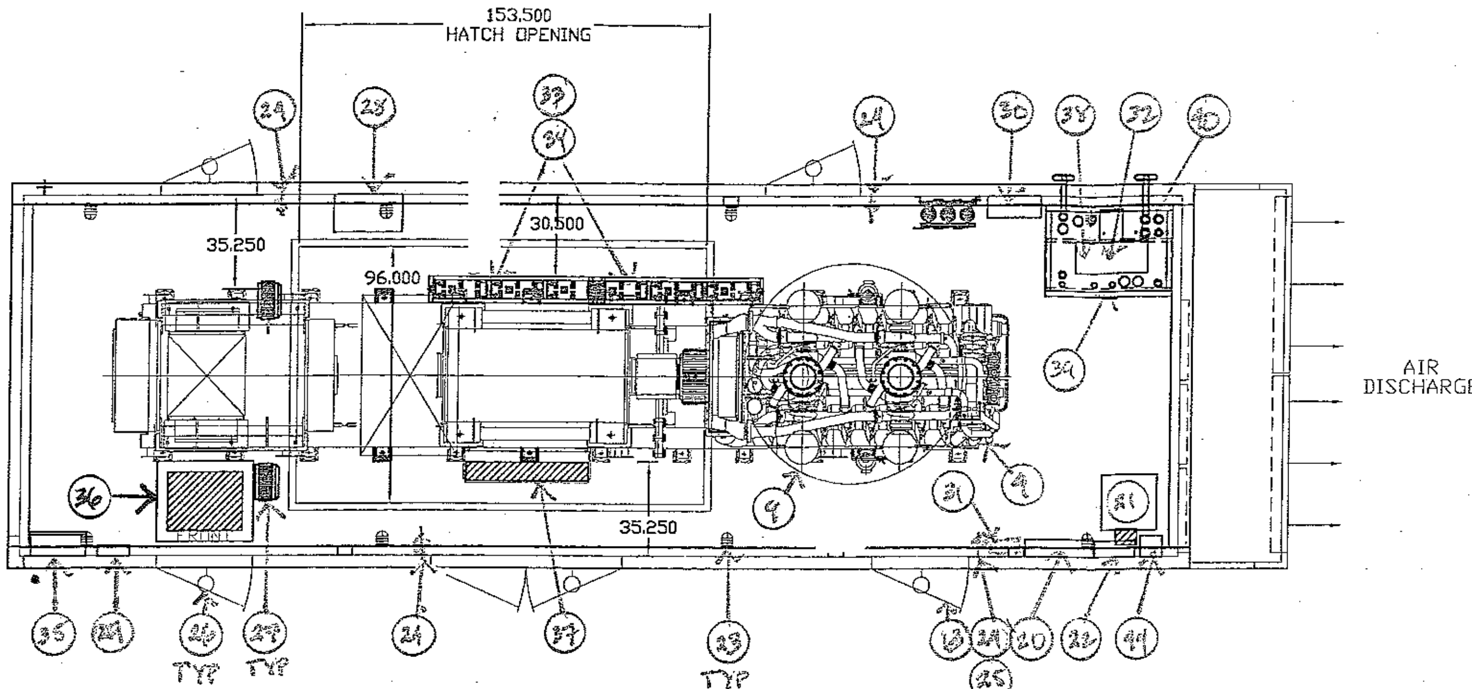
Construction

Base frame	Continuous ship channel base frame around entire perimeter
Corners	Vertical 4" x 4" square columns at each corner and in mid section
Exterior walls	14 gage galvanealed skin with 4" stiffeners on 24" centers.
Insulation	4" of 4lb/ft^3 of mineral wool insulation for sound attenuation and thermal insulation. Covered with 2mil polyethylene over insulation
Interior walls	Interior of enclosure lined with 22 gage galvanized perforated metal.
Roof	14 gage galvanealed material, 4" mineral wool, 16" centerline on stiffeners and a raised seam exterior to add additional roof support and rigidity.
Sound baffling	8" fully insulated sound deadening devices that have a step broke radius inlet and tapered discharge.
Painting	primed, polyurethane finish coat, ANSI 61, gray
Base Tank, if applicable	UL 142/UL 2085 Carbon steel, exterior primed and painted black

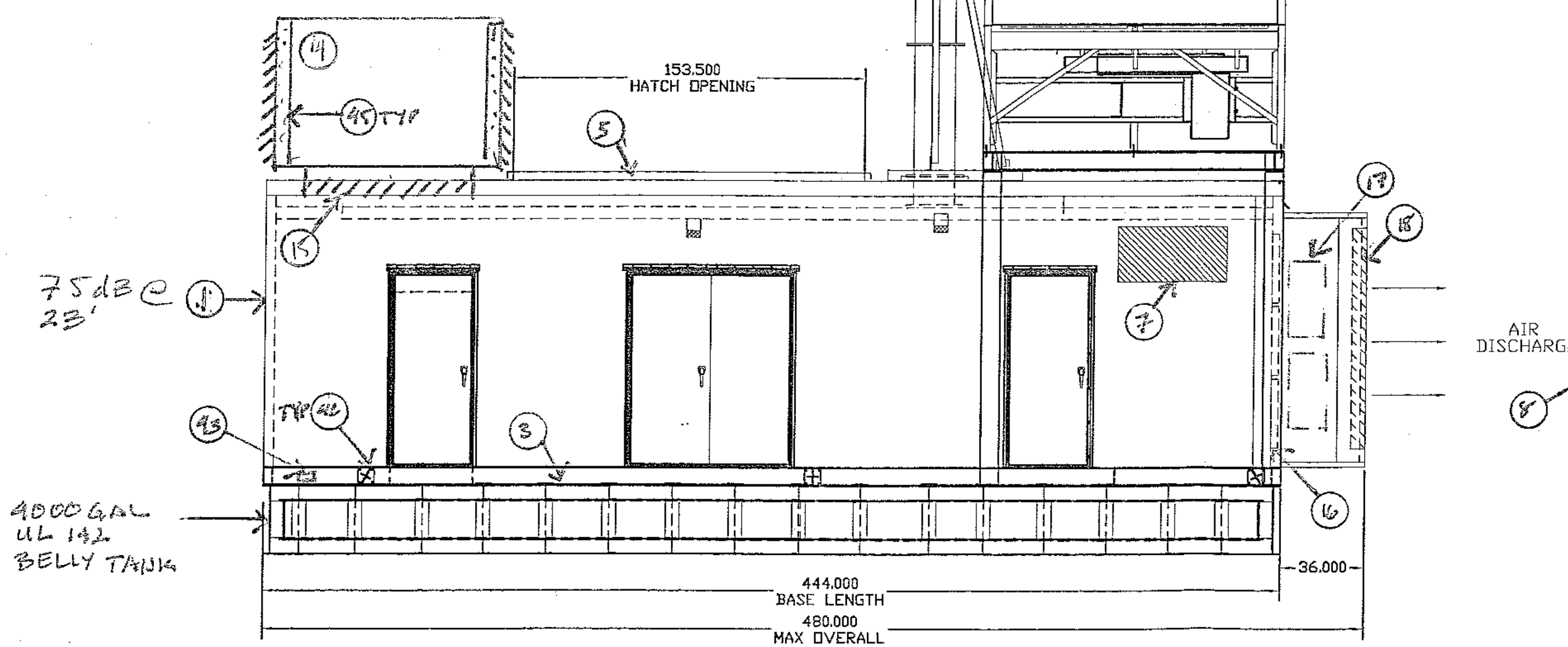
NOTE

Any local codes/standards, state codes/standards, engineer's stamps, certifications, tests or other requirements are not part of the quotation unless specifically mentioned in the quotation. If applicable, the customer should furnish the appropriate specifications and requirements to Hitec for re-quote.

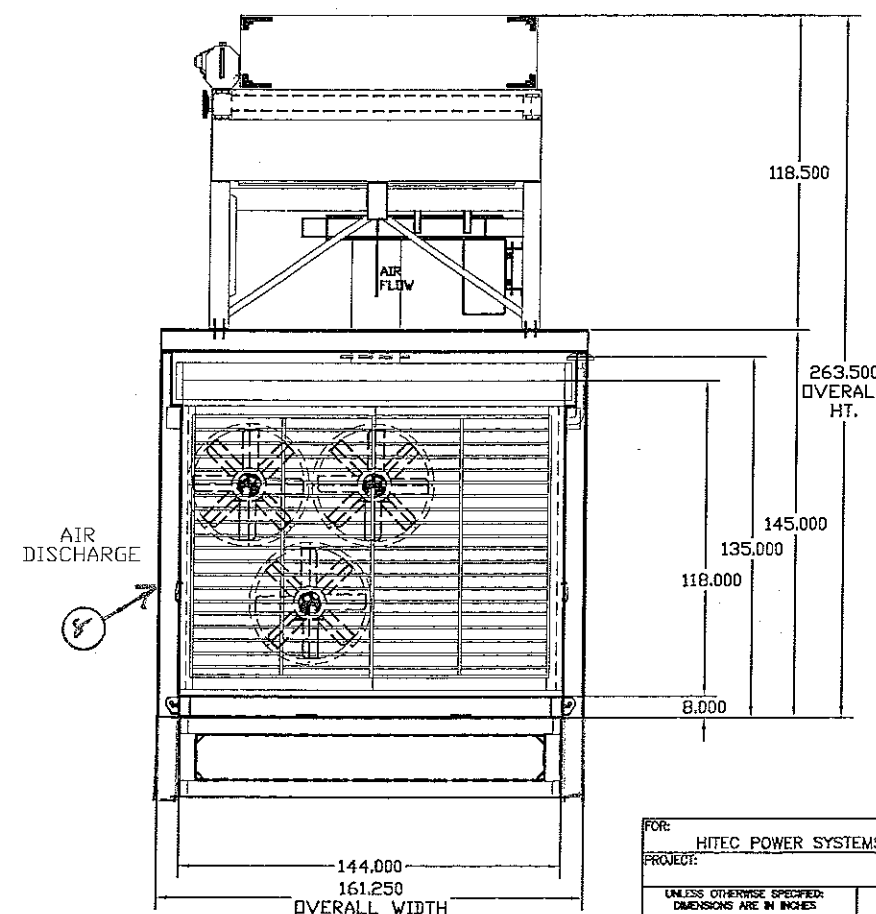
ITEM	QTY:	DESCRIPTION
1	1	[redacted] PACKAGE– DROP OVER CONSTRUCTION
2	A/R	4.5"D WALL PANEL– INSULATED, MARINE GRADE ALUMINUM CONSTRUCTION
3	1	DROP–OVER ENCLOSURE FRAME
4	1	HITEC ROTARY UPS– 2000KW, [redacted]
5	1	ROOF HATCH– REMOVABLE, FOR INDUCTION COUPLING SERVICE
6	1	EXTERIOR MOUNTED RADIATOR– ROCORE HB88, HITEC PROVIDED, SHIPPED LOOSE
7	1	RADIATOR PIPING ACCESS AREA– 24" X 48", [redacted]
8	1	RADIATOR FRAME STRUCTURE– SHIPPED LOOSE, INSTALLED BY CONTRACTOR
9	1	EXHAUST SILENCER– INTERIOR MOUNT, W/ EXHAUST OUTLET ON TOP
10	2	EXHAUST FLEX PIPE– HITEC PROVIDED
11	3	EXHAUST EXTENSION SUPPORTS– SHIPPED LOOSE
12	2	EXHAUST EXTENSION SECTION– W/ RAIN CAP & SUPPORTS, SHIPPED LOOSE
13	4	PERSONNEL ENTRANCE DOORS– PAD LOCKABLE
14	1	AIR INTAKE HOOD W/ FIXED INTAKE LOUVER ASSEMBLY– FOR VENTILATION
15	1	MOTORIZED INTAKE DAMPER ASSEMBLY
16	1	GRAVITY DISCHARGE DAMPER ASSEMBLY
17	4	VENTILATION FAN– INSTALLED IN DISCHARGE HOOD
18	1	AIR DISCHARGE HOOD– W/ FANS
19	1	HAND PUMP – FOR FUEL SUPPLY TO DAY TANK, NOT SHOWN
20	1	DISTRIBUTION PANEL–480VAC, 100A MAIN
21	1	TRANSFORMER– 30kVA, 480:120/208V, CEILING MOUNTED
22	1	SERVICE PANEL– 120/208V, 100A MAIN, 3ø4W
23	8	LIGHT FIXTURE– VAPOR TIGHT, AC
24	4	LIGHT SWITCH
25	2	GFCI RECEPTACLE
26	4	EXTERIOR LIGHT FIXTURE– VAPOR TIGHT, W/ PHOTOCELL
27	2	ENCLOSURE HEATER– CEILING MOUNTED, W/ THERMOSTAT
28	1	BATTERY CHARGER– HITEC PROVIDED
29	1	AUXILIARY CONNECTION BOX
30	1	FUEL CONTROL PANEL
31	1	VENTILATION CONTROL PANEL
32	1	REDUNDANT START PANEL (RSP)– W/ DRIP PAN, HITEC PROVIDED
33	2	STARTING BATTERY SET– HITEC PROVIDED
34	2	BATTERY RACK
35	1	SAXON RADIATOR MOTOR CONTROL PANEL– HITEC PROVIDED
36	1	OUTPUT CIRCUIT BREAKER CUBICLE (GDP)– [redacted] By LC.
37	1	POWER GENERATING MODULE (PGM) CONNECTION BOX– HITEC PROVIDED
38	1	FUEL DAY TANK– ELEVATED, 150 GAL. PRIMARY W/ 225 GAL. RUPTURE, U.L. 142
39	1	DAY TANK FUEL FITTINGS & VENTS
40	1	FUEL OIL COOLER– FOR ENGINE FUEL RETURN TO DAY TANK, MOUNTED ABOVE TANK
41	1	FUEL/WATER SEPARATOR– RACOR 79/1000FGV, HITEC PROVIDED
42	6	REMOVABLE LIFT LUG
43	2	GROUND LUG– LOCATION: RIGHT REAR, FRONT LEFT
44	1	100A DISCONNECT
45	24	24X24X2 500FPM AIR FILTERS



TOP VIEW



SIDE VIEW



DISCHARGE END VIEW

NOTES:

AIR FLOW REQUIREMENTS:
COOLING– 55,500 CFM
COMBUSTION– 6,475 CFM
TOTAL– 61,975 CFM
MAXIMUM WALL PANEL WIDTH– 24"

DROP OVER ENCLOSURE FRAME TO INSTALL DIRECTLY ON CUSTOMER PROVIDED PAD.
GASKET MATERIAL, PROVIDED W/ SHIPMENT, TO BE INSTALLED BETWEEN FRAME & PAD.

FINISH COLOR: UNDETERMINED

EST. ENCL. FRAME WEIGHT:	5,000 LBS
EST. ENCLOSURE WEIGHT:	9,000 LBS
EST. DAY TANK WT., DRY:	2,000 LBS
EST. RADIATOR WT., DRY:	12,000 LBS
EST. RAD. FRAME WEIGHT:	3,000 LBS
EST. DISCHARGE HOOD WT.:	1,500 LBS
EST. MISC. WEIGHT:	5,000 LBS
EST. DRY SHIPPING WT:	37,500 LBS

APPROXIMATE OVERALL DIMENSIONS
LENGTH: 570"
WIDTH: 194.5"
HEIGHT: 263.5"
DAY TANK CAPACITY: 150 GAL.
RUPTURE BASIN CAPACITY: 150% 225 GAL.

ZONE	REV	DESCRIPTION	DATE	APPROVED
–	–	–	–	–

FOR: HITEC POWER SYSTEMS
PROJECT:

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES
TOLERANCES: FRACTIONAL ± 1/64" DECIMAL ± .001"

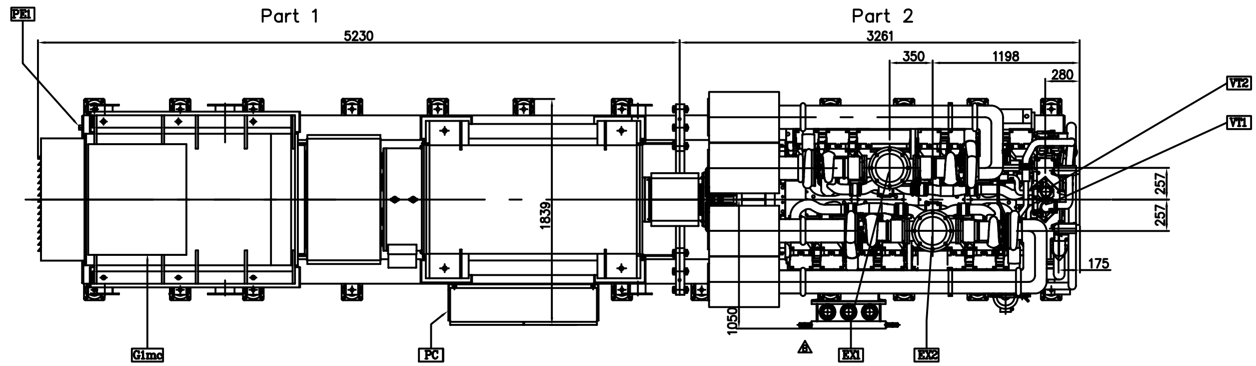
S.C.# QTE#11314F | P.O.# P71100
DRAWN: X | DATE: X
CHECKED: – | –
DESIGN:

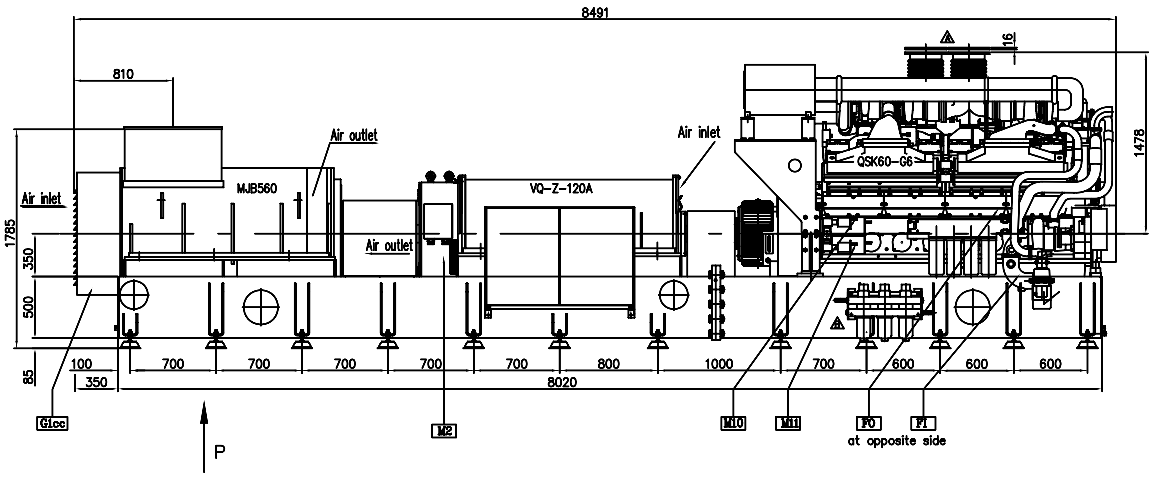
SAMPLE ENCLOSURE

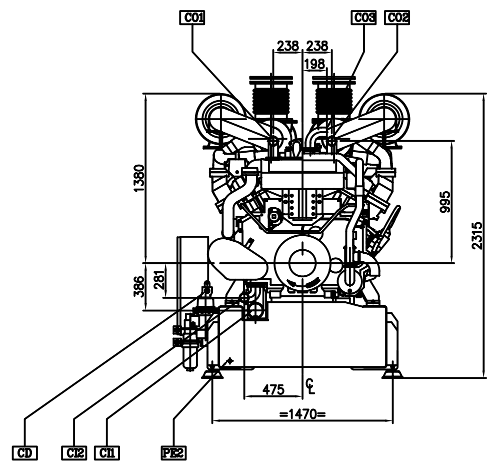
DROP–OVER THERMALLY INSULATED ENCLOSURE GENERAL ARRANGEMENT
FOR A 2,000KW ROTARY UPS

DRAWING NO. X | REV. X
SCALE: 1" = 6' | SHEET 01

Customer electrical installation			Customer mechanical installation		
Item	Loc.	Remarks	Item	Loc.	Remarks
			CD	F6	Crankcase oil drain
G1mc	C2	Generator main connection	CI1	F6	Coolant inlet ø127
			CI2	F6	Aux/ coolant inlet ø76,2
M2	F3	Connection induction coupling	CO1	D6	Coolant outlet ø76,2
			CO2	D7	Coolant outlet ø76,2
M10	F4	Connection starting motor 1	CO3	D7	Coolant outlet ø76,2
M11	F4	Connection starting motor 2			
PE1	A1	Connection earthing M12			
PE2	F6	Connection earthing M12			
			EX1	C4	Flexible exhaust outlet (Detail D)
PC	C3	PGM box connection	EX2	C5	Flexible exhaust outlet (Detail D)
			FD	F6	Fluid drain 3/4"BSP
			FI	F5	Fuel inlet 1 1/16"-12-2A
			FO	F4	Fuel outlet 1 1/16-12-2A
			OS		Oil supply
			VT1	B6	Coolant vent. line 1.1/16"UNF
			VT2	B6	Intercooler coolant vent. line 1.1/16"UNF







Flexible outlet

detail D

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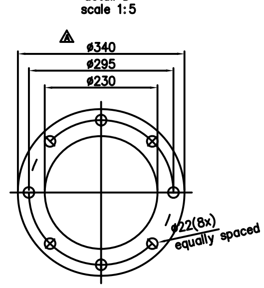
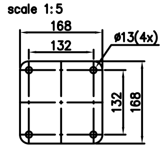


View P

scale 1:5



Mass Part 1: ±14000 kg

Mass Part 2: ± 9300 kg

Total mass : ±23300 kg

rev.	revision	date	par.
A	Exhaust flexibles added	[illegible]-08-2007	H.V.
B	Fuel filters added	04-07-2007	B.D

dim. without tolerance ± 1 — ISO 1302 ✓

scale 1: 20 — ISO 1101 — ISO 128

type: MJB560/VQ-Z/QSK60-G6

	date	name
drwn.	16-05-2007	H.V.
chkd.	04-07-2007	
seen		

order

U P S

HITEC Power Protection

title: Dimension sketch Power Module Unit 4.2 & 4.3 (Left Construction)

dwg.no. DRW-2200326-324 — sheet 1, 2 sh.

rev. B

ref. DRW-400142-301 — replaces

Hitec Power Protection bv - the Netherlands

A1

SPECIFICATION 891
Diesel UPS/CPS

Item	Description	Specified Data	See Note	Rev. #
	Specification Summary			
	This specification covers the design, fabrication, testing and delivery of a Diesel UPS/CPS system in accordance with this specification and stated Standards.			
1	**Environmental Parameters**			
1.1	Application	**Indoor**	13.1	
1.2	Location	**Blythe, California U.S.**		
1.3	Altitude (Ft. above MSL)	**395**		
1.4	Ambient Temperature Range (Deg. F)	**33 to 110**		
1.5	Average Ambient Temperature (Deg. F)	**71**		
1.6	Average Relative Humidity (%)	**40%**		
1.7	Seismic Zone	**See Section 1B**		
1.8	Special Seismic Requirements	**Yes**		
1.9	Environment Contamination Level (IEEE Std C57.19.100-1995)	**Medium**		
1.10	Plant Access for Freight			
1.11	Rail	**See Section 1B**		
1.12	Truck	**See Section 1B**		
1.13	Barge	**See Section 1B**		
2	**Drawings Supplied as part of this Specification**			
2.1	General Arrangement	**N/A**		
2.2	Electrical One-Line	**N/A**		
2.3	Other	**N/A**		
3	**General Requirements**			
3.1	Quantity to be Quoted	**One (1)**		
3.2	Max. Output Rating (kVA)	**2200 kVA**		
3.3	Frequency (Hz)	**60 Hz**		
3.4	Input Voltage (kV)	**480 V**		
3.5	Output Voltage (kV)	**480 V**		
3.6	Voltage deviation	**+/- 1%**		
3.7	Voltage asymmetry	**<2%**		
3.8	Harmonic distortion	**<3.5%**		
3.9	Harmonic filtering	**>95%**		
3.10	Frequency deviation	**<0.5%**		
3.11	Short Circuit Current (kA)	**37 kA**		
3.12	Nominal P.F.	**0.8**		
3.13	Efficiency	**>95%**		
3.14	Color Scheme	**RAL 7032**		
3.15	Diesel Engine	**Manufacturer Standard**		
4	**Options**			
4.1	Modular Enclosure for Diesel UPS/CPS Equipment	**Included**		
4.2	Output Configuration	**Single Output**		
5	**Spare Parts**			
5.1	Manufacturer Recommended Start-Up Spare Parts	**Included**		
5.2	Manufacturer Recommended Two-Year Spare Parts	**N/A**		
6	**Commercial Requirements**			
6.1	Supply Bond, 100%, 12 months from date of order	**Included**		
6.2	Warranty, 18 months minimum from date of delivery	**Included**		
6.3	Extended Warranty (5 year)	**N/A**		

SPECIFICATION 891
Diesel UPS/CPS

Item	Description	Specified Data	See Note	Rev. #
6.4	Freight to JOBSITE	**Included**		
6.5	Transfer of title at JOBSITE	**Included**		
7	**Required Testing**			
7.1	Manufacturer's Standard Testing:	**Included**		
7.2	Witness Test:	**Option**		
8	**Codes and Standards**			
8.1	Follow All the Latest Applicable Standards and Codes Including but Not Limited To:			
8.2	American National Standards Institute (ANSI)			
8.3	American Society of Testing and Materials (ASTM)			
8.4	Institute of Electrical and Electronic Engineers (IEEE)			
8.5	National Electric Code (NEC)			
8.6	National Electrical Manufacturers Association (NEMA)			
8.7	National Electric Safety Code (NESC)			
8.8	National Fire Protection Association (NFPA)			
8.9	Underwriters Laboratories (UL)			
8.10	Occupational Safety & Health Act (OSHA)			
9	**Data to be supplied by Vendor**			
9.1	Overall Dimensions of UPS/CPS (Length x Width x Height)	see drawing		
9.2	Enclosure Dimensions (Length x Width x Height)	see drawing		
9.3	Max. Output Rating (kVA)	2200		
9.4	Frequency (Hz)	60		
9.5	Input Voltage (kV)	480		
9.6	Output Voltage (kV)	480		
9.7	Voltage deviation	±1%		
9.8	Voltage asymmetry	<2%		
9.9	Harmonic distortion	<3.5% linear load		
9.10	Harmonic filtering	>95%		
9.11	Frequency deviation	typically set to go to diesel at ±0.5%		
9.12	Short Circuit Current (kA)	up to 14X		
9.13	Nominal P.F.	0.8		
9.14	Efficiency	>95% @ FL		
9.15	Color Scheme	RAL7032 & RAL 5012; engine std manufacturer color		
9.16	Diesel Engine	Cummins QSK60-G6		
9.17	Rear Access Required?	for swgr		
9.18	Additional Aux Power Requirements?	NA, power rating is net		
10	**Training and Start-up Supervision**			
10.1	Unit Rates ($/Man Hour)	NA		
10.2	Expenses, meals, lodging, auto, travel included	NA		
10.3	Recommended Erection Assistance (8hr Days)	included		
10.4	Recommended Training Period (8hr Days)	2 days, included		
11	**Commercial & Delivery**			
11.1	Site Delivery Time From Receipt of Order (Weeks)	30 weeks ARO		
11.2	Place of Manufacture (City, State, Country)	Almelo, NL for CPS; other matl USA		
11.3	Transfer of Title (Jobsite, Port of Entry, or Other)	**JOBSITE**		
11.4	Period of Quote Validity (days):	budgetary		
11.5	Date of Quotation	2/11/2009		
12	**Quotation Cost Breakdown Requirements**			

SPECIFICATION 891
Diesel UPS/CPS

Item	Description	Specified Data	See Note	Rev. #
	Manufacturer:	**Hitec Power Protection**		
	Show cost of each listed item:	**(rounded)**		
12.1	ELECTRICAL EQUIPMENT:	**$1,574,000**		
12.2	EQUIPMENT ENCLOSURE:	**$300,000**		
12.3	STARTUP/ERECTION ASSISTANCE: commissioning/site tests	**$160,000**		
12.4	TRAINING:	**$7,000**		
12.5	SPARE PARTS SPECIFIED:	**incl in equipment**		
12.6	START-UP SPARE PARTS:	**incl in equipment**		
12.7	TWO-YEAR SPARE PARTS:	**N/A**		
12.8	FREIGHT:	**$87,000**		
12.9	100% SUPPLY BOND:	**$12,000**		
12.10	CUSTOMS/DUTIES AND IMPORT FEES:	**$35,000**		
12.11	OTHER COSTS NOT LISTED (DESCRIBE):			
12.12	TOTAL, D.D.P. JOBSITE: Budgetary	**$2,175,000**		

13	Additional Comments
13.1	Quote shall include price for standalone modular building enclosure. Layout shall be typical and Manufacturer shall provide proposed layout drawing.
13.2	
13.3	
13.4	
13.5	

CB NEBRASKA BOILER®

The power of commitment.™

www.neboiler.com

D-TYPE

Proposal No: 24521-J2
Date: 12-10-2009
Prepared By: Jason Jacobi

TO:	FOR:
Kiewit Power Engineers Lenexa, KS **KPE Project No. 2008-045**	**Palen 240 MW Solar Project** Palen, CA

BOILERS - BURNERS - CONTROLS

TOTAL INTEGRATION

TABLE OF CONTENTS

1.0 INTRODUCTION

CB Nebraska Boiler & **CB Natcom** form the engineered boiler/burner division of the **Cleaver-Brooks** family of companies. We are committed to offering integrated boiler/burner solutions to the industry. This group of companies has been in this business for more than 80 years and continues to enjoy a large percentage of the market share. We maintain our leadership in the industrial watertube market by offering innovative solutions and a true single-source responsibility to our customers for boilers, burners, controls & auxiliary equipment. This commitment to overall system design ensures that your equipment operates efficiently and lasts for years to come.

For your unique application, we are offering a packaged solution with the following design features:

1.1 OUTLET STEAM CONDITIONS:

Capacity (net output):	25,000 LB/HR ¤
Capacity (gross output):	29,000 LB/HR including deaerator steam
Operating Pressure:	165 PSIG (at exit of non-return valve) ¤
Steam Temperature:	Superheated to 480°F ± 10°F (at 100% load) ¤
Steam Purity:	1 ppm TDS ¤

1.2 BOILER DESIGN:

Type:	D-Type Industrial Watertube
Model:	NB-201D-45-SH
Vessel Design Pressure:	300 psig

1.3 BURNER DESIGN:

Type:	Low-NOx Register
Main Fuel:	Propane/Air Mix (9 ppm NOx, 50 ppm CO)
Backup Fuel:	NA

1.4 ECONOMIZER DESIGN:

Type:	Rectangular Finned-Tube
Arrangement:	Vertical Gas Flow; Counter-Current Water Flow
Design Pressure:	350 psig
Inlet Feedwater Temp:	228°F

1.5 STACK DESIGN:

Type:	Freestanding Stub
Diameter (at exit):	36″
Height (from grade):	50 ft

In partnership with our authorized representative, **Trabue Industrial Systems** in Overland Park KS, we offer your true single-source solution for boiler, burner, controls & local support.

2.0 SCOPE OF SUPPLY

The following equipment is included for each steam generator system proposed:

*Note that items marked 'NO' may not be required and/or may not be specified:

Shipped Loose	ITEM	Size	Qty	Included YES	NO	ALT
X	**Model NB-201D-45-SH D-Type industrial watertube boiler**		1	X		
	- Fully membrane (watercooled) pressure vessel that is 100% welded gas-tight with no refractory corner seals			X		
	- Tubes will be SA178A			X		
	- Tubes will be SA192 (seamless)				X	
	- Tubes seal-welded to drum (for high-pressure or heavy cycling service)				X	3
	- Steam separators to provide steam purity of 1 ppm TDS based on water supply meeting attached limits.			X		
	- Boiler shall be painted SSPC - SP3			X		
	- Membrane front wall			X		
	- Membrane rear wall			X		
	- Factory hydrostatic test			X		
	- Factory air casing test			X		
	- Corrugated aluminum outer casing			X		
	- Welded steel outer casing – primed & painted				X	
	- Lower-drum steam heating coil				X	
	- Furnace access door (15x18")		1	X		
	- Convection inspection door		1	X		
	- Furnace observation ports (three 1 ½" on rear wall)		3	X		
	- 12x16" elliptical manways		4	X		
	- 14x18" elliptical manways (steam drum only)				X	
	- Hinged manways		4	X		
	Boiler Steam Trim:					
	- Water column		1	X		
	- Water column drain valve	0.75 in.	1	X		
	- Water column probe		1	X		
	- Water column gage glass		1	X		
	- Water column gage		1	X		
	- Water column gage drain valve	0.75 in.	1	X		
	- Auxiliary Low water cutout		1	X		
	- Auxiliary Low water cutout drain valve	0.5 in.	1	X		
	- Low water cutouts bypass		1	X		
	- Continuous (surface) blowdown stop valve	0.75 in.	1	X		
	- Continuous (surface) blowdown control valve	0.75 in.	1	X		
X	- Bottom (intermittent) blowdown stop valve	1.5 in.	1	X		
X	- Bottom (intermittent) blowdown control valve	1.5 in.	1	X		
	- Chemical feed stop valve	0.5 in.	1	X		
	- Chemical feed check valve	0.5 in.	1	X		
X	- Drum vent valve	0.5 in.	1	X		

Shipped Loose	ITEM	Size	Qty	Included YES	Included NO	Included ALT
	- Drum vent stack		1		X	
	- Steam pressure gage	8.5 in.	1	X		
	- Steam gage drain valve	0.5 in.	1	X		
	- Steam gage test valve	0.25 in.	1	X		
	- Drum Level Transmitter Isolation Valve	1.5 in.	2	X		
	- Drum Level Transmitter Isolation Drain Valve	0.5 in.	2	X		
X	- Main steam non-return valve	6.0 in.	1	X		
X	- Main steam stop valve	6.0 in.	1	X		
X	- Spool piece – 3 ft	6.0 in.	1	X		
X	- Spool piece drain valve	0.5 in.	1	X		
X	- Safety valves - set at: 300 PSIG	300 psig	1	X		
X	- Safety valves - set at: 295 PSIG	295 psig	1	X		
	- Safety valve silencers		2		X	
	- Safety valve vent stacks		2		X	
	- Safety valve silencer/stack support		2		X	
	- Safety valve drip pan elbow		2		X	
	- Steam sample cooler		1		X	
	- Lower-drum steam heating coil trim including isolation valves, drain valves & steam trap temperature regulator	1.5 in.			X	
	Boiler Feedwater Trim:					
X	- Feed control valve	2.0 in.	1	X		
X	- Feed stop valve	2.0 in.	1	X		
X	- Feed check valve	2.0 in.	1	X		
X	- Feed control system drain valve	0.5 in.	2	X		
X	- Feedwater bypass valves – globe	2.0 in.	1	X		
X	- Feedwater bypass valves – gate	2.0 in.	2	X		
X	- Feedwater piping	2.0 in.	1	X		
	Boiler Sootblowers:					
	- Boiler wall boxes & bearings		1	X		
	- Sootblower Manual assembly				X	
	- Sootblower Electric assembly				X	
	- Sootblower element (calorized/dialoy)				X	
	- Sootblower steam piping from boiler				X	
	- Sootblower shutoff valve				X	
	- Sootblower drain valve				X	
	Economizer:					
X	- Rectangular finned-tube economizer with corrugated outer lagging		1	X		
	- Economizer sootblower wall boxes & bearings		1	X		
	- Economizer sootblower assembly				X	
	- Steam supply pipe and steam stop and drain valves for economizer sootblower assembly				X	
	Economizer Trim:					
	- Economizer feedwater bypass				X	
	- Economizer safety relief valve				X	
	- Economizer safety relief valve vent stack				X	
	- Economizer safety relief valve drip pan elbow				X	

Shipped Loose	ITEM	Size	Qty	Included YES	NO	ALT
X	- Header vent valve	1.0 in.	1	X		
X	- Header drain valve	1.0 in.	2	X		
X	- Temperature gauges – feedwater inlet/outlet		2	X		
	- Temperature thermowell - feedwater inlet/outlet		2	X		
X	- Temperature gauges – flue gas inlet/outlet		2	X		
	- Temperature thermowell - fluegas inelt/outlet		2	X		
	Superheater:					
	- Inverted-loop, drainable-type, single stage convection primary superheater, designed for a final temperature 480°F±10°F at 100% MCR		1	X		
	- Secondary superheater - used in dual stage superheaters				X	
	Superheater Trim:					
X	- Saturated steam piping from boiler steam outlet to superheater inlet with vent and drain connections. Shipped loose.	6.0 in.	1	X		
X	- Superheated steam outlet pipe with safety valve connection, vent connection, drain connection, and temperature/pressure gauge connections	6.0 in.	1	X		
X	- Drain and valves	1.0 in.	2	X		
X	- Vent valves	1.0 in.	1	X		
X	- Sample valve	0.75 in.	1	X		
X	- Temperature gauge		2	X		
X	- Pressure gauge		2	X		
X	- Superheater safety relief valve		1	X		
	- Superheater safety relief valve silencer		1		X	
	- Superheater safety relief valve stack		1		X	
	- Superheater safety relief valve silencer/stack supports		1		X	
	- Superheater safety relief valve drip pan elbow		1		X	
	- Start-up vent valve		1	X	X	
	- Start-up vent valve silencer		1		X	
	- Start-up vent valve stack		1		X	
	- Start-up vent valve silencer/stack supports		1		X	
	Attemperator:					
	- Variable-orifice feedwater spray-injection type desuperheater assembly with integral spray nozzle				X	
	- Spray water control valve				X	
	- Steam piping between superheater stages				X	
	Boiler Instrumentation:					
X	- Steam flow element - Orifice plate		1	X		
X	- Feed water flow element - Orifice plate		1	X		
	Boiler Transmitters: - all transmitters include a 3 valve manifold					
X	- Steam flow transmitter		1	X		
X	- Feedwater flow transmitter		1	X		
X	- Steam outlet pressure transmitter		1	X		
X	- Furnace pressure transmitter for draft control		1	X		

Shipped Loose	ITEM	Size	Qty	Included YES	NO	ALT
	- Drum level transmitter		1	X		
X	- Eyehye Remote Drum level transmitter		1	X		
X	- Economizer feedwater inlet temperature transmitter - including RTD		1	X		
X	- Economizer feedwater outlet temperature transmitter - including RTD		1	X		
X	- Economizer flue gas inlet temperature transmitter - including RTD		1	X		
X	- Economizer flue gas outlet temperature transmitter - including RTD		1	X		
	Stack:					
X	- Freestanding Stub stack 36 inch diameter (at the exit) and 50 ft in height (from grade) with sampling ports as required. Made from 0.25 inch carbon steel.		1	X		
X	– Ladders to access sampling ports		1	X		
X	- Platforms to access EPA ports		1	X		
	- 1/16" corrosion allowance on stack wall.				X	
	- Rub plates and all hardware for guiding the stack at the roof				X	
	- Rain hood				X	
X	- Personnel protection - from grade:	8 ft	1	X		
	- External insulation & lagging for stack				X	
	- FAA warning lights		1		X	
	Deaerator:					
	- Spray-type deaerator				X	
	- Tray-type deaerator		1			***1***
	- Storage tank		1			***1***
	- Simplex (one(1) 100% capacity) feedwater pumpset				X	
	- Duplex (two(2) 100% capacity) feedwater pumpset		2			***1***
	- Triplex (three(3) 50% capacity) feedwater pumpset				X	
	- Deaerator support stand		1			***1***
	- Deaerator platforms & ladders		1			***1***
	- Local deaerator control panel		1			***1***
	SCR:					
	- Catalyst to Reduce NOx by 90%				X	
	- Catalyst to Reduce CO by 80%				X	
	- Reactor housing				X	
	- Ammonia Injection Grid (AIG)				X	
	- Ammonia Flow Control Unit (AFCU)				X	
	- Ammonia Dilution and Flow Skid				X	
	- Ammonia storage tank				X	
	- Flow model test				X	
	Boiler Platforms & Ladders:					
X	- Platforms & ladders to access boiler Drum Length		1	X		
X	- Platforms & ladders to access boiler Drum End		1	X		
	- Platforms & ladders to access Economizer		1		X	
X	- Platform construction: Angle Iron handrails, Exp flooring		1	X		

Shipped Loose	ITEM	Size	Qty	Included YES	NO	ALT
	- Platform & ladder finish: Primed & Painted		1	X		
	Miscellaneous:					
	- P.E. stamp (structural only)		1		X	
X	- Blowdown tank		1	X		
	- Blowdown conductivity control system		1		X	
	- Chemical feed system		3		X	
	- C.E.M.S. (continous emissions monitoring system)		1		X	
X	- Inlet air preheater with trim (steam supply req'd)		1	X		
	- Motor starters		1		X	
	- Spreader bars for rigging		1		X	
	- Oil fuel atomizing steam stop and drain valves and supply piping from steam header/drum to entrance to atomizing steam train				X	
	- Superheater piping field welds				X	
	- Piping insulation				X	
	- Piping supports				X	
	- Field cuts/welds for field alignment, between major pieces of equipment. (Ducting flanges are tack welded. Prefab piping is completed for hydrotest at factory)				X	
	- Design & supply of interconnecting piping, wiring, conduit, tubing, and fittings, between boiler/boiler controls and auxiliary equipment e.g. D.A., blowdown, chem. feed, drains, vents, field mounted electronics, etc…				X	
	- Unloading and installation of equipment				X	
	- Interconnecting large-bore (> 2") piping between skids. Small-bore piping (≤ 2") by others				X	
	- Disposal of boil-out chemicals				X	
	- Required chemicals and fuels for boil-out, start-up, and testing				X	
	- Foundation and anchor bolts				X	
	- Export Packing/Crating				X	
	- Bonding or LOC				X	
X	- O&M manuals - Submitted Electronically		10	X		
	Ductwork:					
X	- Boiler-to-economizer transition duct		1	X		
X	- Economizer outlet transition duct with FGR port		1	X		
X	- Expansion Joint		1	X		
	- Misc. Duct		1		X	
	Structural Support:					
X	- Economizer support steel structure		1	X		
	- Misc. Support		1		X	
	Service:					
	- Including: 20 Days 4 Trips				X	
	- 5 days and 1 trip of installation supervision				X	
	- 2 8-hour training sessions				X	
	- Materials for training sessions (manuals, presentations, cut sheets, etc…)				X	

Shipped Loose	ITEM	Size	Qty	Included YES	NO	ALT
	Freight:					
	- Equipment is offered Ex-Works (Incoterms 2000)			X		
	- Freight, via truck/rail, is included FCA jobsite (Incoterms 2000)				X	*2*
	- Rigging & offloading at designated point of delivery				X	
	- Transport from point of delivery to jobsite				X	

BURNER SCOPE OF SUPPLY

Shipped Loose	ITEM	Size	Qty	Included YES	NO	ALT
	Burner (Totally shop assembled and dry tested):					
	Burner outer front plate.		1	X		
	Combustion air tube and inlet shroud.		1	X		
	Air Swirler assembly.		1	X		
	Guide tube center-ring support.		1	X		
	Observation port with sight glass.		1	X		
	Scanner port swivel mount.		2	X		
X	Flame Detector; Microprocessor Fireye Insight 95UV1 Ultraviolet.		2	X		
	Stainless steel Cylindrical burner throat assembly.		1	X		
	Engineering, drawings and instruction manuals.		10	X		
	Igniter:					
	Bluff body Igniter support.		1	X		
	Pilot Spark Igniter; Interruptible (NFPA Class 3)		1	X		
	Gas firing system:					
	Gas manifold with positioning system.		1	X		
	Stabilization gas injector.		1	X		
	Gas injectors / lances.		12	X		
	Windbox:					
	Complete prefabricated windbox to suit new burner and boiler front configuration with necessary structural reinforcement ¼" carbon steel primer and finish paint. Vibration free.		1	X		
	Flanged connection for air inlet.		1	X		
	Access door (flanged).		1	X		
	The following miscellaneous equipment is mounted on the windbox and pre-wired to a NEMA-4 junction box, which is also mounted on the windbox:					
	Ignition transformer 120V / 6,000V with insulated spark plug connector.		1	X		
	Steam Pressure Transmitter		2	X		
	High furnace pressure switch. (Dwyer)		1	X		
	Instrument Air valves train:					
	Manual shutoff valve.		1	X		
	Pressure gauge 4" dial c/w shutoff valve.		1	X		
	Pressure Regulator.		1	X		
	Low pressure switch. (United Electric)		1	X		
	Lot of shutoff valves on air supply connection to valves (c/w 1 spare connection).		1	X		

Shipped Loose	ITEM	Size	Qty	Included YES	NO	ALT
	Plant Air valves train supply to Igniter and Scanner(s):					
	Manual shutoff valve with locking device.		1	X		
	Automatic Safety shutoff valve.		1	X		
	Air flow orifice union.		2	X		
	Lot of flexible and fitting.		1	X		
	Combustion Air Fan and FGR assembly system:					
X	Combustion air inlet Preheater c/w Steam Coil heat exchanger. Steam Flow Control Valve w/ pneumatic actuator Temperature sensor and Temperature Transmitter. Main shutoff valve and strainer. Pressure gauge and shutoff valve. Steam FCV Bypass and isolating valves. Condensate steam trap w/ bypass and isolating valves. Piping.		1	X		
X	Combustion air fan will be windbox mounted, arr't 4, downblast with High Efficiency TEFC Motor and quick release access door.		1	X		
	Noise reduction equipment to achieve 85 dBA at 3 feet.		1	X		
	Combustion airflow measurement device.		1	X		
	Combustion air flow Differential Pressure transmitter.		1	X		
	Temperature transmitter for temperature compensation.		1	X		
	Combustion air flow control Pre-Spin Inlet Box Damper (// blades) c/w 4 to 20 mA pneumatic actuator.		1	X		
	Combustion air flow switch. (Dwyer)		1	X		
	Purge air flow switch. (Dwyer)		1	X		
	Combustion air and FGR Mixing Box.		1	X		
	FGR flow control damper c/w 4 to 20 mA pneumatic actuator and 4 to 20 mA position feedback.		1	X		
	FGR flow measurement device.		1	X		
	FGR flow Differential Pressure transmitter.		1	X		
	Temperature transmitter for temperature compensation.		1	X		
	Inlet Windbox mounted Combustion air flow control Damper (opposed blades) c/w 4 to 20 mA pneumatic actuator.		1	X		
	Pilot gas valve train:					
	Complete prefabricated gas pilot train, schedule 40 piping, is mounted on the windbox per NFPA standards and wired to the junction box located on the windbox.		1	X		
	Pilot manual shutoff valve.		1	X		
	Strainer.		1	X		
	Pressure regulator.		1	X		
	Upstream gas pressure gauge 2½" dial c/w shutoff		1	X		

Shipped Loose	ITEM	Size	Qty	Included YES	NO	ALT
	valve.					
	Automatic safety shutoff valve.		2	X		
	Automatic vent valve.		1	X		
	Downstream gas pressure gauge 2½" dial c/w shutoff valve.		1	X		
	Flexible hose.		1	X		
	Main gas valve train:					
	Complete prefabricated main gas valve train based on fully metered type combustion control, schedule 40 piping per NFPA standards. All fuel train components are wired to the junction box. Fuel train and Junction Box are windbox mounted.		1	X		
X	Main burner manual shutoff valve.		1	X		
X	Strainer.		1	X		
X	Gas Pressure Regulator.		1	X		
X	Flow element & transmitter.		1	X		
	Pressure gauge 4" dial c/w shutoff valve.		1	X		
	Low gas pressure switch. (United Electric)		1	X		
	Automatic Safety Shutoff Valve and switches. (Maxon)		2	X		
	Automatic Safety Vent Valve. (Asco)		1	X		
	Manual lockable vent valve.		1	X		
	High gas pressure switch. (United Electric)		1	X		
	Flow control valve c/w 4 to 20 mA pneumatic actuator.		1	X		
	Pressure gauge 4" dial c/w shutoff valve.		1	X		
	Main Burner test firing manual shutoff valve c/w position limit switch.		1	X		
	Flexible hose; Main natural line inlet.		1	X		
	Stabilizer gas Orifice valve.		2	X		
	Stabilizer gas injector pressure gauge c/w shutoff valve.		1	X		
	Flexible hose; stabilizer gas injector.		1	X		
	Burner Management System:					
	Complete package pre-wired and tested burner management system for single fuel operation. Non-recycling operation. The system is based on a PLC in conjunction with Fireye scanner designed as per NFPA standards.		1	X		
	Control panel 36" W x 72" H x 24" D NEMA 12, Free Standing		1	X		
	Water Level Relay		4	X		
	Push button: Burner Start, Emergency Stop, Burner Stop, Silence Horn, Alarm Silence Push Button		4	X		
	Flame scanner; refer to burner description					
	Control circuit breaker		1	X		
	Alarm horn		1	X		
	Lot of Pilot light: Power ON, Ignition ON, Purge in Progress, Lock Out		1	X		

Shipped Loose	ITEM	Size	Qty	Included YES	NO	ALT
	Alarm, Low Water Level Alarm, High Water Level Alarm, Main Gas Valve Energized.					
	Selector switch: FD Fan On-Auto-Off.		1	X		
	Processor - Allen Bradley CompactLogix 1769-L35E c/w Ethernet/IP Including wire, connectors, Panduit.		1	X		
	Base mounted power supply		1	X		
	16 ch 120 VAC Discrete Input module		4	X		
	16 ch 120 VAC Discrete Output module		2	X		
	4 ch 4–20 mA Analog Input module		1	X		
	HMI 10" color touchscreen display. (Shared with Combustion Control System) Panelview 1000 Plus 2711P-T10C4D2		1	X		
	The HMI includes one Graphic and one Alarm/Status display to show the following operational status (hi-lighted words): Power-On, Ignition-On, Limits Satisfied Light, Purge In Progress, Purge Complete, Flame Detected, Low Fire, Fan Hand/Off/Auto, High/Low Water Alarm, Reset Required, Main Gas-On Light.		1	X		
	Lot of Alarms shown on HMI: Flame-Out, High Steam Pressure, Minimum Air Flow, Water Level Alarm (High/Low), Low Water Cut-out, Low Gas Pressure, High Gas Pressure.		1	X		
	Lot of Discrete Input from Field Switches: Purge Air Flow, Minimum Air Flow, Low Instrument Air Pressure, High Furnace Pressure, Low Water Cut-Out, Low Water Alarm, Auxiliary Low Water Cut-Out, High Water Cut-Out, High Water Alarm, High Gas Pressure, Low Gas Pressure.		1	X		
	Lot of Analog Input: Steam Drum Pressure (2).		1	X		
	Lot of Discrete Input from Buttons: Alarm Silence, System Reset, Emergency Stop, Burner Start, Burner Stop, Low Water Bypass.		1	X		
	Lot of Discrete Input from Valves: Main Shut-Off Gas Valves Closed, Gas FCV On Low Fire, Main Shut-Off Oil Valves Closed.		1	X		
	Lot of Discrete Input from Field Devices: FD Fan Interlock, Flame On, FD Fan Damper Close Position, FD Fan Damper Open Position, FGR Damper Close Position, FGR Damper Open Position, Stack Damper Open Position, Stack Damper Close Position		1	X		
	Lot of Discrete Output to Field Devices: FD Fan Start, Ignition Transformer, Plant Air Igniter Shut-Off Valve, Pilot Safety Shutoff Gas Valves, Pilot Vent Gas Valve, Main Safety Shutoff Gas Valves, Main Vent Gas Valve.		1	X		
	Lot of Other Discrete Output:		1	X		

Shipped Loose	ITEM	Size	Qty	Included YES	NO	ALT
	Common Trouble Alarm, Boiler Shutdown Alarm, High Purge Position, Release For Modulation, Alarm Horn					
	Panel Design and Drawings, BMS Logic Implementation, Panel Assembly and Test, FAT-3 days at NATCOM shop.		1	X		
	Combustion Control System:					
	Combustion control consists of one Fully Metered, Cross Limited, PLC based system mounted and wired in the BMS panel.		1	X		
	Processor Allen Bradley CompactLogix 1769-L35E c/w Ethernet/IP. Cables, wire, connectors, Panduit.		1	X		
	Base mounted power supply		1	X		
	16 ch 120 VAC Discrete Input module		1	X		
	8 ch 4–20 mA Analog Input module		3	X		
	8 ch 4–20 mA Analog Output module		1	X		
	The HMI includes one Graphic and one Alarm/Status display to show the following operational status (hi-lighted words): Boiler Master – an A/M with Bias control Air Flow Control with Oxygen trim Three (3) elements feedwater control Draft control		1	X		
	Lot of Analog Input: Steam Drum Pressure, Drum Level, Combustion Air Flow, Windbox Damper Position Feedback, VFD Feedback, Feedwater Flow, Steam Flow, Combustion Air Temperature, Flue Gas Oxygen Content %, Boiler Demand (from DCS), Furnace Pressure, Fuel Gas Pressure, Natural Gas Temperature, FGR Flow, FGR Temperature, Fuel Gas Flow.		1	X		
	Lot of Analog Output: Feedwater Flow Control Valve, Combustion Air Control Flow Damper, Fuel Gas Flow Control Valve, FGR Damper, Draft Control Damper, Windbox Damper, Preheater Steam Flow Control Valve.		1	X		
	Lot of Discrete Input: Release For Modulation, High Purge Position		1	X		
	Plant Master				X	
X	Oxygen Analyzer. Yokogawa In-Situ Zirconia oxygen detector model ZR22G with model ZR402G analyzer, NEMA-4X with LCD display and interconnecting cable.		1	X		
	Panel Design and Drawings, CCS Logic Implementation, Panel and PLC Assembly and Test, FAT-3 days at NATCOM shop.		1	X		

END OF SCOPE OF SUPPLY

3.0 BOILER DESIGN DATA

Boiler Dimensions:		**Units**
Height to Main Steam Outlet	13’ 8”	FT
Overall Width of Unit	10’ 11”	FT
Overall Length of Unit*	15’ 6”	FT
**Add approximately 6-8 ft length for burner.*		
Weight of Unit (Dry)	60,000	LBS
Weight of Unit (Wet)	85,000	LBS
Surface Area / Volume:		**Units**
Furnace Volume	818	FT3
Furnace Projected Area	531	FT2
Evaporator Area	2,022	FT2
Total Area	2,553	FT2
Economizer Area	4,439	FT2
Superheater Area	126	FT2
Tubing Data:		**Units**
Tube OD	2.0	IN
Tube Wall Thickness – Furnace Section	0.105	IN
Tube Wall Thickness – Convection Section	0.105	IN
Tube Material	SA178A	
Corrosion Allowance	NA	IN
Steam Drum:		**Units**
Inside Drum Diameter:	36 In	IN
Drum Length	15’ 6” Seam/Seam	FT
Drum Material:	SA516 Grade 70	
Corrosion Allowance:	1/16”	IN
Water Drum:		**Units**
Drum Diameter:	24 In	IN
Drum Length	15’ 6” Seam/Seam	FT
Drum Material:	SA106 Grade B	
Corrosion Allowance:	1/16”	IN
Standard Drum Connections:	**Quantity**	**Type**
Main Steam Outlet:	One	Flanged
Safety Valves:	Per ASME Code	Flanged
Feedwater Inlet:	One	Flanged
Bottom Drum Blowoff:	Two	Flanged
Water Column:	Two	Threaded (NPT)
Feedwater Regulator:	Two	Flanged
Vent:	One	NPT
Continuous Blowdown:	One	NPT
Chemical Feed:	One	NPT
Sootblower:	Two	Flanged
Auxiliary L.W. Cutouts:	One	NPT

**The above information is preliminary and shall be confirmed at time of engineering submittal.*

4.0 BOILER PERFORMANCE DATA

Fuel: Propane/Air Mixture (9 ppm NOx Emissions)

Boiler load - %	100%	75%	50%	25%		Units
Net Steam Flow - ¤	25,000	18,750	12,500	6,250		Lb/Hr
Steam Pressure – Operating - ¤	165.0	165.0	165.0	165.0		PSIG
Steam Temperature - ¤	484.0	465.0	464.0	458.0		°F
Fuel Input (HHV)	35.8	26.5	17.7	8.9		MMBTU/Hr
Ambient Air Temperature	80.0	80.0	80.0	80.0		°F
Relative Humidity	60	60	60	60		%
Excess Air	20	20	20	20		%
Flue Gas Recirculation	30	30	30	30		%
Steam Output Duty	31	23	15	8		MMBTU/hr
Heat Release Rate	43,728	32,440	21,611	10,860		BTU/FT3-Hr
Heat Release Rate	67,344	49,960	33,283	16,725		BTU/FT2-Hr
Deaerator Pegging Steam	4,000	3,000	2,000	1,000		Lb/Hr
Feed Water Temperature	228	228	228	228		°F
Water Temp. Leaving Economizer	334	319	305	290		±10°F
Blow Down	3.0	3.0	3.0	3.0		%
Boiler Gas Exit Temperature	573	520	468	413		±10°F
Economizer Gas Exit Temp.	297	279	263	248		±10°F
Air Flow	30,633	22,725	15,139	7,607		Lb/Hr
Flue Gas to Stack	32,974	24,462	16,297	8,189		Lb/Hr
Flue Gas Including FGR	42,867	31,801	21,186	10,646		Lb/Hr
Fuel Flow	2,341	1,737	1,157	581		Lb/Hr
Flue Gas Losses/Efficiency-%						
Dry Gas Loss	4.4	4.0	3.7	3.4		%
Air Moisture Loss	0.1	0.1	0.1	0.1		%
Fuel Moisture Loss	8.6	8.6	8.5	8.5		%
Casing Loss	0.5	0.7	1.0	2.0		%
Margin	0.5	0.5	0.5	0.5		%
Efficiency - LHV	93.3	93.6	93.6	92.9		%
Efficiency – HHV - ¤	85.9	86.2	86.2	85.6		%
Total Pressure Drop Including Economizer	3.73	2.06	0.91	0.23		IN WC
Products of Combustion - CO2	9.7	9.7	9.7	9.7		%
- H2O	14.8	14.8	14.8	14.8		%
-N2	72.4	72.4	72.4	72.4		%
-O2	3.1	3.1	3.1	3.1		%
-SO2	-	-	-	-		%
GAS- % volume	**NG**					
propane	61.00					
nitrogen	31.00					
oxygen	8.00					
LHV-Btu/lb	14,064					
HHV-Btu/lb	15,275					

**The above information is preliminary and shall be confirmed at time of engineering submittal.*

5.0 BURNER DESIGN DATA

Boiler Conditions			Site Conditions		
Boiler model	NB-201D-45		Burner location		Indoors
Capacity	PPH	25,000	Code compliance		NFPA 85
Operating conditions	psig / °F	165 / 488	Control panel enclosure	NEMA	12
Furnace dimensions W	ft	6.69	Area classification burner/fuel train		Non-Hazardous
H	ft	8.34	Area classification control panel		Non-Hazardous
L_{Total}	ft	14.66	Altitude ASL	ft	< 1,000
L_{EFF}	ft	11	Instrument air supply	psig	60 - 125

Burner	Model	P-37-G-22-1117 (preliminary) (do not use preliminary burner model number for air permit purposes)		
Estimated windbox dimensions W x H x D	in.	60 x 60 x 54		
Estimated FD Fan motor (T.B. margin: 10% vol., 21% static, 25°F temp.)	HP	50 480V / 3 ph / 60 cy		
Fuel		**Propane / Air Mixture**		
Ignition fuel		Propane/Air Mixture		
Heat Input	MMBTUH	36.7		
Furnace pressure	in. WC	3.97		
Burner & windbox pressure drop	in. WC	6		
Combustion air temperature	° F	80		
Excess air	%	25		
FGR rate	%	25		
FGR temperature	° F	301		
Turndown ratio		6 to 1		
Available fuel pressure at train inlet	psig	25 - 40		
Guarantee				
NO_x	ppm	9		
CO	ppm	50		
SO_x (Not burner dependant)	lb /MMBtu	0.00055		
PM_{10}	lb /MMBtu	0.01		
VOC	lb /MMBtu	0.005		
Opacity	%	< 5		

Guaranteed emission from 25% to 100% MCR corrected to 3 %O_2 based on **NATCOM** technician is required for start-up and adjustments. Particulate is exclusive of any particulates in combustion air or other sources of residual particulates from material.

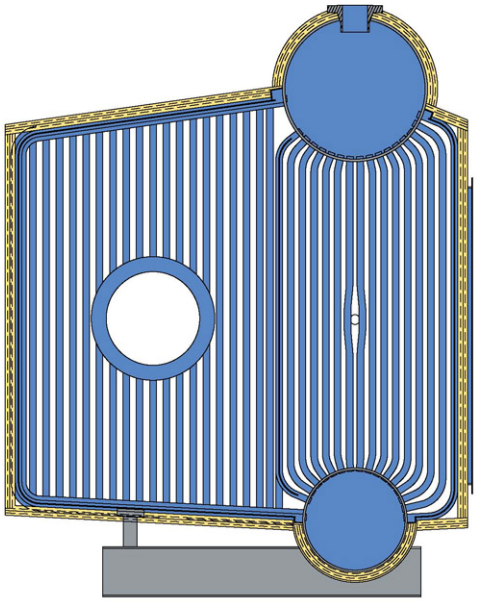
Fuel Gas Analysis	% Vol	N.G.	Propane
Methane	CH_4	93.8	100% propane
Ethane	C_2H_6	3.2	
N & I-Butane	C_4H_{10}	0.2	
Nitrogen	N_2	2.1	
Carbon Dioxide	CO_2	0.7	
Hydrogen Sulfide	H_2S	0.2 grains/100SCF	
HHV	Btu/SCF	1,009	
Supply temperature	^0F	60	
Supply pressure	psig	25-40	

Above information is preliminary only and will be confirmed on drawings issued for construction.
Do not use the above Burner model number designation for emission permit application.

6.0 BOILER DESIGN FEATURES

6.1 D-TYPE BOILER

CB-Nebraska Boiler's proven D-Type boiler series is an ideal solution to almost any steam need. Our unique design incorporates a 100% membrane watercooled furnace with minimal refractory. This feature greatly eliminates the costly & time consuming annual maintenance associated with older refractory boiler designs. In fact, the membrane front & rear walls (including all of the corner gas seals) are completely refractory-free, including the burner throat (when paired with our exclusive Natcom burner).



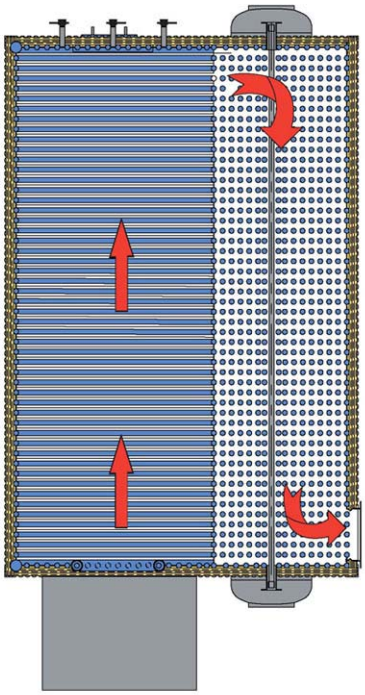
Cross-section view

6.2 DESIGN STANDARDS

The design, material, and workmanship of all pressure parts is in strict conformance with the rules and regulations in effect at the date of contract as required by:

1. THE ASME BOILER AND PRESSURE VESSEL CODE.
2. The Laws of the State in which the equipment is to be installed (as applicable).
3. Requirements of the Hartford Steam Boiler Inspection and Insurance Company, under whose inspection the pressure parts of each unit shall be constructed.
4. Specified codes & standards.
5. Structural components supplied with the boiler package will be designed in accordance with the following codes:

   INTERNATIONAL BUILDING CODE (2000)
   AISC – LRFD (Latest Edition)
   ASME STS-1 STEEL STACKS 2001



Plan view showing gas flow

6.3 FACTORY TESTS

A hydrostatic test at one and one-half times the design pressure is applied to the pressure parts in accordance with the ASME Code. For some applications, a casing pressure test is also performed to ensure gas-tight design.

6.4 DATA REPORTS & BOILER REGISTRATION

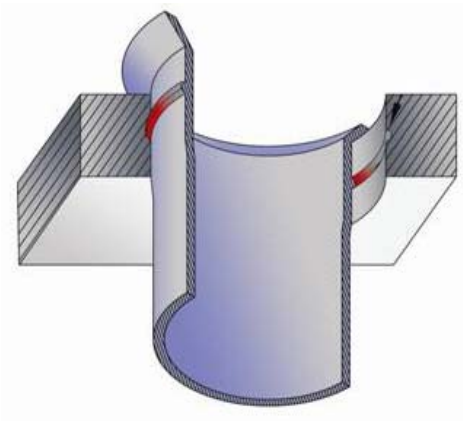
Two(2) copies of the Manufacturer's Data Report are provided. Each boiler is registered with the National Board of Boiler & Pressure Vessel Inspectors and with the State Boiler Inspection Department in the State in which the boiler will be installed (as applicable).

6.5 BOILER DRUMS

Boiler drums are fusion welded in accordance with the latest ASME Boiler and Pressure Vessel Code Section I covering power boilers, including x-raying and stress-relieving as required and under the inspection of Hartford Steam Boiler Inspection and Insurance Company.

All tubes holes are drilled true and radially, to afford full parallel bearing of tubes through the drum plate. Each tube hole is serrated with single or multiple grooves, as required by the design pressure. This insures a seal that is tight when expanded and stays leak-free when in operation. For some severe-duty applications, the tube-to-drum connections are also seal-welded.

All drums have an elliptical manway with cover in each head. Lifting lugs are provided on the drums to facilitate rigging.



Serrated and rolled tube-to-drum connection

6.6 LOWER DRUM BLOW OFF

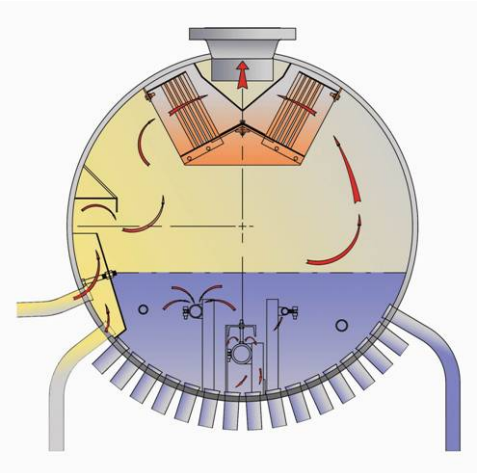
The lower drum is provided with one or two connections at the lowest point for draining and discharge of precipitates. A slotted collector angle of proper proportion is provided for blowing the unit down. These blow-off valves also serve as boiler drains.

6.7 STEAM BAFFLE SYSTEM

All boiler tubes shall discharge into the upper steam drum inside a baffled compartment designed to act as a primary steam-water separator system. Steam discharge from the baffle outlet shall be horizontal above the normal water level.

Secondary steam separation shall be effected by use of a chevron or labryinth steam drier from which dry steam is delivered to the steam outlet connection.

The steam after the boiler outlet shall contain not more than 0.5% moisture if saturated steam or 1 ppm TDS if superheated steam. The solids concentration of the boiler water shall not exceed the recommended values as recommended by the ABMA guidelines (included in this proposal). Higher steam purity is available for certain applications.



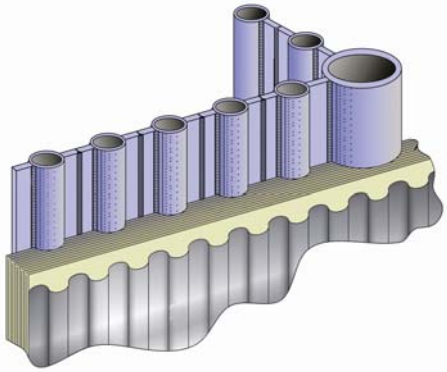
Steam drum cross-section showing typical internals

6.8 BOILER TUBES

Tube bends shall be made on an 8" radius with mandrel inserted during bending to prevent distortion at the bend. Tube arrangement shall be in line. Tubes shall be in proper alignment with tube holes and shall be exact length for proper expanding and flaring. All tubes shall be 2" O.D. on 4" centers. All tubes in the furnace shall be membrane (watercooled) tubes except those where the gases leave the furnace and enter the convection section. The last row in the convection section shall be membrane (watercooled) tubes except in the area where the flue gases leave the boiler. Membrane fins shall be ¼" by 1" steel, fused continuously to opposite sides of the tubes by electric welding. All tubes in both the furnace and convection section shall be 2" O.D. electric resistance-welded carbon steel boiler tubes.

6.9 BOILER WELDED WALLS

The adjacent membrane fins of each outboard furnace and convection tube shall be continuously seal-welded together, forming a water-cooled, gas tight inner seal. The inboard row of membrane tubes between the furnace and convection zone shall also be seal-welded together to prevent short-circuiting of flue gas from the furnace to the boiler flue gas outlet. Super plastic refractory shall be installed to protect the entire length of water and steam drums from radiant heat where exposed to the furnace between the two rows of furnace tubes.



Membrane wall construction

6.10 BOILER FRONT & REAR WALLS

The front & rear walls of the boilers are of membrane tube construction. The watercooled burner throat shall be of the ring header design. The walls will be backed with mineral wool and ceramic fiber blanket. Corner gas seals are welded and refractory-free.

6.11 BOILER CASING

CB-Nebraska Boilers are available with 2 types of outer casings. The aluminum casing uses 0.04" pebble grain lagging. The welded steel outer casing is constructed of 12-gauge SA36 steel that is primed & painted.

Our standard offering guarantees an average casing surface temperature of 140°F in an ambient temperature of 90°F and a surface wind velocity of two(2) feet per second while the boiler is operated continuously at full load.

6.12 BURNER THROAT

CB-NATCOM burners do not require a traditional refractory burner throat. Instead, a cylindrical stainless steel sleeve is installed into the watercooled furnace frontwall in an effort to reduce the costly & time-consuming maintenance and repair associated with refractory burner throats. The burner unit is then inserted into this sleeve as part of a fully integrated boiler/burner package. The burner throat is refractory-free.

6.13 BOILER BASE

The boiler base is constructed of heavy I-beams or welded heavy beams & channels. The boiler weight shall be uniformly distributed over the entire area of the boiler base. Material is SA-36.

6.14 BOILER PAINT FINISH

All non-aluminum portions of the outer casing shall be finished as follows:

Surface Preparation: SSPC-SP3 or as specified

Casings: One (1) coat primer
One (1) coat of industrial enamel, color: Boiler Blue or equal.

Drum Heads: One (1) coat high-temp paint, color: Boiler Black, Silver or equal.

6.15 OBSERVATION PORTS

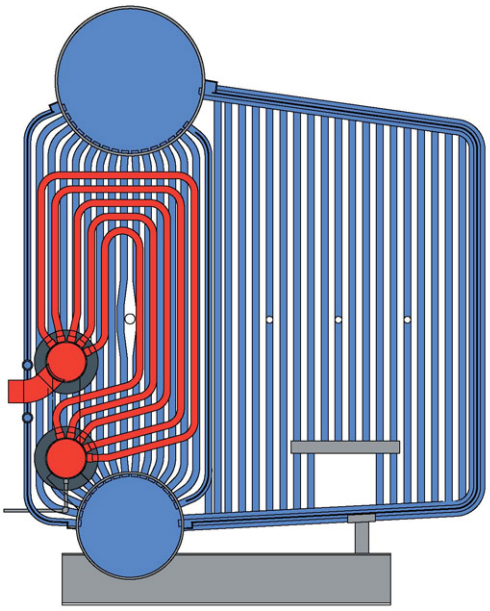
Each boiler includes three(3), air-cooled observation port assemblies, located in the furnace target wall. Additional observation ports are included in the windbox register area.

6.16 SUPERHEATERS

If applicable, an integral inverted-loop convection-type superheater system will be provided. Nebraska Boiler offers both single and dual stage superheater systems with feedwater spray attemperation to maintain steam temperature over turndown.

Superheater elements consist of seamless steel tubes arranged in multiple passes where necessary to obtain the desired mass flow and pressure drop. All necessary braces, spacers, hangers and supports of carbon or alloy steel corresponding to temperature requirements shall be furnished for spacing and supporting of elements and headers.

Saturated steam piping from the steam drum to the superheater inlet is provided along with the outlet piping with safety valve & start-up vent system. Superheater piping shall be shipped loose. Superheater piping is to be field welded by others. The steam connection to the drum on superheater units shall be a welded connection.



Cross-section showing integral superheater arrangement

6.17 ECONOMIZERS

Finned tube with extended surface

CB-Nebraska Boiler furnishes rectangular finned-tube economizers to increase the thermal efficiency of the system by recovering heat from the flue gas to heat the incoming feedwater. These assemblies come complete with structural steel supports (some field assembly and welding is required), interconnecting single-cased duct with fabric type expansion joint from boiler gas outlet to economizer gas inlet and interconnecting feedwater piping from the economizer feedwater outlet to the boiler feedwater inlet.

Economizers are double-cased and insulated. The internal casing is carbon steel, seal-welded and gas-tight. It is externally insulated with 2" heavy duty blanket insulation and externally lagged with corrugated lagging.

Economizers are designed so that access for tube inspection can be achieved by either access doors in the economizer or from adjacent ductwork incorporating access doors. The gas side connections on the economizer are plate flange-type with drilling for bolt holes for aligning to adjacent components. The water side connections are flanged. The economizer unit shall include vent and drain connections, and appropriate closures. Lifting lugs are provided to facilitate loading and unloading.

The design, fabrication and construction of economizers shall be in accordance with ASME Code Section I.

7.0 Start-Up & Freight

7.1 START-UP SERVICE

CB-Nebraska Boiler offers the services of our qualified service technicians, trained in all aspects of boiler room equipment, to supervise boil-out, start-up, and/or operator instruction for equipment furnished. Additional services, beyond those stated in the scope of supply above, are available at our per diem rate in effect at time of start-up (see attached for current rates).

Note that the emissions guarantee is contingent upon our trained field service engineer(s) being present at time of start-up to fine tune the burner as required, and observe the operation of auxiliary equipment to assure that performance guarantees will be met prior to final testing. Approximate time required for setup is twenty(20) days per unit, however, this will vary depending upon the size of the equipment, number of fuels, site readiness, controls system complexity, emission levels required, etc.

7.2 FREIGHT

CB-Nebraska Boiler can offer freight for the equipment in our scope of supply per INCOTERMS 2000. Shipment is via either truck or railcar, depending on the size of the equipment and shipping clearances. Any freight pricing offered is subject to clearance availability at the time of shipment. Rigging & offloading at the designated point of delivery is by others.

8.0 Auxiliary Equipment

8.1 DEAERATOR & FEEDWATER PUMPS

Cleaver-Brooks Model TM30 spray type tray deaerator, pressurized, horizontal deaerator is rated at 29,000 pounds per hour. The system shall be guarantee oxygen removal to not more than 0.005 CCS/liter in the effluent throughout all load conditions between 5 and 100 percent. The deaerator shall be designed for operation at 5 psig, but shall be suitable for use from 2 to 15 psig. Collected water from the surge tank and then transferred to the deaerator. The collected water shall be admitted to the deaerator through a multiple spring-loaded, self-cleaning, adjustable stainless steel spray valves, which shall provide proper internal vent condensing and water distribution at any load between 5 and 100 percent of rated capacity.

The water temperature in the primary heating and vent concentrating section is to be raised within 2 or 3 deg F of steam saturation temperature and most of the gases released. The water then cascade down to strike a 16 gauge stainless steel trays constructed of 430 material, which separates water and steam. Hot, gas-free water is to then drop to the storage compartment to complete the cycle. The steam and non-condensables are to flow upward, through the primary heating spray, into the internal vent concentrating section, where they contact the cold influent water. Here, the steam is to be condensed to continue the cycle. Released gasses are discharged to atmosphere through the vent outlet. Automatic vent valve shall be thermostatically controlled to provide a fast means of venting when a sudden buildup of gases occurs, such as seen at start up. The manual vent valve shall have an orifice for continuous minimum venting. Venting rate shall not exceed 0.1 of 1% of the rated deaerator capacity at 5 psig.

The deaerator shall be two-section unit. There shall be a deaerator and storage section connected by flanges. The heater section shall be 36" diameter and 90" high. A 16” round davited manway shall be provided for access to tray box. All nozzles 3" and under shall be 3000 lbs. forged steel couplings and over 2" shall be 150 lbs. flat face flanges. Heads to be ASME torispherical type constructed of ASTM A516 GR 70 carbon steel with a minimum thickness of 0.25 inches. Shell plate to be fabricated of ASTM A516 GR 70 carbon steel with a minimum thickness of 0.25 inches. The tank shall be designed in accordance with ASME, Section VIII of the Pressure Vessel Code for 50 psig at 650 delta-F and stamped accordingly. Certification shall be required. Joint efficiencies to be 70% circumferential per Table UW-12, which does not require stress relieving or nondestructive examination.

The deaerated water storage section shall have 20 minutes of storage and have a capacity of 600 gallons measured to overflow. The storage section shall be 42" diameter and 120.5" long. A 12” x 16” elliptical manway shall be provided for access. All nozzles 3" and under shall be 3000 lbs. forged steel couplings and over 2" shall be 150 lbs. flat face flanges. Heads to be ASME torispherical type constructed of ASTM A516 GR 70 carbon steel with a minimum thickness of 0.25 inches. Shell plate to be fabricated of ASTM A516 carbon steel with a minimum thickness of 0.25 inches. The tank shall be designed in accordance with ASME, Section VIII of the Pressure Vessel Code for 50 psig at 650 delta-F

and stamped accordingly. Certification shall be required. Joint efficiencies to be 70% circumferential per Table UW-12, which does not require stress relieving or nondestructive examination.

The deaerator shall have a gauge glass assembly that covers the entire tank diameter. The gauge glass shall be quartz, 0.625-inch diameter by 24-inch maximum length. Each length of glass shall be furnished with a bronze gauge cock set and protector rods. The deaerator storage vessel shall be supplied with a pressure gauge that has a 4.5-inch dial with a 0-15 PSIG range for operating range and 4.5-inch dial 0-200 PSIG for design pressure for up set conditions. Each pressure gauge to be included with a pulsation dampener and over pressure relief device. A 4.5" dial thermometer deaerator storage and one 5-inch dial bimetallic thermometer for deaerator section both with a 50 to 300 F range.

Boiler Feedwater Pump And Motor Set
Included

Suction Piping
Included

Discharge piping
Included

Support Stand
The stand shall elevate the deaerator tank to provide the net positive suction head required by the pump at the rated condition to prevent cavitation plus a 1-1/2 foot safety factor. The stand shall be constructed of heavy square steel tubing for the legs

UL Control Panel
Control panel shall be in a NEMA 1 enclosure and wired to the National Electric Code. The wire shall be black number coded. The assembly is to contain individual motor starters with 120 Volt holding coil and fuse protection. Individual green IEC (IP66) pump run lights shall be provided. All switches and lights to have nameplate identification. The assembled panel shall be given a factory continuity test prior to shipment.

Make-up Valve
Fisher, Model 657EZ with DVC6010HC

When the Level Control Selector Switch is in auto mode, the PLC will control operation of the make-up valve

The tank level transmitter indicates to the PLC via a 4-20 ma signal the water level in the deaerator tank. The PLC compares it to the operator input set point, and varies the position between the full open and full closed points to control the incoming flow of water.

Steam Pressure Reducing Station
The diaphragm actuated valve manufacturer shall be Fisher, Model #667EZ with DVC6010 positioner.

Overflow Drainer
Included

Single Tank ADAC Electric Control System
Deaerator PLC Controller, Control Logix L32 processor with 6" HMI display and programming for pump control Pump alternating, Pump lead lag, Low discharge header pressure. Alarm indication provided by bell and Stack light. Stack light has a green light for all systems normal, a yellow light for non-critical alarm like High water, a red light for critical alarms like pump failure. Full text of each alarm

condition is provided on the Panelview operator interface including a "last in, first out" 100 event history. Alarm silence function is provided on the Panelview operator interface. Control circuit transformer to supply 110-120 Volts, single-phase power supply. The transformer shall be mounted, wired and fused. Auxiliary contacts shall be furnished for chemical feed pump initiation. Contacts shall be normally open

Deaerator Vessel Level Transmitter
Differential Pressure transmitter for deaerator level 4-20 mA Rosemount 3051

Deaerator Vessel Pressure Transmitter
Pressure transmitter for deaerator pressure 4-20 mA Rosemount 3051

Boilerfeed Pump Manifold Transmitter
Feedwater and transfer discharge pressure transmitter 4-20 mA Rosemount 3051

Deaerator Vessel Temperature Transmitter
Temperature transmitter for deaerator Rosemount 4-20 mA

Low–Low Level Pump Cut-Off
This control shall be an externally mounted float type switch. The switch shall make contact on fall and break on rise. The float cage construction shall be cast iron. The float switch manufacturer shall be Magnetrol model #W25-1BO-CLA for the deaerator $5,225

Support Stand
Stand will be a one-piece design. Supporting structural calculations will be furnish per the International Building Code (I.B.C.). No anchor bolt calculations furnished.

Finish Coat
The deaerator is to be hand cleaned with a solvent to SSPC- SP-1 standards prior to painting. Prime coated to not less than 1 mil thick and finish coated with enamel paint to not less than 1 mil thick prior to shipment. Unit is to be knocked down for shipment. Piping is to be matched marked.

9.0 Pricing

Alternate	Item	Unit Price	Qty	Total Price
Base Bid	CB-Nebraska Boiler model NB-201D-45, including equipment and accessories as described herein and as noted in the scope above.	$985,000.00	1	$985,000.00
Option Adders/ Deducts				
1	Provide Cleaver-Brooks tray-type deaerator and duplex feedwater pumpset (all manufacturer's standard)	+$234,000.00	1	+$234,000.00
2	Provide freight, via truck, FCA jobsite (rigging & offloading to jobsite by others)	+$56,000.00	1	+$56,000.00
3	Provided welded tube-to-drum connections for severe-duty cycling service	+$65,000.00	1	+$65,000.00
4	Provide a C-B Profire low-NOx burner (manufacturer's standard) in lieu of base bid C-B Natcom	-$105,000.00	1	-$105,000.00

All pricing is in US dollars

9.1 Proposal Type:

This proposal is a **FIRM** proposal.

- A **FIRM** proposal is priced and designed such that CB-Nebraska Boiler would be willing to enter into a contract based off the proposal.
- A **BUDGET** proposal is priced and designed to give the Buyer a reasonable estimate of the cost and design of the equipment. CB-Nebraska Boiler is not obligated to enter into a contract based on a budget proposal.

9.2 Bid Validity:

This proposal is valid for 90 days.

9.3 Shipping Terms:

Equipment is offered Ex-Works (INCOTERMS 2000). All shipments are subject to clearance availability.

9.4 Payment Terms:

Payment terms, subject to credit approval, are as follows:

Upon Receipt of Order 10%
Upon Drawing Submittal #1 .....30% (Net 30 days)
Upon Completion of Hydrostatic Test .....35% (Net 30 days)
Upon date of shipment or date equipment is ready to ship. .....25% (Net 30 days)

9.5 Cancellation Schedule:

Up to14 days after receipt of purchase order 0%
14 days after receipt of purchase order to drawing approval 25%
Up to 30 days after drawing approval 45%
31-60 days after drawing approval 55%
61-90 days after drawing approval 75%
Over 90 days after drawing approval 100%

9.6 Guarantees:

All data in the proposal marked with an ¤ is considered a guaranteed point. All other data provided is predicted only and will be finalized at time of submittal. Guarantees are based on the unit being operated per the requirements of the operation and maintenance manual. Guarantee points are also based on the unit operating at 100% MCR, unless otherwise stated. It is the Buyer's responsibility to have the equipment tested during the stated warranty period. If equipment passes such tests or the tests are not performed before the end of the warranty period, it will be assumed that the equipment is accepted. The cost of all tests is the responsibility of the Buyer.

9.7 Production Time:

Item	Start	Finish
Order Entry	0	1
Submittal of Nebraska Boiler Standard Drawings (see table below)	1	12
Review of submittals by buyer*	12	14
Manufacturing/Procurement of equipment described herein	14	35
Total – All time is in calendar weeks	0	35

*If review of submittals lasts longer than 2 weeks, the shipment of the equipment may be delayed. Any changes to design made after PO date may affect delivery.

The above schedule is an estimate and may be subject to change +/- based on new order input between the date of this proposal and the date of project award.

9.8 General Terms of Sale:

Equipment warranty and other conditions of sale shall be as per our standard "Terms and Conditions of Sale," a copy of which is attached to this proposal.

Any Purchase Order issued must reference this proposal (or subsequent revisions provided prior to award) and must include a tax exemption certificate, direct pay permit or a statement to the effect that Purchaser will be responsible for the payment of taxes. The prices quoted do not include any use, excise, sales, or other like taxes, which may be applicable to this transaction.

We trust that the above meets with your favorable consideration and ask that you do not hesitate to contact our office if you have any questions.

Best Regards,

Jason Jacobi
Proposal Manager

10.0 FIELD SERVICE RATES

	United States	Other
Start-Up, Troubleshooting, Field Inspection Service, Service Technician, Boilermaker*	$1,250.00/day	$1,550.00/day
Combustion/Control Technician	$1,250.00/day	$1,550.00/day
Combustion Engineer	$1,550.00/day	$2,000.00/day

Regular time hours:	Monday to Friday	8:00 a.m.	4:30 p.m.
Over-time hours (x 1.5):	Monday to Friday	4:30 p.m.	8:30 p.m.
	Saturday	8:00 a.m.	4:30 p.m.
Double-time hours (x 2.0):	Monday to Friday	8:30 p.m.	8:00 a.m.
	Saturday	4:30 p.m.	8:00 a.m.
	Sunday	0:00 a.m.	12:00 p.m.
	Statutory/Legal Holidays	0:00 a.m.	12:00 p.m.

*Holiday pay for Union Boilermakers is x 3.0

Stand-By/Waiting time: At rates shown above

Travel time: Travel time is chargeable at rates shown above. Transportation other than service vehicle (taxi, airline, rental vehicle, welding rig, etc., are charged at cost + 10% for administration) Company and private automobile use will be billed at a rate of $.55 per mile/km

Accommodations & Travel: Chargeable at cost + 10% for administration

Meals: $60.00/day minimum

Miscellaneous Expenses: Shipping charges, rental of any special tools, miscellaneous expenses such as securing passports or visas, inoculations, entry and exit fees and all other expenses incurred in making required travel arrangements in connection with the work will be invoiced at cost + 10% for administration

Minimum charge of two (2) days per call

Terms: Pre-payment through pro-forma invoicing

Prices quoted in U.S. Funds

Service rates are subject to change without notice

11.0 STANDARD SUBMITTAL PACKAGE

CB-Nebraska Boiler utilizes a **3-stage submittal process** as described below:

The first stage, or "Submittal #1", consists of the general arrangement & foundation drawings for the **boiler pressure vessel**. This initial submittal allows the customer to begin foundation design & piping layout as quickly as possible without waiting for the full mechanical submittal. It also keeps the project moving forward by allowing the customer to approve and/or mark-up the boiler connection locations and return the drawings to CB-Nebraska Boiler (within 2 weeks) with a release to purchase/manufacture. This process ensures an on-time delivery date by not delaying the longest-lead item, which is the boiler itself.

The second stage, or "Submittal #2", contains the full **mechanical package** including general arrangements, foundation drawings, cut sheets & other data for all equipment (burner, fan, economizer, controls, P&IDs, ductwork, etc…).

The third stage, or "Submittal #3", contains the full **electrical package** including control panel arrangements, wiring diagrams, instrumentation details, logic diagrams, field wiring schematics, etc…

Unless agreed otherwise, CB-Nebraska Boiler shall submit its standard submittal package as follows:

ITEM	DESCRIPTION	SUBMITTAL NUMBER	DUE DATE
1	TRIM LIST OF BOILER ONLY	1	8 WKS ARO
2	GENERAL ARRANGEMENT OF BOILER ONLY	1	8 WKS ARO
3	BASE LOADING OF BOILER ONLY	1	8 WKS ARO
4	BOILER TRIM LIST [EQUIPMENT LIST]	2	10 WKS ARO
5	GENERAL ARRANGEMENT	2	10 WKS ARO
6	BASE-LOADING [FOUNDATION PLAN]	2	10 WKS ARO
7	PREDICTED PERFORMANCE	2	10 WKS ARO
8	P&ID*	2	10 WKS ARO
9	ECONOMIZER ARRANGEMENT*	2	10 WKS ARO
10	BURNER BILL OF MATERIALS*	2	10 WKS ARO
11	BURNER ARRANGEMENT*	2	10 WKS ARO
12	BURNER FUEL TRAIN SCHEMATICS*	2	10 WKS ARO
13	BURNER PANEL ARRANGEMENT*	3	12 WKS ARO
14	BURNER WIRING DIAGRAMS*	3	12 WKS ARO
15	BURNER SEQUENCE OF OPERATION*	3	12 WKS ARO
16	CONTROL PANEL ARRANGEMENT*	3	12 WKS ARO
17	CONTROL PANEL WIRING DIAGRAM*	3	12 WKS ARO
18	CONTROL PANEL SAMA LOGIC*	3	12 WKS ARO

* If applicable.

Drawings must be returned within 2 weeks of submittal. Delivery may be delayed day-per-day or week-per-week upn late return of submittals. Any deviation from the above standard submittal package may result in additional cost and/or delay in final shipment.

12.0 ASME WATER QUALITY

Suggested Water Chemistry Limits
Industrial Watertube, High Duty,
Primary Fuel Fired, Drum Type

Makeup water percentage: Up to 100% of feedwater
Conditions: Includes superheater, turbine drives, or process restriction on steam purity
Saturated steam purity target: See tabulated values below.

Drum Operating Pressure (1) (11)	**Psig 0-300 (MPa) (0-2.07)**	**301-450 (2.08-3.10)**	**451-600 (3.11-4.14)**	**601-750 (4.15-5.17)**	**751-900 (5.18-6.21)**	**901-1000 (6.22-6.89)**	**1001-1500 (6.90-10.34)**	**1501-2000 (10.35-13.79)**
Feedwater (7)								
Dissolved oxygen ppm (mg/l)O_2 - measured before chemical oxygen scavenger addition (8)	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007
Total iron ppm (mg/l) Fe	≤ 0.1	≤ 0.05	≤ 0.03	≤ 0.025	≤ 0.02	≤ 0.02	≤ 0.01	≤ 0.01
Total copper ppm (mg/l) Cu	≤ 0.05	≤ 0.025	≤ 0.02	≤ 0.02	≤ 0.015	≤ 0.01	≤ 0.01	≤ 0.01
Total hardness ppm (mg/l)*	≤ 0.3	≤ 0.3	≤ 0.2	≤ 0.2	≤ 0.1	≤ 0.05	ND	ND
pH @ 25^{0}C	8.3-10.0	8.3-10.0	8.3-10.0	8.3-10.0	8.3-10.0	8.8-9.6	8.8-9.6	8.8-9.6
Chemicals for preboiler system protection	NS	NS	NS	NS	NS	VAM	VAM	VAM
Nonvolatile TOC ppm (mg/l) C (6)	< 1	< 1	< 0.5	< 0.5	< 0.5	< 0.2	< 0.2	< 0.2
Oily matter ppm (mg/l)	< 1	< 1	< 0.5	< 0.5	< 0.5	< 0.2	< 0.2	< 0.2
Boiler Water								
Silica ppm (mg/l)	≤ 150	≤ 90	≤ 40	≤ 30	≤ 20	≤ 8	≤ 2	≤ 1
Total alkalinity ppm (mg/l)*	< 700(3)	< 600(3)	< 500(3)	< 200(3)	< 150(3)	< 100(3)	< NS(4)	< NS(4)
Free OH alkalinity ppm (mg/l)* (2)	NS	NS	NS	NS	NS	NS	ND(4)	ND(4)
Specific conductance (12) µmhos/cm (µS/cm) 25^{0}C without neutralization	5400-1100(5)	4600-900(5)	3800-800(5)	1500-300(5)	1200-200(5)	100-200(5)	≤ 150	≤ 80
Total Dissolved Solids in Steam (9)								
TDS (maximum) ppm (mg/l)	1.0-0.2	1.0-0.2	1.0	0.2	0.5-0.1	0.5-0.1	0.1	0.1

* as $CaCO_3$
NS = not specified
ND = not detectable
VAM = Use only volatile alkaline materials upstream of attemperation water source. (10)

Notes to Table:

(1) With local heat fluxes >1.5 x 10^5 Btu/hr/ft^2 (>473.2 kW/m^2), use values for at least the next higher pressure range.
(2) Minimum hydroxide alkalinity concentrations in boilers below 900 psig (6.21 MPa) must be individually specified by a qualified water treatment consultant with regard to silica solubility and other components of internal treatment. See section 6.6 of this document.
(3) Maximum total alkalinity consistent with acceptable steam purity. If necessary, should override conductance as blowdown control parameter. If makeup is demineralized quality water and boiler operates at less that 1000 psig (6.89 MPa) drum pressure, the boiler water conductance should be that in table for 100-1500 psig (6.9-10.34 MPa) range. In this case, the necessary continuous blowdown will usually keep these parameters below the tabulated maximum values. Alkalinity values in excess of 10% of specific conductance values may cause foaming.
(4) Not detectable in these cases refers to free sodium or potassium hydroxide alkalinity. Some small variable amount of total alkalinity will be present and measurable with the assumed congruent or coordinated phosphate-pH control or volatile treatment employed at these high pressure ranges.
(5) Maximum values are often not achievable without exceeding maximum total alkalinity values, especially in boilers below 900 psig (6.21 MPa) with >20% makeup of water whose total alkalinity is >20% of TDS naturally or after pretreatment by lime-soda, or sodium cycle ion exchange softening. Actual permissible conductance values to achieve any desired steam purity must be established for each case by careful steam purity measurements. Relationship between conductance and steam purity is affected by too many variables to allow its reduction to a simple list of tabulated values.
(6) Nonvolatile TOC is that organic carbon not intentionally added as part of the water treatment regime. See Section 6.4 of this document.

(7) Boilers below 900 psig (6.21 MPa) with large furnaces, large steam release space, and internal chelant, polymer, and/or antifoam treatment can sometimes tolerate higher levels of feedwater impurities than those in the table and still achieve adequate deposition control and steam purity. Removal of these impurities by external pretreatment is always a more positive solution. Alternatives must be evaluated as to practicality and economics in each individual case.

(8) Values in the table assume existence of a deaerator.

(9) Achievable steam purity depends on many variables, including boiler water total alkalinity and specific and specific conductance as well as design of boiler steam drum internals and operating conditions [(Note 5)]. Since boilers in this category require a relatively high degree of steam purity for protection of the superheaters and turbines, more stringent steam purity requirements such as process steam restrictions on individual chemical species or restrictions more stringent than 0.1 ppm (mg/l) TDS turbine steam purity must be addressed specifically.

(10) As a general rule, the requirements for attemperation spray water quality are the same as those for steam purity. In some cases boiler feedwater is suitable; however, frequently additional purification is required. In all cases the spray water should be obtained from a source that is free of deposit forming and corrosive chemicals such as sodium hydroxide, sodium sulfite, sodium phosphate, iron, and copper. The suggested limits for spray water quality are < 30 ppb (µg/l) TDS maximum, < 10 ppb (µg/l) Na maximum, < 20 ppb (µg/l) SiO_2 maximum, and it should be essentially oxygen free.

(11) Low pressure boilers frequently use feedwater that is suitable for use in higher pressure boilers. In these cases the boiler water chemistry limits should be based on the pressure range that is mose consistent with the feedwater quality. See Sections 1 and 6.2 of this document regarding blowdown.

(12) Conversion from ppm (mg/l) TDS values in the ABMA standards [12] used a factor of 0.65. See Section 6.7 of this document.

13.0 STANDARD VENDOR / MANUFACTURER LIST

Unless otherwise specified by the customer, CB-Nebraska Boiler shall utilize the following vendors for major components:

Item	Size / Rating	Standard Vendor / Manufacturer	Alternate Vendors / manufacturer
Water Column	<900#	NBC	Clark-Reliance, Yarway
Water Column	>900#	Clark-Reliance	Yarway
Water Gage		Clark-Reliance	Yarway
Water Column Trycocks		Clark-Reliance	Yarway
Water Gage Valves		Vogt	Crane, Velan
Gate and Globe valves	< 2"	Vogt	Crane, Velan
Gate and Globe valves	>2"	Velan	Edward, Powell
Steam Gage		Ashcroft	
Steam Gage Valve		Marsh	
Steam Gage Valve		Marsh	
Main Steam NRV		Powell	Edward
Main Steam Stop Valve		Powell	Edward, Crane, Velan
Check valves	< 3"	Vogt	Crane, Edward
Check valves	> 3"	Crane	Edward, Powell
Flow control valves	< 300#		
Flow control valves	> 300#	Fisher	
Safety relief valves	<300#	Kunkle	Crosby, Consolidated
Safety relief valves	> 300#	Crosby	Consolidated, Kunkle
Drip pan elbows		Kunkle	
Low water cut outs		Clark-Reliance	
Low water cut-out by-pass switch		Allen-Bradley	Square-D
Transmitters		Rosemount	Foxboro, Siemens, ABB
PLC's/Controller		Allen-Bradley	Moore

NOTE:

The standard vendor/manufacturer list is generated by CB-Nebraska Boiler based on our stringent quality requirements and vendor performance over the years. In principle, we have no objection to using vendors/manufacturers on the alternate list. However the cost and delivery impact in using the alternate vendors has to evaluated and agreed upon. We reserve the right to provide items of equal or better quality from vendor/manufacturers listed above based on project execution needs.

14.0 Comments

14.1 TECHNICAL CLARIFICATIONS

Equipment as offered is per CB-Nebraska Boiler's standard design & construction. Scope of supply shall be as outlined in this proposal. This proposal is based on information from the specifications received. CB-Nebraska Boiler makes the following comments to the above specifications:

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1.5	Equipment as offered is designed for indoor installation.
1.9	Turn down ratio is 17% to 100% load (6 to 1).
1.10	If the boiler is to be cycled routinely, we recommend that the tube-to-drum connections be seal-welded. An option price is provided for your review.
3.1	Emissions guarantees are from 25% to 100% load.
3.2	We are offering 9 ppm NOx emissions which is typical for California location.
5.3	Individual electrical devices included in our scope are UL and FM approved. The entire system is not approved.
5.4	The burner could fire a mixture of propane and air having the same Wobbe index equal to natural gas without any change to the burner or valves setting. Air Mixed propane system excluded from our scope of supply.
5.6	Maximum turn down ratio with 9 ppm burner is 6 to 1.
8.14	We have offered our standard 15x18 furnace access door.
11.16	FAA lighting is not currently included.
13.27	Start-up spares are included in our base bid. Operational spares are determined after award during detailed engineering.
13.33	Supervision, start-up an training are not included but are available at per Diem rate plus traveling expenses.

General Notes:

The Cleaver-Brooks deaerator and feedwater pumpset is manufacturer's standard equipment. Specification compliance is not offered at this time.

An option is offered for our proprietary C-B Profire low-NOx burner. Emissions performance and turndown are the same as the base bid C-B Natcom burner. This is a manufacturer's standard design that is proven and economical. Additional details can be provided upon request.

Boiler safety valves shall be set at the design pressure of the boiler. Lower set pressures can be provided for a price adder available upon request.

Start-up & commissioning spare parts are included in our base bid. Recommended operational spare parts list with pricing shall be provided after award during detailed engineering.

All submittals shall be electronic.

Saturated & superheated steam piping connections shall be butt-welded in the field by others. The gas seals for superheater inlet & outlet piping penetrations through the casing shall be welded in the field by others.

The steam purity numbers listed in this proposal are the purity levels of the saturated steam at the outlet of the steam drum. If applicable, the quality of the spray water used to control the steam temperature should be the same or better than the saturated steam quality to ensure that the purity of the superheated steam is not compromised. Use of spray water with impurity levels higher than that of the saturated steam may compromise the operating life of the down stream equipment including the final superheater.

CB-Nebraska Boiler shall comply with the specified national codes & standards unless noted otherwise. We shall be responsible for local laws, codes & ordinances only to the extent we are made aware by Purchaser and/or Enduser.

CB-Nebraska Boiler is certified ISO 9001:2000.

14.2 COMMERCIAL CLARIFICATIONS

Terms & conditions shall be as mutually agreed-upon between Buyer & Seller.

We have offered our standard five(5) year limited pressure vessel warranty. See attached for details. Additional warranty and bonding are not included at this time. Erection supervision, start-up service & training are available at our per diem rates.

Optional freight pricing is offered FCA Jobsite (INCOTERMS 2000).

END OF COMMENTS SECTION

15.0 Terms & Conditions

CB Nebraska Boiler (the "Company") agrees to sell the Equipment described herein upon the following terms and conditions of sale which, accordingly, supersede any of Purchaser's additional or inconsistent terms and conditions of purchase.

1. TERMS AND PRICES

(a) All orders are subject to the approval of the Company's home office and shall not be binding upon the Company unless signed by a duly elected and acting officer of the Company. Unless otherwise stated, terms of payment shall be as proposed in the Company's firm proposal. If partial shipments are made, payment shall become due upon the earlier of date of shipment or date of invoice.

(b) The prices agreed upon herein are exclusive of any present or future Federal, State, Municipal or other excise, sales or use tax with respect to the Equipment or services covered hereby. If the Company is required by applicable law or regulation to pay or collect any such tax or taxes on account of this transaction or the Equipment or services covered hereby, then such amount of tax shall be paid by the Purchaser in addition to the prices provided herein.

(c) Prepaid freight, if applicable, will be added to the purchase price and invoiced separately. Where the price includes transportation or other shipping charges, any increases in transportation rates, any demurrage, special detention charges or other shipping charges shall be for the account of and paid by Purchaser.

(d) If Purchaser requests changes in the Equipment or delays progress of the manufacture or shipment of the Equipment, the contract price shall be adjusted to reflect increases in selling price caused thereby.

(e) Prices are subject to revision because of increases in material and labor cost during the period of manufacture if a price adjustment schedule is part of the proposal. Typographical errors are subject to correction

(f) The Company shall not be called upon to make any allowance to Purchaser for material, labor, repairs or alterations made for its account unless authorized in writing by a duly elected and acting officer of the Company.

(g) The Purchaser shall furnish the Company with all information, instructions and drawings requisite to the execution of the work.

(h) The Company shall not furnish any drawings other than general arrangement drawings as are necessary for the work. The Company shall furnish its drawings promptly and the Purchaser shall check, approve and return one set without delay.

2. WITHDRAWAL OR CANCELLATION OF PROPOSAL

(a) The price and terms quoted herein are subject to acceptance by the Purchaser within a period of 30 days from the date hereof, except that the Company shall have the right to withdraw this Proposal at any time before formal acceptance by the Purchaser and written acknowledgment by a duly elected and acting officer of the Company.

(b) Orders accepted by the Company are not subject to cancellation except by mutual agreement and at cancellation charges as determined by the Company. Changes in specifications after acceptance of Purchaser's order are subject to a charge to be determined by the Company.

3. SHIPMENT

Shipment is F.O.B. Company's plant or point of shipment, unless otherwise specified. Risk of loss of or damage to the Equipment shall pass to the Purchaser upon delivery of the Equipment or any portion thereof by the Company to a common carrier at Company's plant or point of shipment, in the case of shipments F.O.B. point of destination, risk of loss or damage to the Equipment shall pass to the Purchaser when the Equipment arrives at the nearest rail siding to point of destination, subject to clearance availability.

However, when the Equipment is ready for shipment and shipment is delayed or postponed through any causes beyond the control of the Company, the Purchaser shall arrange for storage of the Equipment covered by this Proposal other than at the works of the Company, unless by separate written agreement Company shall agree to store the Equipment. After shipment and when the Equipment is ready for erection, if erection is delayed or postponed through any causes beyond the control of the Company, the Purchaser shall protect the Equipment against damage from the weather or other causes, and in any case the Purchaser shall assume the risk of loss or damage to the Equipment and shall be responsible for any charges in connection with storage or reconditioning.

4. DELIVERY

(a) The Company will endeavor to make shipment of orders as scheduled. However, all shipment dates are approximate only, and the Company reserves the right to readjust shipment schedules.

(b) UNDER NO CIRCUMSTANCES WILL THE COMPANY BE RESPONSIBLE OR INCUR ANY LIABILITY FOR COSTS OR DAMAGES OF ANY NATURE (WHETHER GENERAL, CONSEQUENTIAL, AS A PENALTY OR LIQUIDATED DAMAGES, OR OTHERWISE) ARISING OUT OF OR OWING TO (i) ANY DELAYS IN DELIVERY OR (ii) FAILURE TO MAKE DELIVERY AT AGREED OR SPECIFIED TIMES DUE TO CIRCUMSTANCES BEYOND ITS REASONABLE CONTROL.

(c) If shipment is delayed or suspended by Purchaser, Purchaser shall pay (i) Company's invoice for the Equipment as per payment terms, (ii) Company's handling and storage charges then in effect, and (iii) demurrage, special detention, and any related charges if loaded on rail cars.

5. LIMITED WARRANTY; WARRANTY ADJUSTMENT; EXCLUSIONS; LIMITATION OF LIABILITY

(a) Limited Warranty

The Company warrants that at the time of shipment, the Equipment manufactured by it shall be merchantable, free from defects in material and workmanship and shall possess the characteristics represented in writing by the Company. The Company's warranty is conditioned upon the Equipment being properly installed and maintained and operated within the Equipment's capacity under normal load conditions with competent supervised operators and with proper water conditioning. Equipment, accessories and other parts and components not manufactured by the Company are warranted only to the extent of and by the original manufacturer's warranty to the Company, and in no event shall such other manufacturer's warranty create any more extensive warranty obligations of the Company to the Purchaser than the Company's warranty covering Equipment manufactured by the Company. Refractories installed in Equipment manufactured by the Company are excluded from this Limited Warranty for the reason that Company has no control over the conditions to which the refractories are subjected in service.

(b) Exclusions from Warranty

(i) THE FOREGOING IS IN LIEU OF ALL OTHER WARRANTIES, ORAL OR EXPRESSED OR IMPLIED, INCLUDING ANY WARRANTIES THAT EXTEND BEYOND THE DESCRIPTION OF THE EQUIPMENT. THERE ARE NO EXPRESS WARRANTIES OTHER THAN THOSE CONTAINED IN THIS PARAGRAPH 5 AND TO THE EXTENT PERMITTED BY LAW THERE ARE NO IMPLIED WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE. THE PROVISIONS OF THIS PARAGRAPH 5 AS TO DURATION, WARRANTY ADJUSTMENT AND LIMITATION OF LIABILITY SHALL BE THE SAME FOR BOTH IMPLIED WARRANTIES (IF ANY) AND EXPRESS WARRANTIES.

(ii) The Company's warranty is solely as stated in (a) above and does not apply or extend, for example, to expendable items, ordinary wear and tear, altered units, units repaired by persons not expressly approved by the Company, materials not of the Company's manufacture, or damage caused by accident, the elements, abuse, misuse, temporary heat overloading, or by erosive or corrosive substances. The treatment of feedwater and the conditioning of boiler water are beyond the control of the Company. Therefore, the Company shall not be held responsible for any damage, direct or consequential, due to the presence of oil, grease, scale or deposits on the internal surfaces of the Equipment, or for damage resulting from foaming caused by chemical conditions of the water; or for damage resulting from corrosion or caustic embrittlement, or from any other cause which results because of improper or inadequate treatment of feedwater or conditioning of boiler water.

(c) Warranty Adjustment

The Company shall repair or shall replace F.O.B. point of shipment, any parts of the Equipment within one (1) year from the date of initial firing, but not to exceed eighteen (18) months after date of shipment or date of invoice, whichever is earlier, found to be defective in design, workmanship, or material, provided the Equipment is operated by the Purchaser in accordance with generally approved practice and in accordance with the conditions of service, if any, herein specified, and provided the Purchaser notifies the Company in writing within thirty (30) days of discovery of any alleged defect. Any warranty adjustments made by the Company shall not extend the initial warranty period set forth above. The warranty period for replacements to the Equipment made by the Company shall terminate upon the termination of the initial warranty period set forth above. Expenses incurred by Purchaser for labor to replace or repair or expenses to return the Equipment or any part or parts to Company will not be reimbursed by the Company.

(d) Spare and Replacement Parts Warranty Adjustment

The Company sells spare and replacement parts. This subparagraph (d) sets forth the Warranty Adjustment for such parts. Purchaser must make claim of any breach of any spare or replacement parts warranty by written notice to the Company's home office within thirty (30) days of discovery of any alleged defect for all such parts manufactured by the Company. The Company agrees at its option to repair or replace, but not install, F.O.B. Company's plant, any part or parts it manufactures which, within one (1) year from the date of shipment shall prove to the Company's satisfaction (including return to the Company's plant, transportation prepaid, for inspection, if required by the Company) to be defective within this Parts Warranty. The Warranty and warranty period for spare and replacement parts not manufactured by the Company (purchased by the Company from third party suppliers) shall be limited to the Warranty and Warranty Adjustments extended to the Company by the original manufacturer of such parts; in no event shall such other manufacturer's warranty create any more extensive warranty obligation of the Company to the Purchaser for such parts than the Company's Warranty Adjustment covering parts manufactured by the Company as set forth in this subparagraph (d). Expenses incurred by the Purchaser for labor to replace or repair or expenses to return the spare or replacement parts will not be reimbursed by the Company.

(e) Limitation of Liability

The warranty adjustment provision set forth in this paragraph shall be Purchaser's exclusive remedy and the extent of the Company's liability for breach of implied (if any) and express warranties, representations, instructions or defects from any cause in connection with the sale or use of the Equipment. THE COMPANY SHALL NOT BE LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, OR FOR LOSS, DAMAGE OR EXPENSE, DIRECTLY OR INDIRECTLY ARISING FROM THE USE OF THE EQUIPMENT, SPARE OR REPLACEMENT PARTS, OR FROM ANY OTHER CAUSE WHETHER BASED ON WARRANTY (EXPRESSED OR IMPLIED) OR TORT OR CONTRACT, regardless of any advices or recommendations that may have been rendered concerning the purchase, installation or use of the Equipment.

6. PATENTS

(a) Patent Indemnity and Conditions

The Company shall defend at its own expense and hold Purchaser harmless in the event of any suits instituted against Purchaser based on a claim that the Equipment, or any part thereof, furnished hereunder constitutes an infringement of any claim of any United States Patent covering the Equipment as originally manufactured by the Company per the Company's specifications and without modification by the Purchaser, provided Purchaser shall (i) have given the Company immediate notice in writing of any such claim or institution or threat of such suit; and (ii) have permitted the Company to defend or settle the same, and have given all needed information, assistance and authority to enable the Company to do so. Purchaser shall defend and indemnify the Company against all expenses, costs and loss by reason of any real or alleged infringement by the Company's incorporating a design or modification requested by Purchaser.

(b) Limitation of Liability

The Company's total liability hereunder is expressly limited to an amount not to exceed the sales price of the Equipment and may be satisfied by the Company's refund to Purchaser, at the Company's option, of the sales price of the Equipment. In the event the Company elects to defend any such suit and the Equipment is held to infringe any such United States Patent and if the Purchaser's use thereof is enjoined, the Company shall, at its expense and at its option: (i) obtain for the Purchaser the right to continue using the Equipment; or (ii) supply non-infringing Equipment for installation by Purchaser; or (iii) modify the Equipment so that it becomes non-infringing; or (iv) refund the then-market value of the Equipment.

7. PRIOR USE

(a) If damage to the Equipment or other property or injury to persons is caused by use or operation of the Equipment prior to being placed in initial operation ("Start-up") by the Company where Start-up is included in the purchase price, then Purchaser shall indemnify and hold the Company harmless from all liability, costs, and expenses for all such damage or injury.

(b) Inasmuch as representatives of the Company are authorized only to advise and consult with the Purchaser, and no representative of the Company is authorized or licensed to operate the Equipment, all preliminary operations and demonstration of capacity and performance guarantees, if required, prior to final acceptance, shall be performed by the Purchaser.

8. EQUIPMENT CHANGES

The Company may, but shall not be obligated to, incorporate in the Equipment any changes in specifications, design, construction, arrangement or components.

9. SECURITY INTEREST; INSURANCE

(a) To secure payment of the purchase price, Purchaser agrees that the Company shall retain a security interest in the Equipment until Purchaser shall have paid in cash the full purchase price when due, interest at the highest lawful contract rate until so paid and the costs of collection, including reasonable attorneys' fees. The Equipment shall at all times be considered and remain personal property and Purchaser shall perform all acts necessary to assure and perfect retention of the Company's security interest against the rights or interests of third persons. In the event Purchaser defaults in payment of any part of the purchase price when due, or fails to comply with any provisions of this contract, the Company shall have the remedies available under the Uniform Commercial Code.

(b) From the date that risk of loss of and damage to the Equipment passes to the Purchaser as provided above, and until the Equipment is finally accepted and the Contract Price paid in full, or until all obligations of the Company hereunder have terminated, the Purchaser shall provide and maintain insurance in the names of the Purchaser and the Company as interest may appear to the total value of the Equipment and of all work performed in the erection thereof against risk of fire, lightning, windstorm, aircraft and explosion, including inherent dangers and boiler explosion and the proceeds of such insurance shall be applied to the cost of repairing and replacing the Equipment and work destroyed or damaged.

(c) In the event the Purchaser furnishes workmen for the unloading, transportation, loading, handling or erection of the Equipment to be furnished by the Company hereunder, or if the Company or its Erection Supervisor utilizes workmen paid directly by the Purchaser to perform the work covered by this contract, or in the event preliminary operations of the Equipment are performed by the Purchaser prior to final acceptance, then the Purchaser shall indemnify and hold harmless the Company from any and all liability, claims, suits or expenses in connection with bodily injuries, including death, at any time resulting therefrom, and in connection with any damage to or loss of property sustained by any person or persons including such workmen, occurring during the performance of such work or resulting from the operation of such Equipment by the Purchaser prior to final acceptance, except such injury, death, damage or loss as may result from negligent acts or omissions of the Company or its employees. The Purchaser shall at his own expense defend any and all suits brought against the Company alleging any such injury, death, damage or loss, even if such suit or suits are groundless, false or fraudulent. The Company shall not be responsible for damage to or loss of the Equipment furnished or work done by the Company if so caused by employees of the Purchaser or if resulting from such preliminary operations.

(d) The Company shall provide and maintain until completion of the work the following forms of insurance in respect of its own employees (but not in respect of any employee paid directly by the Purchaser, but utilized by the Company):

Workers' Compensation Insurance including Employer's Liability Insurance in accordance with the laws of the State in which the Company may be required to pay compensation; and

Comprehensive General Liability Insurance, excluding products, with a combined bodily injury and property damage liability limit of $1,000,000 for each occurrence and $1,000,000 in the aggregate.

10. LOSS, DAMAGE OR DELAY

The Company shall not be liable for loss, damage or delay resulting from causes beyond its reasonable control or caused by strikes or labor difficulties, lockouts, acts or omissions of any governmental authority or the Purchaser, insurrection or riot, war, fires, floods, Acts of God, breakdown of essential machinery, accidents, priorities or embargoes, car and material shortages, delays in transportation or inability to obtain labor, materials or parts from usual sources. In the event of any delay from such sources, performance will be postponed by such length of time as may be reasonably necessary to compensate for the delay. In the event performance by the Company of this agreement cannot be accomplished by the Company due to any action of governmental agencies, or any laws, rules or regulations of any governmental agency, the Company (at its option) may cancel this agreement without liability. In no event shall the Company be liable for any loss or damage of any kind, including consequential or special damages of any nature.

11. WORK BY OTHERS

(a) The Company, being only a supplier of the Equipment, shall have no responsibility for labor or work of any nature relating to the installation or operation or use of the Equipment all of which shall be performed by Purchaser or others. It is the responsibility of Purchaser to furnish such accessory and safety devices as may be desired by it and/or required by law or OSHA standards respecting Purchaser's use of the Equipment. Purchaser shall be responsible for ascertaining that the Equipment is installed and operated in accordance with all code requirements and other applicable laws, rules, regulations and ordinances.

(b) The Company shall provide the Purchaser with General Arrangement drawings showing the Equipment with reference to foundations, including loading diagrams and showing location of anchor bolts in the foundations. The Company shall not be responsible for the depth of the footings, size or accuracy of the foundations, or the character of the materials selected for their construction. Adequate foundations, having plan measurements in accordance with such drawings including foundation bolts and plates, concrete work, all grouting, and excavation, shall be furnished in place in due time by the Purchaser. The Company shall not be responsible for any damages, or repairs necessary to the Equipment furnished by it, caused by or resulting from defects in or settlement of the foundations.

(c) Unless otherwise stated, any supporting steel to be furnished by the Company as specified in this Proposal will be designed to support the Equipment which the Company proposes to furnish and will be designed in accordance with the latest Rules of the American Institute of Steel Construction. If the Company is required to increase the size or weight of its supporting structures to conform to other than these Rules or because of additional loadings imposed by the Purchaser, the Purchaser shall reimburse the Company for the additional steel required.

(d) It is mutually agreed that where State laws or Municipal ordinances require permits to install Equipment covered by this Proposal, or the approval of the plans and specifications for this installation, the Purchaser assumes the responsibility for securing the approval of said plans and specifications from the proper State or Municipal authorities and for any required fees. If any changes are required in the Equipment covered by this Proposal to meet the approval of said State or Municipal authorities, the Purchaser shall inform the Company of such changes and shall reimburse it for changes actually made to comply with the requirements of said authorities.

12. GOVERNING LAW AND RECOVERY OF FEES AND EXPENSES

This Agreement is made and entered into in the State of Nebraska, County of Lancaster, and shall be construed in accordance with the laws of the State of Nebraska. With regard to any disputes which arise hereunder, jurisdiction and venue shall be proper in the State or Federal Courts located in Lancaster County.

In the event suit is brought or an attorney is retained by Company to enforce these Terms and Conditions or to collect any money hereunder, or to collect any money damages for breach hereof, Company shall be entitled to recover, in addition to other remedy, reimbursement for reasonable attorneys' fees, court costs, costs of investigation and other related expenses incurred in connection therewith.

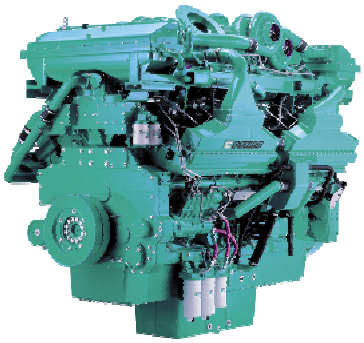
13. COMPLETE AGREEMENT; NON-WAIVER

THE COMPLETE AGREEMENT BETWEEN THE COMPANY AND PURCHASER IS CONTAINED HEREIN AND NO ADDITIONAL OR DIFFERENT TERM OR CONDITION STATED BY PURCHASER SHALL BE BINDING UNLESS AGREED TO BY THE COMPANY IN WRITING, EXECUTED BY A DULY ELECTED AND ACTING OFFICER OF THE COMPANY. No course of prior dealings and no usage of the trade shall be relevant to supplement or explain any terms used in this Agreement. This Agreement may be modified only by a writing signed by both the Company and Purchaser. The failure of the Company to insist upon strict performance of any of the terms and conditions stated herein shall not be considered a waiver of any such term or condition or any of the Company's rights.

END OF STANDARD TERMS & CONDITIONS

QSK60-G6

Emissions Compliance
EPA Tier 2 @ 60Hz



> Specification sheet

Our energy working for you.™

Description

The QSK60 is a V 16 cylinder engine with a 60 litre displacement. This Quantum series utilizes sophisticated electronics and premium engineering to provide outstanding performance levels, reliability and versatility for Standby, Prime and Continuous Power applications.

CE	This engine has been built to comply with CE certification.
ISO 9001	This engine has been designed in facilities certified to ISO9001 and manufactured in facilities certified to ISO9001 or ISO9002.

Features

High pressure fuel pump, Modular Common Rail fuel System (MCRS) and state of the art integrated electronic control system provide superior performance, efficiency and diagnostics. The electronic fuel pumps deliver up to 1600 bar injection pressure and eliminate mechanical linkage adjustments. The new MCRS utilizes an electric priming pump which is integrated with the off-engine stage-1 fuel filter head and is controlled and powered by the engine ECM. The stage-2 fuel filters are mounted on-engine

CTT (Cummins Turbo Technologies) HX82/HX83 turbo-charging utilizes exhaust energy with greater efficiency for improved emissions and fuel consumption.

Low Temperature After-cooling - Two-pump Two-loop (2P2L)

Ferrous Cast Ductile Iron (FCD) Pistons - High strength design delivers superior durability.

G-Drive Integrated Design - Each component has been specifically developed and rigorously tested for G-Drive products, ensuring high performance, durability and reliability.

Service and Support - G-Drive products are backed by an uncompromising level of technical support and after sales service, delivered through a world class service network.

1800 rpm (60 Hz Ratings)

Gross Engine Output			Net Engine Output			Typical Generator Set Output					
Standby	Prime	Base	Standby	Prime	Base	Standby (ESP)		Prime (PRP)		Base (COP)	
kWm/BHP			kWm/BHP			kWe	kVA	kWe	kVA	kWe	kVA
2180/2923	1975/2648	1740/2333	2120/2843	1937/2598	1702/2282	2000	2500	1825	2281	1633	2042

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(01/08) (GDSS169)

General Engine Data

Type	4 cycle, Turbocharged, After-cooled
Bore mm	159
Stroke mm	190
Displacement Litre	60.2
Cylinder Block	Cast iron, 16 cylinder
Battery Charging Alternator	55A
Starting Voltage	24V
Fuel System	Direct injection Cummins MCRS
Fuel Filter	Spin on fuel filters with water separator
Lube Oil Filter Type(s)	Spin on full flow filter
Lube Oil Capacity (l)	280
Flywheel Dimensions	SAE 0

Coolpac Performance Data

Cooling System Design	2 pump - 2 loop
Coolant Ratio	50% ethylene glycol; 50% water
Coolant Capacity (l)	Engine only – not applicable
Limiting Ambient Temp.**	
Fan Power	
Cooling System Air Flow (m^3/s)**	
Air Cleaner Type	Dry replaceable element with restriction indicator

** @ 13 mm H^2O

Ratings Definitions

Emergency Standby Power (ESP):
Applicable for supplying power to varying electrical load for the duration of power interruption of a reliable utility source. Emergency Standby Power (ESP) is in accordance with ISO 8528. Fuel Stop power in accordance with ISO 3046, AS 2789, DIN 6271 and BS 5514.

Limited-Time Running Power (LTP):
Applicable for supplying power to a constant electrical load for limited hours. Limited-Time Running Power (LTP) is in accordance with ISO 8528.

Prime Power (PRP):
Applicable for supplying power to varying electrical load for unlimited hours. Prime Power (PRP) is in accordance with ISO 8528. Ten percent overload capability is available in accordance with ISO 3046, AS 2789, DIN 6271 and BS 5514.

Base Load (Continuous) Power (COP):
Applicable for supplying power continuously to a constant electrical load for unlimited hours. Continuous Power (COP) in accordance with ISO 8528, ISO 3046, AS 2789, DIN6271 and BS 5514.

Weight & Dimensions

Length mm	Width mm	Height mm	Weight (dry) kg
2781	1794	2155	7185

Fuel Consumption 1800 (60 Hz)

%	kWm	BHP	L/ph	US gal/ph
Standby Power				
100	2180	2922	536	141.4
Prime Power				
100	1975	2647	470	124.1
75	1481	1985	381	100.6
50	987	1324	285	75.1
25	494	662	165	43.5
Continuous Power				
100	1740	2332	423	111.6

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(01/08) (GDSS169)

CLARKE®

FIRE PUMP ENGINES

MODELS

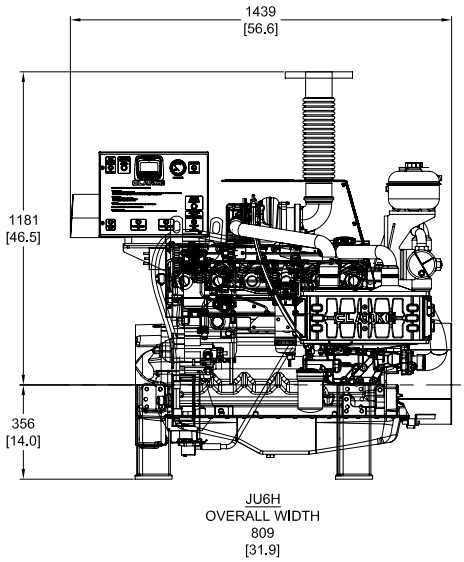
JU6H-UFADK0 JU6H-UFAD58 JU6H-UFADNG JU6H-UFADN0 JU6H-UFADQ0 JU6H-UFADR0 JU6H-UFADP8 JU6H-UFADP0 JU6H-UFADT0 JU6H-UFAD88 JU6H-UFADR8 JU6H-UFADS8 JU6H-UFADS0 JU6H-UFADW8 JU6H-UFADX8 JU6H-UFAD98

FM-UL-CUL APPROVED RATINGS BHP/*KW*

JU6H MODEL	RATED SPEED 1760		2100		2350	
UFADK0	168	*125*	173	*129*	175	*131*
UFAD58	183	*137*				
UFADNG	190	*142*	181	*135*	183	*137*
UFADN0	197	*147*	197	*147*	200	*149*
UFADQ0			224	*167*	226	*169*
UFADR0			238	*177.5*	240	*179*
UFADP8	220	*164*				
UFADP0	220	*164*	209	*156*	211	*157*

JU6H MODEL	RATED SPEED 1760		2100		2350	
UFADT0	229	*171*	274	*204*	277	*206.5*
UFAD88	237	*177*				
UFADR8	250	*187*				
UFADS8	260	*194*				
UFADS0			260	*194*	268	*200*
UFADW8	282	*211*				
UFADX8	305	*227.5*				
UFAD98	315	*235*				

All engine models and ratings are USA EPA emissions certified Tier 3 per NSPS (40 CFR Part 60 Sub Part IIII)



SPECIFICATIONS

ITEM	JU6H-UDAD MODELS K0	58	NG	N0	88	Q0	R0	P8	P0	T0	R8	S8	S0	W8	X8	98
Number of Cylinders	6															
Aspiration	TRWA															
Rotation*	Clockwise (CW)															
Weight - lb (kg)	1747 (791)															
Compression Ratio	19.0:1					17.0:1										
Displacement - cu. in. (l)	415 (6.8)															
Engine Type	4 Stroke Cycle - Inline Construction															
Bore & Stroke - in. (mm)	4.19 x 5.00 (106 x 127)															
Installation Drawing	D - 628 - US															
Wiring Diagram AC	C07591 (AC Heater Wiring)															
Wiring Diagram DC	C071367, C071360, C071761					C071368, C071360, C071761										
Engine Series	John Deere 6068 Series Power Tech E					John Deere 6068 Series Power Tech Plus										
Speed Interpolation	Opt.	N/A				Opt.	N/A		Opt.		N/A		Opt.	N/A		

Abbreviations: CW - Clockwise • NA - Naturally Aspirated • T - Turbocharged • TRWA - Turbocharged Raw Water Aftercooled
*Rotation viewed from Heat Exchanger/Front of engine • Engine intended for indoor use or inside weatherproof enclosure only

† ENGINE RATINGS BASELINES

- Engines are rated at standard SAE conditions of 29.61 in. (7521 mm) Hg barometer and 77˚F (25˚C) inlet air temperature [approximates 300 ft. (91.4 m) above sea level] by the testing laboratory (see SAE Standard J 1349).
- A deduction of 3 percent from engine horsepower rating at standard SAE conditions shall be made for diesel engines for each 1000 ft. (305 m) altitude above 300 ft. (91.4 m).
- A deduction of 1 percent from engine horsepower rating as corrected to standard SAE conditions shall be made for diesel engines for every 10˚F (5.6˚C) above 77˚F (25˚C) ambient temperature.
- Note: Engines are not to be used for continuous duty. Engines are to be used only for stationary emergency standby fire pump service. According to NFPA 25 engines are to be tested 30 minutes per week at no pump flow and full pump flow once per year.

CERTIFIED POWER AT ANY SPEED

- FM-UL Certified BHP ratings are shown at specific speeds, Clarke engines can be applied at a single rated RPM setting ±50 RPM. Contact Clarke or your Pump OEM representative to obtain details.
- Engines with optional speed interpolation can be factory set at any intermediate speed, to determine intermediate certified power, make a linear interpolation from the certified FM-UL certified power curve.

c UL US

Meets NFPA 20 Requirements

C FM US APPROVED

ENGINE EQUIPMENT

EQUIPMENT	STANDARD	OPTIONAL
Air Cleaner	Direct Mounted, Washable, Indoor Service with Drip Shield	Disposable, Drip proof, Indoor Service, Outdoor Type
Alternator	12V-DC, 42 Amps; w/Belt Guard	24V-DC, 40 Amps; w/Belt Guard
Exhaust Protection	Metal Guards on Manifolds & Turbo	
Coupling	Bare Flywheel	UL Listed Drive Shaft & Guard, JU6H-UFADK0/58/NG/N0/Q0/R0 - CDS30 - S1, UFADP8/P0/T0/88/R8/S8/S0/W8/X8/88- CDS50-SC at 1760/2100 RPM only
Electronic Control Module	12V-DC, Energized to stop, Primary ECM always powered on	24V-DC, Energized to stop, Primary ECM always powered on
Exhaust Flex Connection*	SS Flex, 150# Flange, JU6H-UFADK0/58/NG/N0/S8 - 5", JU6H-UFADP8/P0/Q0/R0/S0/T0/R8/S8/W8/X8/98 - 6"	SS Flex, 150# Flange, JU6H-UFADK0/58/NG/N0/S8 - 6", JU6H-UFADP8/P0/Q0/R0/S0/T0/R8/S8/W8/X8/98 - 8"
Flywheel Housing	S.A.E. #3	
Flywheel Power Take Off	11.5" S.A.E. Industrial Flywheel Connection	
Fuel Connections	Fire Resistant Flexible, Supply & Return Lines, US Coast Guard Approved	
Fuel Filter	Primary Filter w/priming pump	
Fuel Injection System	High Pressure Common Rail	
Engine Heater	120V-AC, 1500 Watt	240V-AC, 1500 Watt
Governor, Speed	Electronic, Dual Electronic Engine Control Modules	
Heat Exchanger	Tube & Shell Type, 60 PSI w/NPTF Connections	
Instrument Panel	Multimeter to Display English & Metric, Tachometer, Hourmeter, Water Temperature, Oil Pressure & One (1) Voltmeter with toggle switch, Front Opening	
Junction Box	Integral with Instrument Panel; For DC Wiring Interconnection to Engine Controller	
Lube Oil Cooler	Engine Water Cooled, Plate Type	
Lube Oil Filter	Full Flow w/By-Pass Valve	
Lube Oil Pump	Gear Driven, Gear Type	
Manual Start Controls	On Instrument Panel With Control Position Warning Light	
Overspeed Control	Electronic w/Reset & Test in Instrument Panel	
Raw Water Solenoid Operation	Automatic from Engine Controller & from Instrument Panel	
Run-Stop Control	On Instrument Panel With Control Position Warning Light	
Starters	Two (2) 12V-DC	Two (2) 24V-DC
Throttle Control	Adjustable Speed Control by Increase/Decrease Button, Tamper Proof	
Water Pump	Poly-Vee Belt Drive w/Guard	

Note: Engine Controller needs 2 additional signals: Injector Failure, Alternate ECM Selected
* JU6H-UFADP8/P0/Q0/R0/S0/T0/R8/S8/W8/X8/98 All provided with orifice plate mounted in flex exhaust.

MODEL NOMENCLATURE: (10 Digit Models)

JU6H-UFADK0

- JU6H — John Deere Base Engine
- U — 250 Series
- F — 6 Cylinders
- A — Heat Exchanger Cooled
- D — FM Approved
- K — UL Listed
- 0 — Power Curve Number
  - 5 — US EPA Tier 3 Certified
  - 8 — Built in USA

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Attachment 3

DOC Application Appendix D, Emission Calculations

AECOM

Prepared for:
Solar Millennium LLC and Chevron Energy Solutions
Palen Solar Power Project

Appendix D
Air Emissions Calculations

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Contents

Attachments

1.0 Introduction

This Appendix contains a description of the emission calculation methodologies and includes the emissions calculations for the operation of the Palen Solar Power Project (PSPP or Project). Criteria pollutant emissions of the PSPP are addressed in Section 2 and Toxic Air Contaminant (TAC) emissions are presented in Section 3. References are provided in Section 4. Tables showing emissions calculations and emissions summaries during Project operation are provided in Attachment 1.

2.0 Operating Criteria Pollutant Emissions

Criteria pollutant (NOx, SOx, CO, VOC, PM10, and PM2.5) emissions are estimated for normal Project operation. The emissions were calculated for each of the Project's two power plant units. For the purpose of this document, one power plant consists of one auxiliary boiler, one heat transfer fluid (HTF) heater, one emergency fire water pump engine, one emergency generator engine, one auxiliary cooling tower, one HTF ullage system, and solar piping. Each power plant unit will have identical emissions equipment, maximum usage, and corresponding emissions. The sections below describe the emissions calculations for each power plant unit.

In accordance with the South Coast Air Quality Management District (SCAQMD) permit application guidelines, the Maximum Hourly Uncontrolled (**MHU**), Maximum Hourly Controlled (**MHC**), Maximum Daily Uncontrolled (**MDU**), Maximum Daily Controlled (**MDC**), Average Hourly Controlled (**AHC**), Average Hourly Uncontrolled (**AHU**), Annual Average (**AA**) and 30-Day Average (**30-DA**) emissions are calculated for each emissions source.

2.1 Auxiliary Boiler Criteria Pollutant Emissions

The assumptions made regarding the auxiliary boiler operation that were used as the basis for emission calculations include:

- One 35 Million British Thermal Units (MMBtu) per hour auxiliary boiler per power plant unit;
- Liquefied Petroleum Gas (LPG or propane) will be the only fuel used by the boiler;
- The auxiliary boiler will be equipped with an ultra-low-NOx burner and will be operated with good combustion practices;
- Maximum daily operation of the auxiliary boiler is limited to 15 hours per day at 25 percent load and two hours per day at full load;
- Annual operation of the auxiliary boiler is 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 uncontrolled emissions are equivalent to maximum controlled emissions since the auxiliary boiler does not utilize add-on controls.

The emission factors used for the NOx and CO emission estimates are based on the Best Available Control Technology (BACT) Determination (see **Appendix E**). The PM10 and VOC emission factors are based on vendor guaranteed emission factors, and the SOx emission factor was taken from the SCAQMD 2008 Annual Emission Report General Instruction Book for External LPG combustion (SCAQMD, 2009). The emission factors and corresponding emissions are presented in the Tables D-1a and b in Attachment 1.

2.1.1 NOx and CO Emission Calculations

Emissions of NOx and CO are estimated based on the pollutant concentration in the stack discharge. The volumetric stack flow rate is determined using the "F-factor" (i.e., the volume of exhaust gas from the combustion of 1.0 MMBtu of propane) of 8,710 standard cubic feet per MMBtu (scf/MMBtu) taken from 40 Code of Federal Regulations (CFR) Part 60, Appendix A-7, Method 20, with the appropriate correction (for

oxygen (O_2) content (three percent). The volumetric flow is used to convert the proposed BACT limit from units of parts per million by volume (ppmv) to an emission factor in units of pounds per MMBtu (lb/MMBtu). The emission factor is calculated using Equation 2-1:

$$EF\ (lb/MMBtu) = (ppmv/10^6) \times (F\text{-factor}) \times (O_2\ Corr) \times (MW/MV) \quad \text{(Eq. 2-1)}$$

Where: EF = emission factor
ppmv = concentration of the pollutant in the stack
F-factor = volume of exhaust gas from the combustion of 1.0 MMBtu of propane gas
= 8,710 scf/MMBtu
O_2 Corr = Correction for excess O_2 content (20.9/[20.9 - $\%O_2$])
MW = molecular weight of the species (NOx = 46 lb/mole, CO = 28 lb/mole)
MV = molar volume of gas at standard conditions (379 dscf/mole)

Maximum Hourly Uncontrolled and Controlled (MHU/MHC) Emissions

The maximum hourly emissions will be calculated based on one hour of operation at a full load according to Equation 2-2.

MHU/MHC (lb/hr) = EF x heat rate of boiler [MMBtu/hr] (Eq. 2-2)

Maximum Daily Uncontrolled and Controlled (MDU/MDC) Emissions

The maximum daily emissions are based on 15 hours of operation per day at 25 percent load and one hour at full load, according to Equation 2-3.

MDU/MDC (lb/day) = (**MHU/MHC** x 15 hr/day x 0.25) + (**MHU/MHC** x 2 hr/day) (Eq. 2-3)

Average Annual (AA) Emissions

The annual average emissions are based on 5,000 hours per year of operation with a heat duty cycle of 10 percent at full load and 90 percent at 25 percent load according to Equation 2-4.

AA (lb/yr) = EF x heat rate of boiler [MMBtu/hr] x 5,000 hr/yr x ((0.10 x 1) + (0.90 x 0.25)) (Eq. 2-4)

Average Hourly Uncontrolled and Controlled (AHU/AHC) Emissions

The average hourly emissions are determined by annual average emissions divided by the total number of hours in a year, according to Equation 2-5.

AHU/AHC (lb/hr) = **AA** ÷ 8,760 hr/yr (Eq. 2-5)

30-Day Average (30-DA) Emissions

The 30-day average emissions are calculated as the MDC multiplied by an adjustment factor for days per month of operation. The operation is seven days per week; the appropriate adjustment factor is 30/30. The 30-day average emissions are calculated using Equation 2-6.

30-DA = MDU/MDC x adjustment factor (30/30) (Eq. 2-6)

2.1.2 VOC, PM10, and PM2.5 Emission Calculations

BACT proposed for VOC and PM10 emissions is the use of LPG and good combustion practice. Emission estimates are based on vendor guaranteed emissions factors for the boiler. The emission factors were presented on an energy basis, and no conversion was necessary to estimate the emissions with the use of Equations 2-2, 2-3, 2-4, 2-5, and 2-6 to calculate the maximum hourly (**MHU/MHC**), maximum daily (**MDU/MDC**), average annual (**AA**), average hourly (**AHU/AHC**), and 30-day average (**30-DA**), respectfully, for both VOC and PM10 emissions. It was assumed that the PM2.5 emissions are equivalent to the PM10 emissions.

2.1.3 SOx Emission Calculations

Emission estimates are based on the SCAQMD SOx emission factor for LPG combustion (SCAQMD, 2009). The emission factor was converted from a fuel rate basis to an energy basis using a heating value of 91.5 MMBtu/10^3 gal (EPA, 2008), according to Equation 2-7.

$$EF\ (lb/MMBtu) = EF'\ (lb/10^3\ gal) \div 91.5\ MMBtu/10^3\ gal \qquad \text{(Eq. 2-7)}$$

Where: EF = emission factor (lb/MMBtu)
EF' = AP-42 Emission Factor for LPG Combustion (lb/10^3 gal)

The maximum hourly (**MHU/MHC**), maximum daily (**MDU/MDC**), average annual (**AA**), average hourly (**AHU/AHC**), and 30-day average (**30-DA**) SOx emissions were calculated similar to the CO and NOx emissions using Equations 2-2, 2-3, 2-4, 2-5, and 2-6, respectively.

2.2 HTF Heater Criteria Pollutant Emissions

The assumptions made regarding the HTF heater operation that were used as the basis for emission calculations include:

- One 35 MMBtu per hour HTF heater per power plant unit;
- LPG will be the only fuel used by the heater;
- The HTF heater will be equipped with an ultra-low-NO_X burner and will be operated with good combustion practice;
- The HTF heater will operate for a maximum of 10 hours per day and 500 hours per year;
- 100 percent of the PM10 emissions are PM2.5; and
- Maximum uncontrolled emissions are equivalent to maximum uncontrolled emissions since the auxiliary boiler does not utilize add-on controls.

The emissions for the HTF heater are similar to the emissions for the auxiliary boiler. The emission factors used for the NOx and CO emission estimates are based on the BACT Determination (see **Appendix E**). The PM10 and VOC emission factors are based on vendor guaranteed emission factors, and the SOx emission factor was taken from the SCAQMD 2008 Annual Emission Report General Instruction Book for External LPG combustion (SCAQMD, 2009). The emission factors and corresponding emissions are presented in the Tables D-1a through c in Attachment 1.

2.2.1 NOx and CO Emission Calculations

Emissions of NOx and CO are estimated based on pollutant concentration in the stack discharge using an "F-Factor" as shown in Equation 2-1.

Maximum Hourly Uncontrolled and Controlled (MHU/MHC) Emissions

The maximum hourly emissions will be calculated based on one hour of operation at full load according to Equation 2-2.

Maximum Daily Uncontrolled and Controlled (MDU/MDC) Emissions

The maximum daily emissions are based on 10 hours of operation per day at full load, according to Equation 2-8.

MDU/MDC (lb/day) = EF x heat rate x 10 hr/day (Eq. 2-8)

Average Annual (AA) Emissions

The annual average emissions are based on 500 hours of operation per year at full load using Equation 2-9.

AA (lb/yr) = EF x heat rate x 500 hr/yr (Eq. 2-9)

The average hourly (**AHU/AHC**) emissions and the 30-day average (**30-DA**) emissions are calculated using Equations 2-5 and 2-6, respectively.

2.2.2 VOC, PM10, and PM2.5 Emission Calculations

Emission estimates are based on vendor guaranteed emissions factors for the heater. The emission factors were presented on an energy basis, and no conversion was necessary to estimate the emissions using Equations 2-2, 2-8, 2-9, 2-5, and 2-6 to calculate the maximum hourly (**MHU/MHC**), maximum daily (**MDU/MDC**), average annual (**AA**), average hourly (**AHU/AHC**), and 30-day average (**30-DA**), respectively, for VOC and PM10 emissions. It was assumed that the PM2.5 emissions are equal to the PM10 emissions.

2.2.3 SOx Emission Calculations

Emission estimates are based on the SCAQMD SOx emission factor for LPG combustion (SCAQMD, 2009). The emission factor was calculated using Equation 2-7. The maximum hourly (**MHU/MHC**), maximum daily (**MDU/MDC**), average annual (**AA**), average hourly (**AHU/AHC**), and 30-day average (**30-DA**) SOx emissions were calculated using Equations 2-2, 2-8, 2-9, 2-5, and 2-6, respectively.

2.3 Emergency Diesel-Fired Engine Emissions

The assumptions made regarding the emergency fire water pump and the emergency generator engine operation used as the basis for emission calculations include:

- One 300-horsepower (hp) diesel-fired fire water pump engine per power plant unit;
- One 300-hp diesel-fired emergency generator engine per power plant unit;
- The fire water pump engine is a 2009 model year Tier 3 engine;
- The emergency generator engine is a 2009 model year Tier 3 engine;

- Both engines will only use ultra-low sulfur diesel fuel;
- The fire water pump engine will be operated for one one-hour test per week, not to exceed 50 hours per year;
- The emergency generator engine will be operated for one one-hour test per week, not to exceed 50 hours per year;
- Emissions from engines do not reflect emergency use;
- 100 percent of the PM10 emissions are PM2.5; and
- Maximum controlled emissions are equivalent to maximum uncontrolled emissions since the emergency engines do not utilize add-on controls.

Emission estimates for NOx, CO, VOC and PM10 are based on New Source Performance Standard (NSPS) Subpart IIII compliance for stationary fire pump engines and stationary non-fire pump engines of 300 horsepower or more constructed after 2009. Under these standards, the emission limits for NOx is combined with non-methane hydrocarbons (NMHC). For these emission estimates, the NOx fraction is assumed to be 95 percent of the combined emissions, and the balance NMHC (ARB, 2003). NMHC is assumed to be equivalent to VOC. The calculation procedure for NOx, CO, PM10, and VOC are similar to one another, only the emission factors differ between the calculations. These emission factors and corresponding emissions are presented in Tables D-2a through e in Attachment 1.

The procedure used to estimate SOx emissions differs from the other criteria pollutants. Emission estimates for SOx are based on estimated fuel use and fuel sulfur content. Fuel consumption is estimated based on the EPA default fuel consumption rate of 7,000 Btu/hp-hr (EPA, 1996), and the fuel sulfur content is assumed to be 15 parts per million by weight (ppmw) based on the use of ultra-low sulfur diesel.

2.3.1 NOx, CO, VOC, PM10 and PM2.5 Emission Calculations

The daily emissions are based on operating each engine one hour per day at full load for readiness testing. The engine will be operated no more than once per day for testing; therefore, the daily emissions are equal to the hourly emissions. The engine use will be limited to 50 hours per year for maintenance and testing. The maximum hourly (**MHU/MHC**) emissions are calculated using Equation 2-10, the maximum daily calculations (**MDU/MDC**) are calculated using Equation 2-11, and the average annual (**AA**) emissions are calculated using Equation 2-12. The average hourly (**AHU/AHC)** and the 30-day average (**30-DA**) emissions are calculated using Equations 2-5 and 2-6, respectively. These emissions estimates do not include emissions from emergency operations.

Maximum Hourly Uncontrolled and Controlled (MHU/MHC) Emissions

The maximum hourly emissions are calculated according to Equation 2-10.

MHU/MHC (lb/hr) = EF x hp x ÷ conv. factor (lb/g) (Eq. 2-10)

Maximum Daily Uncontrolled and Controlled (MDU/MDC) Emissions

Because engine testing will be operated no more than once per day for one hour, the maximum daily emissions are equal to the hourly emissions.

MDU/MDC (lb/day) = **MHU/MHC** x 1 hour/day (Eq. 2-11)

Average Annual (AA) Emissions

The annual average emissions are determined by multiplying the maximum hourly emissions by the annual hours of operation. The engines will be limited to 50 hours per year for maintenance and testing.

AA (lb/yr) = **MHU/MHC** x 50 hr/yr (Eq. 2-12)

The average hourly (**AHU/AHC**) emissions and the 30-day average (**30-DA**) emissions are calculated using Equations 2-5 and 2-6, respectively.

2.3.2 SOx Emission Calculations

SOx emissions are based on fuel use and fuel sulfur content of 15 ppmw. Fuel use is estimated based on the engine horsepower and the default fuel usage rate, according to Equation 2-13.

Fuel = hp x default fuel use rate / heating value of fuel (Eq. 2-13)

All of the fuel sulfur is assumed to form SOx, calculated as sulfur dioxide SO_2.

Maximum Hourly Uncontrolled and Controlled (MHU/MHC) Emissions

Hourly emissions are calculated according to Equation 2-14.

MHU/MHC (lb/hr) = fuel x density x duration x sulfur content x weight ratio (SO_2 to sulfur) (Eq. 2-14)

The maximum daily (**MDU/MDC**), annual average (**AA**), average hourly (**AHU/AHC**), and 30-day average (**30-DA**) sulfur emissions are calculated similar to the NOx, CO, VOC, and PM10 emissions using Equations 2-11, 2-12, 2-5, and 2-6, respectively.

2.4 HTF Ullage System Vent Emissions

The total uncontrolled VOC emissions from the HTF expansion tank/ullage system vent were estimated based on data provided by the engineering contractor. The assumptions made regarding the HTF ullage system vent emissions for each power plant unit used that were used as the basis for emission calculations include:

- One HTF ullage system per power plant unit;
- The VOC emissions are controlled with the use of two carbon adsorption canisters in series with an overall control efficiency of 98 percent;
- Controlled VOC emissions would be limited to a maximum 0.75 lb/hr and 1.5 lb/day;
- The HTF ullage system would be vented a maximum of 2 hours per day; and
- The maximum annual operation (i.e., venting) would be limited to 400 hours per year.

The hourly and daily emissions and the control efficiency of the carbon adsorption canisters were used to calculate the emissions. Emission calculations are shown in Tables D-3a and b.

Maximum Hourly Controlled (MHC) Emissions

VOC emissions are limited to a maximum of 0.75 lb/hr following emissions control; the maximum hourly controlled emissions are shown in Equation 2-15.

MHC (lb/hr) = 0.75 lb/hr (Eq. 2-15)

Maximum Hourly Uncontrolled (MHU) Emissions

Because the VOC emissions were approximated following emissions control, hourly emissions were divided the control efficiency of the carbon canisters to estimate the uncontrolled emissions using Equation 2-16.

MHU (lb/hr) = **MHC** ÷ (1 - control efficiency) (Eq. 2-16)

Maximum Daily Controlled (MDC) Emissions

VOC emissions are limited to a maximum of 1.5 lb/day following emissions control; the maximum daily controlled emissions are shown using Equation 2-17.

MHC (lb/day) = 1.5 lb/day (Eq. 2-17)

Maximum Daily Uncontrolled (MDU) Emissions

Because the VOC emissions were approximated following emissions control, daily controlled emissions were divided the control efficiency of the carbon canisters to estimate the uncontrolled emissions using Equation 2-18.

MDU (lb/hr) = **MDC** ÷ (1 – control efficiency) (Eq. 2-18)

Average Annual (AA) Emissions

The annual average emissions are based on 0.75 lb/hr of VOC emissions, with the HTF ullage system vented a maximum of 400 hours per year. The annual average emissions are calculated using Equation 2-19.

AA (lb/yr) = **MHC** x 400 hr/yr (Eq. 2-19)

Average Hourly Controlled (AHC) Emissions

The average hourly controlled emissions are determined by annual average emissions divided by the total number of hours in a year using Equation 2-20.

AHC(lb/hr) = **AA** ÷ 8,760 hr/yr (Eq. 2-20)

Average Hourly Uncontrolled (AHU) Emissions

The average hourly uncontrolled emissions are determined from the average hourly controlled emissions divided by control efficiency of the carbon canisters. This is shown in Equation 2-21.

AHU (lb/hr) = **AHC** ÷ (1 – control efficiency) (Eq. 2-21)

The 30-day average (**30-DA**) emissions are calculated using Equation 2-6.

2.5 Fugitive VOC Emissions

The assumptions made regarding the fugitive emissions from the HTF piping network for each power plant unit that were used as the basis for emission calculations include:

- Fugitive emissions from the HTF piping network consist of VOCs only;
- Fugitive emissions can occur 24 hours per day and 365 days per year;
- Components counts are estimated based on similar solar projects;
- Each HTF expansion tank and HTF overflow tank is equipped with pressure relief valves; and
- Maximum controlled emissions are equivalent to maximum uncontrolled emissions because fugitive components do not use add-on controls.

The fugitive emissions are calculated based on the number of fugitive components (such as pumps, seals, flanges, and valves) and an emission factor. The fugitive emission factors were taken from the EPA 1995 Protocol for Equipment Leak Emission Estimates for Oil and Gas Production (EPA, 1995b). Since the HTF has a very low vapor pressure, the values for "Heavy Oil" were used to calculate the emissions. The emissions were calculated for each component type and the emissions from all of the components were summed to derive the fugitive emissions for the power plant unit. The component counts and emission factors are presented in Table D-4a; the fugitive emissions are presented in Table D-4b.

Average and Maximum Hourly Uncontrolled and Controlled (AHC/AHU and MHU/MHC) Emissions

Since it was assumed that fugitive emissions can occur 24 hours per day and 365 hours per year, the average hourly and maximum hourly emissions are equal. The hourly emissions were calculated according Equation 2-25:

MHU/MHC (lb/hr) = EF_f x Components (Eq. 2-22)

Where: EF_f = Fugitive emission factor (kg/hr/component)
Components = Number of components in the solar field of one power plant unit

Maximum Daily Uncontrolled and Controlled (MDU/MDC) Emissions

Because fugitive emissions can occur anytime in the 24 hour period of a day, the maximum daily emissions are equal to the maximum hourly emissions multiplied by 24 hours per day using Equation 2-23.

MDU/MDC (lb/day) = **MHU/MHC** x 24 hr/day (Eq. 2-23)

Average Annual (AA) Emissions

The annual average emissions are determined by multiplying the maximum hourly emissions by the annual hours of operation. It was assumed that fugitive emissions could occur 24 hour per day and 365 days per year for a total of 8,760 hours per year. The average annual emissions are calculated using Equation 2-24.

AA (lb/yr) = **MHU/MHC** x 8,760 hr/yr (Eq. 2-24)

The 30-day average (**30-DA**) emissions are calculated using Equation 2-6.

2.6 HTF Waste Loadout Emissions

The high boiling point organic compounds ("high-boilers") that are byproducts of HTF degradation will be drained and collected in a waste collecting tank that is regularly emptied and hauled away from the facility. Since the HTF has a negligible vapor pressure at atmospheric conditions, it is assumed that the high-boiler will also have a negligible vapor pressure and the emissions that would be associated with waste loadout are negligible. Criteria pollutant and TAC emissions have not been calculated for waste loadout.

2.7 Land Treatment Unit Emissions

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.

2.8 Summary of Criteria Pollutant Emissions

The Project consists of two identical 250-megawatt power plant units. The emissions from each power plant unit and the emissions from on-site vehicles were combined to calculate the total on-site Project emissions. The on-site emissions for the Project in the SCAQMD permit application units (e.g., AHU, AHC, etc.) are presented by source type in Table D-5a through h in Attachment 1. A summary of the criteria pollutant emissions for the Project is presented in Table D-5i.

3.0 Toxic Air Contaminant Emissions

TAC emissions are estimated for normal operation of each power plant unit. The TAC emissions from the auxiliary boiler, HTF heater, emergency fire water pump engine, emergency generator engine, auxiliary cooling tower, and HTF ullage system were calculated for each power plant unit and the emissions from both units were combined to determine the total TAC emissions for the Project. The Maximum Hourly Controlled (**MHC**), Maximum Hourly Uncontrolled (**MHU**), and Maximum Annual Controlled (**MAC**) emissions were calculated for each source of TACs, in accordance with SCAQMD permit application guidance.

3.1 Auxiliary Boiler and HTF Heater TAC Emission Calculations

AP-42 does not provide TAC emission factors for the combustion of LPG, so the TAC emissions from the auxiliary boiler and HTF heater are estimated based on EPA AP-42 emission factors for natural gas combustion. These emission factors were adjusted for LPG usage by dividing the emission factors by the estimated heat content of 1,020 MMBtu/scf for natural gas to convert the emission factors to an energy basis (EPA, 1998).

For each pollutant, the maximum hourly uncontrolled and controlled (**MHU/MHC**) emissions are calculated according to Equation 2-2. Maximum annual (**MAC**) emissions are calculated by multiplying the hourly emission rate by the maximum annual hours of operation according to Equations 2-3 and 2-8 for the auxiliary boiler and the HTF heater, respectively. The emission factors and corresponding emissions are shown in Table D-6 in Attachment 1.

3.2 Emergency Engine TAC Emission Calculations

TAC emissions from the fire water pump and the emergency generator engines for each power plant unit were quantified for routine testing and maintenance operation, which will be limited to no more than 50 hours per year per engine. Emissions were not calculated for emergency use.

The TAC emissions were characterized as aggregate particulate emissions (diesel particulate matter [DPM]) from diesel-fired engines (OEHHA, 2003). The DPM emissions are assumed to be equal to the PM10 emissions, which were calculated using Equations 2-10 and 2-12.

3.3 HTF Ullage System TAC Emissions

The total uncontrolled TAC emissions from the HTF ullage tank vent were estimated based on data provided by an existing solar plant and extrapolated to account for HTF system size. Controlled emissions were calculated based on the use of two carbon adsorption canisters in series with an overall control efficiency of 98 percent. The TAC emissions were approximated as 99.99 percent benzene, and 0.01 percent of the total emissions for biphenyl. Phenol emissions were considered negligible. These emissions are presented in Table D-7 in Attachment 1.

3.4 HTF Fugitive TAC Emissions

The HTF ullage system was designed to remove the degraded HTF products from the HTF system. Since the amount TACs removed from the system daily (i.e., through the ullage system vent) is negligible in comparison to the total quantity of HTF in the piping system, it was assumed that the fugitive emissions would consist of

HTF vapors only. All TAC emissions from degraded HTF exit the system through the HTF ullage vent, and there are no fugitive TAC emissions.

3.5 Summary of TAC Emissions

Operational TAC emissions were calculated for each power plant unit, and TAC emissions for the two power plant units were totaled to provide total TAC emissions for the Project. The individual unit TAC emissions and the total Project TAC emissions are shown in Tables D-8a and b in Attachment 1.

4.0 References

40 Code of Federal Regulations (CFR) Part 60, Appendix A-7, Method 20

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ATTACHMENT 1

OPERATION EMISSIONS TABLES

Summary of TAC Emissions

Table D-8a Summary of TAC Emissions for One Power Plant Unit

Pollutant	Auxiliary Boiler		HTF Heater		Fire Water Pump		Generator		HTF Vent			Total		
	Maximum Hourly (lb/hr)	Maximum Annual (lb/yr)	Maximum Hourly (lb/hr)	Maximum Annual (lb/yr)	Maximum Hourly (lb/hr)	Maximum Annual (lb/yr)	Maximum Hourly (lb/hr)	Maximum Annual (lb/yr)	Maximum Hourly Uncontrolled (lb/hr)	Maximum Hourly Controlled (lb/hr)	Maximum Annual (lb/yr)	Maximum Hourly Uncontrolled (lb/hr)	Maximum Hourly Controlled (lb/hr)	Maximum Annual (lb/yr)
7,12-Dimethylbenz(a)anthracene	5.49E-07	8.92E-04	5.49E-07	2.75E-04	---	---	---	---	---	---	---	1.10E-06	1.10E-06	1.17E-03
Acenaphthene	6.18E-08	1.00E-04	6.18E-08	3.09E-05	---	---	---	---	---	---	---	1.24E-07	1.24E-07	1.31E-04
Acenaphthylene	6.18E-08	1.00E-04	6.18E-08	3.09E-05	---	---	---	---	---	---	---	1.24E-07	1.24E-07	1.31E-04
Anthracene	8.24E-08	1.34E-04	8.24E-08	4.12E-05	---	---	---	---	---	---	---	1.65E-07	1.65E-07	1.75E-04
Benz(a)anthracene	6.18E-08	1.00E-04	6.18E-08	3.09E-05	---	---	---	---	---	---	---	1.24E-07	1.24E-07	1.31E-04
Benzene	7.21E-05	1.17E-01	7.21E-05	3.60E-02	---	---	---	---	3.75E+01	7.50E-01	3.00E+02	3.75E+01	7.50E-01	3.00E+02
Benzo(a)pyrene	4.12E-08	6.69E-05	4.12E-08	2.06E-05	---	---	---	---	---	---	---	8.24E-08	8.24E-08	8.75E-05
Benzo(b)fluoranthene	6.18E-08	1.00E-04	6.18E-08	3.09E-05	---	---	---	---	---	---	---	1.24E-07	1.24E-07	1.31E-04
Benzo(g,h,i)perylene	4.12E-08	6.69E-05	4.12E-08	2.06E-05	---	---	---	---	---	---	---	8.24E-08	8.24E-08	8.75E-05
Benzo(k)fluoranthene	6.18E-08	1.00E-04	6.18E-08	3.09E-05	---	---	---	---	---	---	---	1.24E-07	1.24E-07	1.31E-04
Biphenyl	---	---	---	---	---	---	---	---	3.75E-03	7.50E-05	3.00E-02	3.75E-03	7.50E-05	3.00E-02
Chrysene	6.18E-08	1.00E-04	6.18E-08	3.09E-05	---	---	---	---	---	---	---	1.24E-07	1.24E-07	1.31E-04
Dibenz(a,h)anthracene	4.12E-08	6.69E-05	4.12E-08	2.06E-05	---	---	---	---	---	---	---	8.24E-08	8.24E-08	8.75E-05
Dichlorobenzene	4.12E-05	6.69E-02	4.12E-05	2.06E-02	---	---	---	---	---	---	---	8.24E-05	8.24E-05	8.75E-02
Diesel Particulate Matter	---	---	---	---	9.91E-02	4.96E+00	9.91E-02	4.96E+00	---	---	---	1.98E-01	1.98E-01	9.91E+00
Fluoranthene	1.03E-07	1.67E-04	1.03E-07	5.15E-05	---	---	---	---	---	---	---	2.06E-07	2.06E-07	2.19E-04
Formaldehyde	2.57E-03	4.18E+00	2.57E-03	1.29E+00	---	---	---	---	---	---	---	5.15E-03	5.15E-03	5.47E+00
Hexane	6.18E-02	1.00E+02	6.18E-02	3.09E+01	---	---	---	---	---	---	---	1.24E-01	1.24E-01	1.31E+02
Indeno(1,2,3-cd)pyrene	6.18E-08	1.00E-04	6.18E-08	3.09E-05	---	---	---	---	---	---	---	1.24E-07	1.24E-07	1.31E-04
Naphthalene	2.09E-05	3.40E-02	2.09E-05	1.05E-02	---	---	---	---	---	---	---	4.19E-05	4.19E-05	4.45E-02
Phenanthrene	5.83E-07	9.48E-04	5.83E-07	2.92E-04	---	---	---	---	---	---	---	1.17E-06	1.17E-06	1.24E-03
Pyrene	1.72E-07	2.79E-04	1.72E-07	8.58E-05	---	---	---	---	---	---	---	3.43E-07	3.43E-07	3.65E-04
Toluene	1.17E-04	1.90E-01	1.17E-04	5.83E-02	---	---	---	---	---	---	---	2.33E-04	2.33E-04	2.48E-01
Total												**3.78E+01**	**1.08E+00**	**4.47E+02**

Summary of TAC Emissions

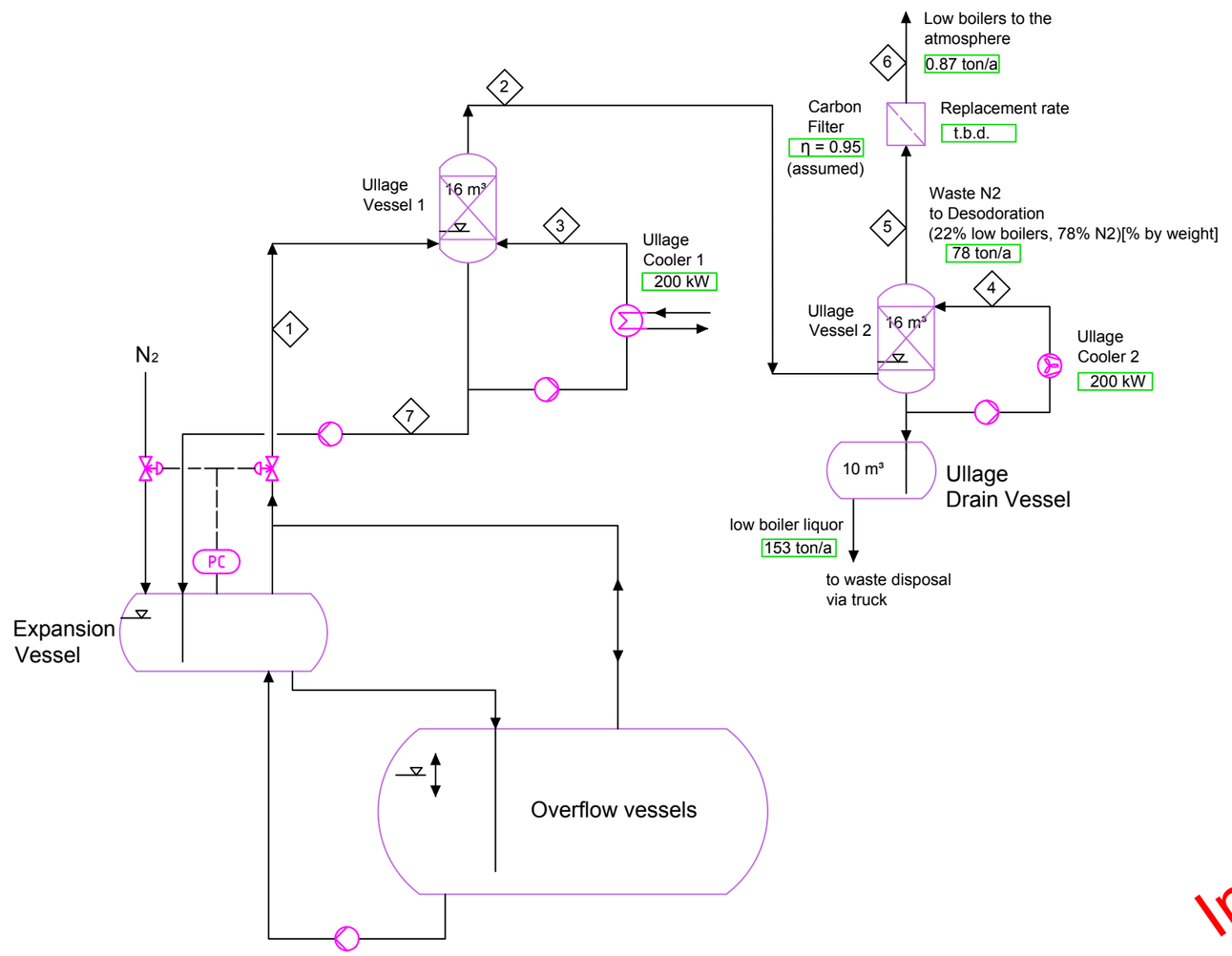
Table D-8b Summary of Project TAC Emissions1

Pollutant	Auxiliary Boilers		HTF Heaters		Fire Water Pumps		Generators		HTF Vents			Total		
	Maximum Hourly (lb/hr)	Maximum Annual (lb/yr)	Maximum Hourly (lb/hr)	Maximum Annual (lb/yr)	Maximum Hourly (lb/hr)	Maximum Annual (lb/yr)	Maximum Hourly (lb/hr)	Maximum Annual (lb/yr)	Maximum Hourly Uncontrolled (lb/hr)	Maximum Hourly Controlled (lb/hr)	Maximum Annual (lb/yr)	Maximum Hourly Uncontrolled (lb/hr)	Maximum Hourly Controlled (lb/hr)	Maximum Annual (lb/yr)
7,12-Dimethylbenz(a)anthracene	1.10E-06	1.78E-03	1.10E-06	5.49E-04	---	---	---	---	---	---	---	2.20E-06	2.20E-06	2.33E-03
Acenaphthene	1.24E-07	2.01E-04	1.24E-07	6.18E-05	---	---	---	---	---	---	---	2.47E-07	2.47E-07	2.63E-04
Acenaphthylene	1.24E-07	2.01E-04	1.24E-07	6.18E-05	---	---	---	---	---	---	---	2.47E-07	2.47E-07	2.63E-04
Anthracene	1.65E-07	2.68E-04	1.65E-07	8.24E-05	---	---	---	---	---	---	---	3.29E-07	3.29E-07	3.50E-04
Benz(a)anthracene	1.24E-07	2.01E-04	1.24E-07	6.18E-05	---	---	---	---	---	---	---	2.47E-07	2.47E-07	2.63E-04
Benzene	1.44E-04	2.34E-01	1.44E-04	7.21E-02	---	---	---	---	7.50E+01	1.50E+00	6.00E+02	7.50E+01	1.50E+00	6.00E+02
Benzo(a)pyrene	8.24E-08	1.34E-04	8.24E-08	4.12E-05	---	---	---	---	---	---	---	1.65E-07	1.65E-07	1.75E-04
Benzo(b)fluoranthene	1.24E-07	2.01E-04	1.24E-07	6.18E-05	---	---	---	---	---	---	---	2.47E-07	2.47E-07	2.63E-04
Benzo(g,h,i)perylene	8.24E-08	1.34E-04	8.24E-08	4.12E-05	---	---	---	---	---	---	---	1.65E-07	1.65E-07	1.75E-04
Benzo(k)fluoranthene	1.24E-07	2.01E-04	1.24E-07	6.18E-05	---	---	---	---	---	---	---	2.47E-07	2.47E-07	2.63E-04
Biphenyl	---	---	---	---	---		---	---	7.50E-03	1.50E-04	6.00E-02	7.50E-03	1.50E-04	6.00E-02
Chrysene	1.24E-07	2.01E-04	1.24E-07	6.18E-05	---	---	---	---	---	---	---	2.47E-07	2.47E-07	2.63E-04
Dibenz(a,h)anthracene	8.24E-08	1.34E-04	8.24E-08	4.12E-05	---	---	---	---	---	---	---	1.65E-07	1.65E-07	1.75E-04
Dichlorobenzene	8.24E-05	1.34E-01	8.24E-05	4.12E-02	---	---	---	---	---	---	---	1.65E-04	1.65E-04	1.75E-01
Diesel Particulate Matter	---	---	---	---	1.98E-01	9.91E+00	1.98E-01	9.91E+00	---	---	---	3.96E-01	3.96E-01	1.98E+01
Fluoranthene	2.06E-07	3.35E-04	2.06E-07	1.03E-04	---	---	---	---	---	---	---	4.12E-07	4.12E-07	4.38E-04
Formaldehyde	5.15E-03	8.36E+00	5.15E-03	2.57E+00	---	---	---	---	---	---	---	1.03E-02	1.03E-02	1.09E+01
Hexane	1.24E-01	2.01E+02	1.24E-01	6.18E+01	---	---	---	---	---	---	---	2.47E-01	2.47E-01	2.63E+02
Indeno(1,2,3-cd)pyrene	1.24E-07	2.01E-04	1.24E-07	6.18E-05	---	---	---	---	---	---	---	2.47E-07	2.47E-07	2.63E-04
Naphthalene	4.19E-05	6.80E-02	4.19E-05	2.09E-02	---	---	---	---	---	---	---	8.37E-05	8.37E-05	8.90E-02
Phenanthrene	1.17E-06	1.90E-03	1.17E-06	5.83E-04	---	---	---	---	---	---	---	2.33E-06	2.33E-06	2.48E-03
Phenol	3.43E-07	5.58E-04	3.43E-07	1.72E-04	---	---	---	---	---	---	---	6.86E-07	6.86E-07	7.29E-04
Pyrene	2.33E-04	3.79E-01	2.33E-04	1.17E-01	---	---	---	---	---	---	---	4.67E-04	4.67E-04	4.96E-01
Toluene	---	---	---	---	1.98E-01	9.91E+00	1.98E-01	9.91E+00	---	---	---	3.96E-01	3.96E-01	1.98E+01
Total												**7.61E+01**	**2.55E+00**	**9.14E+02**

Attachment 4

Process Flow Diagram, Ullage System

No.			1	2	3	4	5	6	7
Medium			N2/HTF	N2/Low Boilers	HTF	Low Boilers	N2/Low Boilers	N2/Low Boilers	HTF
Mass Flow	100%	kg/s	0 - 0.4	0 - 0,4	0.005	0.005	0 - 0.12	0 - 0.09	0 - 0.003
Density		kg/m3			1014	870			1014
Pressure		barg	0.6	0.6					
Temperature		°C	300	80	80	30	30	30	80



NOTE: -TOTAL ANNUAL VENTING TIME WILL BE 182,5 h/a
-ALL UNITS ARE METRIC

FOR PERMITS

Solar Millennium LLC

Rev.:	Description	Date	Drawn	Designed	Checked	Approved	Engineering
02	GENERAL REVISION	2010-01-13	SL	FL	DT	HK	
01	GENERAL REVISION	2009-12-03	VG	FL	FG	UH	

CAD File: PD1_GEN_GEN_PRO_002_00 | First Created: 2009-11-30 | VG | FL | FG | UH

Scale: | Original Size: DIN A2

FlagSol GmbH
Agrippinawerft 22
D-50678 Köln
Tel.: +49 221 925 970 0
Fax: +49 221 925 970 99

Project: Palen Solar Power Plant
Location: Palen Dry Lake
Document Title: Schematic Process Flow Diagram
Ullage-System
block diagram
Customer Doc - ID:
Sheet: 1 of 1

Attachment 2
SCAQMD Confirmation of Blythe Meteorological Data

From: Jillian Baker [mailto:jbaker@aqmd.gov]
Sent: Friday, January 29, 2010 2:16 PM
To: Hamel, Richard
Cc: Tom Chico; Ken Coats
Subject: RE: Palen Solar Power Project - Met Data Selection

Hi Rich,

I reviewed the modeling performed for the HRA. The meteorological data was developed using AERMET and consistent with US EPA methodology. Three years of meteorological data (2002 to 2004) were used instead of five years, due to problems in the raw data for 2005 and 2006. This is acceptable for SCAQMD permitting purposes since the surface conditions at the airport were shown to be consistent with the project site using AERSURFACE.

Please feel free t contact me with any further questions.

Jillian Baker, Ph.D.
South Coast AQMD
21865 Copley Drive,
Diamond Bar, CA 91765
Direct: 909.396.3176

From: Hamel, Richard [mailto:richard.hamel@aecom.com]
Sent: Thursday, January 21, 2010 7:06 AM
To: Jillian Baker
Subject: RE: Palen Solar Power Project - Met Data Selection

Hi Jillian,

I'm just checking in on the status of confirmation that using Blythe Airport for the PSPP criteria pollutant analysis was acceptable, and that there are no sources within 6 miles of the PSPP project site that emit more than 5 tpy of any criteria pollutant. I believe per our phone conversation we concluded that Blythe was OK for the met data and that indeed there was nothing within 6 miles to worry about, but we need formal confirmation in order to respond to CEC comments. If you'd like I'll resend the emails with those two requests for you to respond to.

Thanks,

Rich Hamel

Richard Hamel
Air Quality Meteorologist
Environment
D 978.589.3275
richard.hamel@aecom.com

From: Jillian Baker [mailto:jbaker@aqmd.gov]
Sent: Tuesday, January 12, 2010 6:52 PM
To: Hamel, Richard
Cc: Tom Chico; Ken Coats
Subject: RE: Palen Solar Power Project - Met Data Selection

Hi Rich,

I have a few questions for you:

1) In the electronic files you provided, under the AERSURFACE folder, there are two folders – one for Blythe Airport and another for Palen. Can you please explain why two AERSURFACE runs were performed?
2) Currently, I only have the HRA for review and there is no discussion in the HRA as to how the met data was developed and the assumptions used, as well as an explanation of why met data from Blythe Airport is appropriate for the Palen site. If this information is in another section of the submittal, can you please let me know where or provide me with the relevant pages of the report electronically.
3) You mentioned that you were also processing other projects in the vicinity of the project, which were outside of SCAQMD jurisdiction. Are you using the same met data set for all those sites? If not, can you please explain why.

Thanks,
Jillian Baker, Ph.D.
South Coast AQMD
21865 Copley Drive,
Diamond Bar, CA 91765
Direct: 909.396.3176

From: Hamel, Richard [mailto:richard.hamel@aecom.com]
Sent: Monday, January 04, 2010 1:55 PM
To: Jillian Baker
Subject: Palen Solar Power Project - Met Data Selection

I wanted to follow up on an email I sent last week, and also add an additional request. I will send the additional request in a separate email. We have a submittal due to CEC on Jan 6th (Wednesday) so the quicker the response, the better:

Jillian,

I am writing you with respect to meteorological data use for our AERMOD modeling analysis for the Palen Solar Power Project, located east of Desert Center, CA. In the early stages of the project (around July or August), my colleague Matthew Stresing had a telephone conversation with you asking whether it would be acceptable to use Blythe Airport as the surface station, because of its proximity and similarity to the project site. The nearest site for which SCAQMD has processed met data is Indio, which is not only about twice as far as Blythe Airport from the project, but also lies within a valley and would not be representative of the Palen site. Your response at the time was that it would be acceptable to use Blythe Airport as long as we properly justified its used in the modeling report submitted as part of the AFC for the project.

Could you please confirm the above to be correct? Please do not hesitate to contact me at the phone number below if you have any questions or concerns.

Thank you,

Richard Hamel
Air Quality Meteorologist
Environment
D 978.589.3275
richard.hamel@aecom.com

AECOM
2 Technology Park Drive, Westford, MA 01886-3140
T 978.589.3000 F 978.589.3100
www.aecom.com

Attachment 3
Public Record Request

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

Information Management
Public Records Unit

Direct Dial: (909) 396-3700
Fax:(909) 396-3330

ACKNOWLEDGEMENT LETTER

February 02, 2010

RUSSELL KINGSLEY
AECOM
1220 AVENIDA ACASO
CAMARILLO, CA 93012

Re: Request for Records
Control # 61462
Request: PROPOSED PALEN SOLAR POWER PROJECT INFORMATION

Your request for records has been received by the Public Records Unit and has been assigned for processing. When a thorough search for the requested records is complete, the records found will be provided to you in one of the following manners:

-- electronically by email or by an accessible link on line at no charge.
-- on CD and mailed to you along with an invoice for $10.00 per CD.
-- photocopied and mailed to you along with an invoice for the direct cost of duplication at $.15 per page over 10 pages.

If review of the requested records is preferred, Public Records staff will contact you once the records are gathered, to make an appointment for a mutually agreeable time for inspection of the documents.

Records requested which contain confidential or trade secret information, may require legal review and could delay the release of requested records.

Should you have any questions or need additional information, please do not hesitate to contact me, Tuesday through Friday, 8:00 a.m. to 4:30 p.m. Please reference your Control Number listed above in all communications and correspondence.

Sincerely,

RAFAEL VILLA x2049
For Colleen Paine
Public Records Coordinator

:rv

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

Information Management
Public Records Unit

Direct Dial: (909) 396-3700
FAX: (909) 396-3330

PUBLIC RECORDS REQUEST FORM

PRU Office Use Only
CONTROL NUMBER

ATTENTION REQUESTOR: To expedite your request for District records, please fill out this form completely, and identify specifically the type of records you are requesting. Please limit your request to one facility or one site address for each request form filed, and three requested items per form. Additional forms or pages can be used if requesting information for more than one facility or for records not identified on this form. Requests should reasonably describe identifiable records prepared, owned, used, or retained by the District. Public Records Unit staff is available to assist you in identifying those records in the District's possession. The District is not required by law to create a new record or list from an existing record.

REQUESTOR INFORMATION

NAME: **Russell Kingsley**		DATE: **February 2, 2010**
COMPANY: **AECOM**		
MAILING ADDRESS: **1220 Avenida Acaso**		
CITY: **Camarillo**	STATE: **CA**	ZIP CODE: **93012**
PHONE NUMBER: **805-388-3775**	FAX NUMBER: **805-388-3577**	
EMAIL ADDRESS: russ.kingsley@aecom.com		

REQUESTED RECORDS (*3 items per form*)

■ Applications (APPLS)	☐ Complaints	☐ Asbestos Notifications/Records
■ Permits to Operate (P/O)	☐ Site Inspection Reports (I/R)	☐ Facility Potential to Emit (PTE)
☐ Equipment List Report (EQL)	☐ Emissions Summary	☐ Facility Positive Balance (NSR)
☐ Notices of Violation (NOV)	☐ Source Test Reports (S/T RPTS)	☐ Toxic-Health Risk Assessment (HRA)
☐ Notices to Comply (N/C)	☐ Air Monitoring Data	■ Other (describe below or on additional pages):

Want any information related to facilities that are proposed, applications that have been filed, or permits that have been issued to facilities that are within a 6 mile radius of the proposed Palen Solar Power Project which will be located 0.5 miles north of Interstate 10 at the Corn Springs Road Exit. Data is required to satisfy the CEC data request for the AFC processing.

TIME PERIOD OF DOCUMENTS REQUESTED From: **January 1, 2008** To: **February 2, 2010**

REQUESTED FACILITY INFORMATION (If Applicable)

FACILITY NAME:		
FACILITY ADDRESS:		
CITY:	STATE:	ZIP CODE:
FACILITY I.D. NO. (if known):	APPL. AND/OR PERMIT NO. (if known):	

***Direct cost of duplication:** $.15 per page for paper copies (first 10 pages free) and $5.00 per copied audio tape. No charge for copied Diskettes or CDs. Transfer of gathered electronic records onto CD or Diskette typically costs $10.00 each, but costs will vary (see Instructions for Requesting Records).*

■ I wish to inspect the requested records, where applicable, or receive the requested records electronically at no charge. I do not want copies produced at this time.
☐ I request that the SCAQMD contact me prior to copying the requested records if the cost exceeds $20.00.
☐ I would like copies of the requested records and I hereby agree to reimburse the SCAQMD for the direct cost of duplicationin accordance with Gov. Code Sec. 6253(b).

Russell Kingsley
Signature of Requestor

Note: After a preliminary estimate, advance payment may be required.

(Rev. 06/17/08-lkoenig)

E-Mail Correspondence:

Emily,

Thank you for your quick response. The site has no address yet – it is on Bureau of Land Management Land a few miles east from the City of Desert Center off I-10. The physical location is 0.5 miles north of I-10 at the Corn Springs Exit. According to Google Maps, the zip code for Desert Center is 92239, but I don't know if that is the same zip that will apply to the site address when it is assigned. I've attached a map. Please let me know if you need more information. Thanks, for your help – Russ

Russell Kingsley
Program Manager
Environment
T 805.388.3775
Russ.Kingsley@aecom.com

AECOM
1220 Avenida Acaso, Camarillo, CA 93012
T 805.388.3775 F 805.388.3577
www.aecom.com

From: Emily Lawson [mailto:elawson@aqmd.gov]
Sent: Thursday, February 04, 2010 8:51 AM
To: Kingsley, Russ
Subject: Records Requested

Hello Russ, I needed a little bit more information about this request for facility information within a 6 mile radius of the Palen Solar Power Project that you submitted. Do you have an address for that proposed site? Even intersections are sufficient, I'll also need the zip code of the site. This information determines what sector the site is in, which will determine who I route this request for information to. Thanks so much.

Emily Lawson
Industrial Compliance
(909) 396-3145

Complete Palen Refinements

Air Quality

Palen Solar Power Project

Docket No. 09-AFC-7

Alice Harron
Senior Director of Project Development
1625 Shattuck Avenue, Suite 270
Berkeley, CA 94709-1161

AECOM Environment
1220 Avenida Acaso
Camarillo, CA 93012
tel 805-388-3775
fax 805-388-3577

February 1, 2010

Mr. Ken Coats
Engineering and Compliance
South Coast Air Quality Management District
21865 Copley Drive
Diamond Bar, CA 91765

Subject: Refinements to the Palen Solar Power Project to be located off Corn Spring Road in Desert Center, CA 92239; AQMD Facility IDs 161483 and 161484; (09-AFC-7)

Dear Mr. Coats,

This letter is being submitted to describe a number of changes to the Palen Solar Power Project (PSPP or Project). One change is that a Project-specific entity has been created to own and operate the entire PSPP; Palen Solar I, LLC (PSI and also referred to as "Applicant" in this letter) a wholly owned subsidiary of Solar Millennium, LLC. A second change is in the nature of a technical refinement to the Project and involves elimination of the use of the Heat Transfer Fluid (HTF) heater for Project operations based on the system performance modeling, historical ambient temperature data and cost considerations. HTF freeze protection will be provided by additional use of the Project's auxiliary boilers. In the last technical refinement addressed in this letter, PSI, after re-evaluating the power requirements of an emergency situation, is requesting to change the size of both emergency generator engines for the Project from 300 horsepower (hp) to 2,922hp. These Project refinements will require the following five permit actions:

1. Change the Owner/Operator of both generating units within the PSPP to Palen Solar I, LLC;
2. Cancel the applications for two HTF heaters (A/N 502591 and 502598);
3. Change the hours of operation for both auxiliary boilers (A/N 502590 and 502597);
4. Cancel both 300-hp emergency generator applications; and
5. Apply for two, 2,922-hp emergency generators.

Each of these permit actions are discussed in this letter in their corresponding sections. **Section 5.0** discusses the applicable Rule 301 fees. Permit Action #1 (discussed below under **Section 1.0** Change of Owner/Operator), is an administrative change; Permit Actions #2 and #3 will not increase emissions or require a health risk assessment of the Toxic Air Contaminant (TAC) emissions from the facility. The District-required application forms are included in **Attachment 1**. Permit Action #4 is discussed in more in the detail in the "Permit Application for Emergency Generators for the Palen Solar Power Project" provided in **Attachment 2**. Revised operational emission calculation spreadsheets, that reflect requested the permit actions, are provided in **Attachment 3**.

1.0 Change of Owner/Operator

The Project was originally divided into two facilities each with different owners, operators, and facility ID numbers. Solar Millennium, LLC was the owner/operator of Unit 1, and Chevron Energy Solutions was the owner/operator of Unit 2. Both units will now be owned and operated by a single entity, Palen Solar I, LLC (PSI). PSI is requesting a change in owner/operator for all permit units and to place all of the permit units under the Facility ID 161483. This is an administrative change and does not trigger new regulatory requirements. The required South Coast Air Quality Management District (SCAQMD) Application Forms are provided in **Attachment 1**.

2.0 Cancellation of the HTF Heater Applications

Based on the system performance modeling, historical ambient temperature data and cost considerations, the Applicant has determined that the HTF heaters will not be needed for Project operations. Instead, the heat required for HTF freeze protection will be provided by additional use of the auxiliary boilers. Therefore, the Applicant is requesting that the SCAQMD cancel the applications for Heater #1 (A/N 502591) and Heater #2 (A/N 502598).

3.0 Change in Hours of Operation of the Auxiliary Boilers

3.1 Operational Changes

As noted in **Section 2.0** above, the auxiliary boilers will be used for HTF freeze protection. PSI has determined that a maximum of 10 hours per day, and a total of 100 additional hours of operation per year, by the auxiliary boilers will be sufficient for HTF freeze protection. The maximum daily operation of the boiler is expected to be 15 hours per day at 25 percent load for standby, two hours per day at full load for start up support, and up to 10 hours per day for HTF freeze protection; these three maximum operational cases would not occur on the same day. The new operating hours are summarized in **Table 3-1**.

Table 3-1 Hours of Operation

Function	Maximum Daily Operation	Maximum Annual Operation
Start up Support	2 hours at 100% load	500 hours at 100% load
HTF Freeze Protection	10 hours at 100% load	100 hours at 100% load
Standby	15 hours at 25% load	4,500 hours at 25% load
Maximum Total Used in Calculations	17 hours (12 at 100% and 5 at 25%)	5,100 hours (600 at 100% and 4,500 at 25%)

3.2 Auxiliary Boiler Emissions

With the exception of the changes to the operating schedule of the boilers, the same assumptions and methodologies were used as the basis for auxiliary boiler emission calculations as in the original analysis:

- One 35-MMBtu/hr boiler per power plant unit, a total of two identical boilers for the Project;
- Propane will be the only fuel used by the boilers;

- Boilers to be equipped with ultra-low-NOx (9 parts per million by volume [9 ppmv]) burners;
- Maximum controlled emissions are equivalent to maximum uncontrolled emissions because the auxiliary boilers will not utilize add-on controls;
- Maximum daily operation is expected to be 5 hours per day at 25 percent load and 12 hours per day at full load; and
- Annual operation of each boiler is limited to 5,100 hours per year with 600 hours at full load and 4,500 hours at 25 percent load.

The criteria pollutant emission factors used for the NOx and CO emission estimates are based on the BACT Determination (see Appendix E of the Application for Determination of Compliance (DOC) for the PSPP that was submitted in September 2009); the PM10 and VOC emission factors are based on vendor guaranteed emission factors, 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 3-2**.

Table 3-2 Auxiliary Boiler Criteria Pollutant Emissions (One Boiler)

Pollutant	Emissions				
	AHU/AHC (lb/hr)	MHU/MHC (lb/hr)	MDU/MDC (lb/day)	AA (lb/yr)	30-DA (lb/day)
NOx	0.08	0.39	5.15	671	5.15
VOC	0.03	0.18	2.32	302	2.32
CO	0.26	1.31	17.42	2268	17.42
PM10	0.07	0.35	4.64	604	4.64
PM2.5	0.07	0.35	4.64	604	4.64
SOx	0.08	0.40	5.24	682	5.24

3.3 Change in Emissions

The additional hours for the auxiliary boilers and the deletion of the HTF heaters yields a net decrease in emissions for the Project. The boiler emissions provided in the September 2009 DOC Application, and the HTF heater emissions in the DOC Application both were subtracted from the auxiliary boiler emissions that are presented in **Section 3.2** in order to determine the net change in emissions. For illustration purposes, the change in the Annual Average emissions from the auxiliary boiler and HTF heater are presented in **Table 3-3**; more detailed emission calculations and facility totals are presented in the Operation Emissions Calculation spreadsheets provided in **Attachment 3**.

Table 3-3 Change in Annual Average Criteria Pollutant Emissions (lb/year)

Pollutant	Original Boiler Emissions (One Unit)	Deleted HTF Heater Emissions (One Unit)	New Boiler Emissions (One Unit)	Net Change in Emissions (One Unit)	Net Change in Emissions (Both Units)
NOx	632	194	671	-155	-310
VOC	284	88	302	-70	-140
CO	2,137	657	2,268	-526	-1,052
PM10	569	175	604	-140	-280
PM2.5	569	175	604	-140	-280
SOx	643	198	682	-159	-318

The combination of Permit Action #2 and Permit Action #3 will decrease facility emissions, and emission reductions do not trigger regulatory requirements.

4.0 Cancel the 300-hp Emergency Generator Applications

Based on the power requirements of an emergency situation, the Applicant has decided that a 300-hp emergency generator will not provide sufficient power to the Project. The Applicant is requesting that the SCAQMD cancel the applications for Emergency Electrical Generator #1 (A/N 502595) and Emergency Electrical Generator # 2(A/N 502602).

5.0 New 2,922-hp Emergency Generator Applications

This permit action is discussed in more in the detail in the "Permit Application for Emergency Generators for the Palen Solar Power Project" provided in **Attachment 2**. The emergency generator will be operated by Palen Solar I, LLC.

6.0 Required Fees

The Applicant submitted permit fees with the DOC Application for the PSPP in September 2009. Because the Unit 2 devices are physically identical to Unit 1, the fees were calculated with the 50 percent discount per Rule 301 (c)(1)(F) in the original submittal. The Applicant was later advised that the Unit 1 devices are not considered identical to the Unit 2 devices, since they were installed under separate SCAQMD Facility IDs, and the Rule 301 (c)(1)(F) discount does not apply to PSPP. The additional fees were paid to the District in October 2009. Now that PSPP will be operated under one entity and operated under a single Facility ID, PSPP might be entitled to a 50 percent discount per Rule 301 (c)(1)(F) for the Unit 2 devices that are identical to Unit 1. To prevent delays in the permitting process, this discount was not yet applied to the fees presented in **Section 5.0.** In addition to the change in operator fees, the Applicant is submitting fees for the new generator applications; changes to the boiler applications do not require Rule 301 fees since these are open applications and changes to the Project are anticipated. **Table 5-1** summarizes the applicable Rule 301 fees and fee schedules for this submittal.

Table 5-1 Permit Application Fees

Application Number	Device	Rule 301 Description	Schedule	Fee
502590	Auxiliary boiler – Unit 1	Change of Operator	---	$178.77
502597	Auxiliary boiler – Unit 2	Change of Operator	---	$178.77
502594	Emergency fire water pump engine – Unit 1	Change of Operator	---	$178.77
502601	Emergency fire water pump engine – Unit 2	Change of Operator	---	$178.77
502580	Land Treatment Unit	Change of Operator	---	$178.77
502592	Tank/Ullage System – Unit 1	Change of Operator	---	$178.77
502599	Tank/Ullage System – Unit 2	Change of Operator	---	$178.77
502593	Carbon Adsorption System	Change of Operator	---	$178.77
502600	Carbon Adsorption System	Change of Operator	---	$178.77
502595	Emergency generator engine – Unit 1	IC Engine, Emergency, > 500 hp	C	$3,244.91
502595	Emergency generator engine – Unit 2	IC Engine, Emergency, > 500 hp	C[1]	$1,622.46
TOTAL				**$6,833.84**

1. Note: Unit 2 devices are identical to Unit 1 devices and thereby entitled to a 50 percent discount per Rule 301(c)(1)(F).

Please do not hesitate to contact either of the undersigned if implementation of the above permit actions is a concern or if additional clarification of the permit application data is required.

Sincerely,

Russ Kingsley
Program Manager, AECOM
Russ.Kingsley@aecom.com

Attachment 1
SCAQMD Forms

South Coast Air Quality Management District

Form 400-A

Application For Permit To Construct and Permit To Operate

Mail Application To:
P.O. Box 4944
Diamond Bar, CA 91765

Tel: (909) 396-3385
www.aqmd.gov

Section A: Operator Information

1. Business Name of Operator To Appear On The Permit: Palen Solar I, LLC

2. Valid AQMD Facility ID (Available on Permit or Invoice issued by AQMD): 161484

3. Owner's Business Name (only if different from Business Name of Operator):

Section B: Equipment Location

4. Equipment Location Address:
For equipment operated at various locations in AQMD's jurisdiction, provide address of initial site

Off Corn Spring Road Exit 10 miles East of Desert Center
Street Address

Desert Center | CA, | 92239
City | State | Zip Code

County: ○ Los Angeles ○ Orange ○ San Bernardino ● Riverside

Contact Name: Elizabeth Ingram

Contact Title: Associate Project Manager Phone: (510) 809-4663

Fax: (510) 524-5516 E-Mail: ingram@solarmillennium.com

Section C: Permit Mailing Address

5. Permit and Correspondence Information:
☐ Check here if same as equipment location address

1625 Shattuck Ave., Suite 270
Street Address

Berkeley | CA | 94709
City | State | Zip Code

Contact Name: Elizabeth Ingram

Contact Title: Associate Project Manager Phone: (510) 809-4663

Fax: (510) 524-5516 E-Mail: ingram@solarmillennium.com

Section D: Application Type

The facility is in ○ RECLAIM ○ Title V ○ RECLAIM & Title V Program (please check if applicable)

6. Reason for Submitting Application (Select only ONE):

- ○ New Construction (Permit to Construct)
- ○ Equipment Operating Without A Permit or Expired Permit*
- ● Administrative Change
- ○ Equipment On-Site But Not Constructed or Operational
- ○ Title V Application (Initial, Revisions, Modifications, etc.)
- ○ Compliance Plan
- ○ Facility Permit Amendment
- ○ Registration/Certification
- ○ Streamlined Standard Permit
- ○ Permitted Equipment Altered/ Modified Without Permit Approval*
- ○ Proposed Alteration/Modification to Permitted Equipment
- ○ Change of Condition For Permit To Operate
- ○ Change of Condition For Permit To Construct
- ○ Change of Location—Moving to New Site

Existing Or Previous Permit/Application Number:
(If you checked any of the items in this column, you MUST provide a existing Permit/ Application Number)

* A Higher Permit Processing Fee applies to those items with an asterisk (Rule 301 (c) (1) (D)

7. Estimated Start Date of Operation/Construction (MM/DD/YYYY): 10/01/2010

8. Description of Equipment:
Boiler, 35 MMBTU/hr, Propane fueled, Unit #2 (A/N 502597)

Change Owner from Chevron Energy Solutions to Palen Solar I,LLC
Change Facility ID to 161483
Change in hours of operation

9. Is this equipment portable AND will it be operated at different locations within AQMD's jurisdiction? ● No ○ Yes

10. For Identical equipment, how many additional applications are being submitted with this application? (Form 400-A required for each) 1

11. Are you a Small Business as per AQMD's Rule 102 definition?
(10 employees or less and total gross receipts are $500,000 or less, or a not-for-profit training center?) ● No ○ Yes

12. Has a Notice of Violation (NOV) or a Notice To Comply (NC) been issued for this equipment?
● No ○ Yes If yes, provide NOV/NC #:

Section E: Facility Business Information

13. What type of business is being conducted at this equipment location?
Solar electric generating facility

14. What is your businesses primary NAICS Code (North American Industrial Classification System)? 221119

15. Are there other facilities in the SCAQMD jurisdiction operated by the same operator? ● No ○ Yes

16. Are there any schools (K-12) within a 1000-ft. radius of the equipment physical location? ● No ○ Yes

Section F: Authorization/Signature

I hereby certify that all information contained herein and information submitted with this application is true and correct.

17. Signature of Responsible Official: Alice L. Harron

18. Title: Sr Dir Development

19. Print Name: Alice L Harron

20. Date: 1/28/10

Check List

- ☒ Form(s) signed and dated by authorized official
- ☒ Supplemental Equipment Form (400-E-XX or 400-E-GEN)
- ☒ CEQA Form (400-CEQA) attached
- ☒ Payment for permit processing fee attached

Your application will be rejected if any of the above items are missing.

AQMD USE ONLY	APPLICATION/TRACKING #	TYPE B C D	EQUIPMENT CATEGORY CODE:	FEE SCHEDULE: $	VALIDATION
ENG. A R DATE	ENG. A R DATE	CLASS I III IV	ASSIGNMENT Unit Engineer	CHECK/MONEY ORDER #	AMOUNT $	Tracking #

South Coast Air Quality Management District

Form 400-A

Application For Permit To Construct and Permit To Operate

Mail Application To:
P.O. Box 4944
Diamond Bar, CA 91765

Tel: (909) 396-3385
www.aqmd.gov

Section A: Operator Information

1. Business Name of Operator To Appear On The Permit:
Palen Solar I, LLC

2. Valid AQMD Facility ID (Available on Permit or Invoice issued by AQMD): 161483

3. Owner's Business Name (only if different from Business Name of Operator):

Section B: Equipment Location

4. Equipment Location Address:
For equipment operated at various locations in AQMD's jurisdiction, provide address of initial site

Off Corn Spring Road Exit 10 miles East of Desert Center
Street Address

Desert Center | CA, | 92239
City | State | Zip Code

County: ○ Los Angeles ○ Orange ○ San Bernardino ● Riverside

Contact Name: Elizabeth Ingram

Contact Title: Associate Project Manager Phone: (510) 809-4663

Fax: (510) 524-5516 E-Mail: ingram@solarmillennium.com

Section C: Permit Mailing Address

5. Permit and Correspondence Information:
☐ Check here if same as equipment location address

1625 Shattuck Ave., Suite 270
Street Address

Berkeley | CA | 94709
City | State | Zip Code

Contact Name: Elizabeth Ingram

Contact Title: Associate Project Manager Phone: (510) 809-4663

Fax: (510) 524-5516 E-Mail: ingram@solarmillennium.com

Section D: Application Type

The facility is in ○ RECLAIM ○ Title V ○ RECLAIM & Title V Program (please check if applicable)

6. Reason for Submitting Application (Select only ONE):

- ○ New Construction (Permit to Construct)
- ○ Equipment Operating Without A Permit or Expired Permit*
- ● Administrative Change
- ○ Equipment On-Site But Not Constructed or Operational
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- ○ Compliance Plan
- ○ Facility Permit Amendment
- ○ Registration/Certification
- ○ Streamlined Standard Permit
- ○ Permitted Equipment Altered/ Modified Without Permit Approval*
- ○ Proposed Alteration/Modification to Permitted Equipment
- ○ Change of Condition For Permit To Operate
- ○ Change of Condition For Permit To Construct
- ○ Change of Location—Moving to New Site

Existing Or Previous Permit/Application Number:
(If you checked any of the items in this column, you MUST provide a existing Permit/ Application Number)

* A Higher Permit Processing Fee applies to those items with an asterisk (Rule 301 (c) (1) (D)

7. Estimated Start Date of Operation/Construction (MM/DD/YYYY): 10/01/2010

8. Description of Equipment:
Land treatment unit for treatment of HTF-contaminated soil (A/N 502580)

Change of Owner from Solar Millennium, LLC to Palen Solar I, LLC

9. Is this equipment portable AND will it be operated at different locations within AQMD's jurisdiction? ● No ○ Yes

10. For Identical equipment, how many additional applications are being submitted with this application? (Form 400-A required for each) 0

11. Are you a Small Business as per AQMD's Rule 102 definition?
(10 employees or less and total gross receipts are $500,000 or less, or a not-for-profit training center?) ● No ○ Yes

12. Has a Notice of Violation (NOV) or a Notice To Comply (NC) been issued for this equipment?
● No ○ Yes If yes, provide NOV/NC #:

Section E: Facility Business Information

13. What type of business is being conducted at this equipment location?
Solar electric generating facility

14. What is your businesses primary NAICS Code (North American Industrial Classification System)? 221119

15. Are there other facilities in the SCAQMD jurisdiction operated by the same operator? ● No ○ Yes

16. Are there any schools (K-12) within a 1000-ft. radius of the equipment physical location? ● No ○ Yes

Section F: Authorization/Signature

I hereby certify that all information contained herein and information submitted with this application is true and correct.

17. Signature of Responsible Official:

18. Title: Sr Dir, Development

19. Print Name: Alice L. Harron

20. Date: 1/28/10

Check List

- ☒ Form(s) signed and dated by authorized official
- ☒ Supplemental Equipment Form (400-E-XX or 400-E-GEN)
- ☒ CEQA Form (400-CEQA) attached
- ☒ Payment for permit processing fee attached

Your application will be rejected if any of the above items are missing.

AQMD USE ONLY	APPLICATION/TRACKING #	TYPE B C D	EQUIPMENT CATEGORY CODE:	FEE SCHEDULE: $	VALIDATION
ENG. A R DATE	ENG. A R DATE	CLASS I III IV	ASSIGNMENT Unit Engineer	CHECK/MONEY ORDER #	AMOUNT $	Tracking #

South Coast Air Quality Management District

Form 400-A

Application For Permit To Construct and Permit To Operate

Mail Application To:
P.O. Box 4944
Diamond Bar, CA 91765

Tel: (909) 396-3385
www.aqmd.gov

Section A: Operator Information

1. Business Name of Operator To Appear On The Permit:
Palen Solar I, LLC

2. Valid AQMD Facility ID (Available on Permit or Invoice issued by AQMD): 161483

3. Owner's Business Name (only if different from Business Name of Operator):

Section B: Equipment Location

4. Equipment Location Address:
For equipment operated at various locations in AQMD's jurisdiction, provide address of initial site

Off Corn Spring Road Exit 10 miles East of Desert Center
Street Address

Desert Center | CA, | 92239
City | State | Zip Code

County: ○ Los Angeles ○ Orange ○ San Bernardino ● Riverside

Contact Name: Elizabeth Ingram

Contact Title: Associate Project Manager Phone: (510) 809-4663

Fax: (510) 524-5516 E-Mail: ingram@solarmillennium.com

Section C: Permit Mailing Address

5. Permit and Correspondence Information:
☐ Check here if same as equipment location address

1625 Shattuck Ave., Suite 270
Street Address

Berkeley | CA | 94709
City | State | Zip Code

Contact Name: Elizabeth Ingram

Contact Title: Associate Project Manager Phone: (510) 809-4663

Fax: (510) 524-5516 E-Mail: ingram@solarmillennium.com

Section D: Application Type

The facility is in ○ RECLAIM ○ Title V ○ RECLAIM & Title V Program (please check if applicable)

6. Reason for Submitting Application (Select only ONE):

- ○ New Construction (Permit to Construct)
- ○ Equipment Operating Without A Permit or Expired Permit*
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- ○ Streamlined Standard Permit
- ○ Permitted Equipment Altered/ Modified Without Permit Approval*
- ○ Proposed Alteration/Modification to Permitted Equipment
- ○ Change of Condition For Permit To Operate
- ○ Change of Condition For Permit To Construct
- ○ Change of Location—Moving to New Site

Existing Or Previous Permit/Application Number:
(If you checked any of the items in this column, you MUST provide a existing Permit/ Application Number)

* A Higher Permit Processing Fee applies to those items with an asterisk (Rule 301 (c) (1) (D)

7. Estimated Start Date of Operation/Construction (MM/DD/YYYY): 10/01/2010

8. Description of Equipment:
Boiler, 35 MMBTU/hr, Propane fueled, Unit #1 (A/N 502590)

Change Owner from Solar Millennium, LLC to Palen Solar I, LLC.
Change in hours of operation.

9. Is this equipment portable AND will it be operated at different locations within AQMD's jurisdiction? ● No ○ Yes

10. For Identical equipment, how many additional applications are being submitted with this application? (Form 400-A required for each) 1

11. Are you a Small Business as per AQMD's Rule 102 definition?
(10 employees or less and total gross receipts are $500,000 or less, or a not-for-profit training center?) ● No ○ Yes

12. Has a Notice of Violation (NOV) or a Notice To Comply (NC) been issued for this equipment?
● No ○ Yes If yes, provide NOV/NC #:

Section E: Facility Business Information

13. What type of business is being conducted at this equipment location?
Solar electric generating facility

14. What is your businesses primary NAICS Code (North American Industrial Classification System)? 221119

15. Are there other facilities in the SCAQMD jurisdiction operated by the same operator? ● No ○ Yes

16. Are there any schools (K-12) within a 1000-ft. radius of the equipment physical location? ● No ○ Yes

Section F: Authorization/Signature

I hereby certify that all information contained herein and information submitted with this application is true and correct.

17. Signature of Responsible Official:
Alice L. Harron

18. Title:
Sr Dr. Development

19. Print Name:
Alice L. Harron

20. Date:
1/28/10

Check List

- ☒ Form(s) signed and dated by authorized official
- ☒ Supplemental Equipment Form (400-E-XX or 400-E-GEN)
- ☒ CEQA Form (400-CEQA) attached
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AQMD USE ONLY	APPLICATION/TRACKING #	TYPE B C D	EQUIPMENT CATEGORY CODE:	FEE SCHEDULE: $	VALIDATION
ENG. A R DATE	ENG. A R DATE	CLASS I III IV	ASSIGNMENT Unit Engineer	CHECK/MONEY ORDER #	AMOUNT $	Tracking #

South Coast Air Quality Management District

Form 400-A

Application For Permit To Construct and Permit To Operate

Mail Application To:
P.O. Box 4944
Diamond Bar, CA 91765

Tel: (909) 396-3385
www.aqmd.gov

Section A: Operator Information

1. Business Name of Operator To Appear On The Permit:
Palen Solar I, LLC

2. Valid AQMD Facility ID (Available on Permit or Invoice issued by AQMD): 161483

3. Owner's Business Name (only if different from Business Name of Operator):

Section B: Equipment Location

4. Equipment Location Address:
For equipment operated at various locations in AQMD's jurisdiction, provide address of initial site

Off Corn Spring Road Exit 10 miles East of Desert Center
Street Address

Desert Center | CA, | 92239
City | State | Zip Code

County: ○ Los Angeles ○ Orange ○ San Bernardino ● Riverside

Contact Name: Elizabeth Ingram

Contact Title: Associate Project Manager Phone: (510) 809-4663

Fax: (510) 524-5516 E-Mail: ingram@solarmillennium.com

Section C: Permit Mailing Address

5. Permit and Correspondence Information:
☐ Check here if same as equipment location address

1625 Shattuck Ave., Suite 270
Street Address

Berkeley | CA | 94709
City | State | Zip Code

Contact Name: Elizabeth Ingram

Contact Title: Associate Project Manager Phone: (510) 809-4663

Fax: (510) 524-5516 E-Mail: ingram@solarmillennium.com

Section D: Application Type

The facility is in ○ RECLAIM ○ Title V ○ RECLAIM & Title V Program (please check if applicable)

6. Reason for Submitting Application (Select only ONE):

- ○ New Construction (Permit to Construct)
- ○ Equipment Operating Without A Permit or Expired Permit*
- ● Administrative Change
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- ○ Facility Permit Amendment
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- ○ Proposed Alteration/Modification to Permitted Equipment
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- ○ Change of Location—Moving to New Site

Existing Or Previous Permit/Application Number:
(If you checked any of the items in this column, you MUST provide a existing Permit/ Application Number)

* A Higher Permit Processing Fee applies to those items with an asterisk (Rule 301 (c) (1) (D)

7. Estimated Start Date of Operation/Construction (MM/DD/YYYY): 10/01/2010

8. Description of Equipment:
2 Carbon canisters in series controlling HTF ullage system vent, serving Unit #1 (A/N 502593)

Change Owner from Solar Millennium, LLC to Palen Solar I, LLC

9. Is this equipment portable AND will it be operated at different locations within AQMD's jurisdiction? ● No ○ Yes

10. For Identical equipment, how many additional applications are being submitted with this application? (Form 400-A required for each) 1

11. Are you a Small Business as per AQMD's Rule 102 definition? (10 employees or less and total gross receipts are $500,000 or less, or a not-for-profit training center?) ● No ○ Yes

12. Has a Notice of Violation (NOV) or a Notice To Comply (NC) been issued for this equipment?
● No ○ Yes If yes, provide NOV/NC #:

Section E: Facility Business Information

13. What type of business is being conducted at this equipment location?
Solar electric generating facility

14. What is your businesses primary NAICS Code (North American Industrial Classification System)? 221119

15. Are there other facilities in the SCAQMD jurisdiction operated by the same operator? ● No ○ Yes

16. Are there any schools (K-12) within a 1000-ft. radius of the equipment physical location? ● No ○ Yes

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I hereby certify that all information contained herein and information submitted with this application is true and correct.

17. Signature of Responsible Official:
Alice L. Harron

18. Title:
Sr Dir., Development

19. Print Name:
Alice L. Harron

20. Date:
1/28/10

Check List

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- ☒ CEQA Form (400-CEQA) attached
- ☒ Payment for permit processing fee attached

Your application will be rejected if any of the above items are missing.

AQMD USE ONLY	APPLICATION/TRACKING #	TYPE B C D	EQUIPMENT CATEGORY CODE:	FEE SCHEDULE: $	VALIDATION
ENG. A R DATE	ENG. A R DATE	CLASS I III IV	ASSIGNMENT Unit Engineer	CHECK/MONEY ORDER #	AMOUNT $ / Tracking #

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Form 400-A

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Mail Application To:
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Tel: (909) 396-3385
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1. Business Name of Operator To Appear On The Permit:
Palen Solar I, LLC

2. Valid AQMD Facility ID (Available on Permit or Invoice issued by AQMD): 161484

3. Owner's Business Name (only if different from Business Name of Operator):

Section B: Equipment Location

4. Equipment Location Address:
For equipment operated at various locations in AQMD's jurisdiction, provide address of initial site

Off Corn Spring Road Exit 10 miles East of Desert Center
Street Address

Desert Center — CA, — 92239
City — State — Zip Code

County: ○ Los Angeles ○ Orange ○ San Bernardino ● Riverside

Contact Name: Elizabeth Ingram

Contact Title: Associate Project Manager — Phone: (510) 809-4663

Fax: (510) 524-5516 — E-Mail: ingram@solarmillennium.com

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5. Permit and Correspondence Information:
☐ Check here if same as equipment location address

1625 Shattuck Ave., Suite 270
Street Address

Berkeley — CA — 94709
City — State — Zip Code

Contact Name: Elizabeth Ingram

Contact Title: Associate Project Manager — Phone: (510) 809-4663

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- ○ Registration/Certification
- ○ Streamlined Standard Permit
- ○ Permitted Equipment Altered/ Modified Without Permit Approval*
- ○ Proposed Alteration/Modification to Permitted Equipment
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(If you checked any of the items in this column, you MUST provide a existing Permit/ Application Number)

* A Higher Permit Processing Fee applies to those items with an asterisk (Rule 301 (c) (1) (D)

7. Estimated Start Date of Operation/Construction (MM/DD/YYYY): 10/01/2010

8. Description of Equipment:
2 Carbon canisters in series controlling HTF ullage system vent, serving Unit #2 (A/N 502600)

Change Owner from Chevron Energy Solution to Palen Solar I, LLC
Change Facility ID to 161483

9. Is this equipment portable AND will it be operated at different locations within AQMD's jurisdiction? ● No ○ Yes

10. For Identical equipment, how many additional applications are being submitted with this application? (Form 400-A required for each) 1

11. Are you a Small Business as per AQMD's Rule 102 definition? (10 employees or less and total gross receipts are $500,000 or less, or a not-for-profit training center?) ● No ○ Yes

12. Has a Notice of Violation (NOV) or a Notice To Comply (NC) been issued for this equipment?
● No ○ Yes If yes, provide NOV/NC #:

Section E: Facility Business Information

13. What type of business is being conducted at this equipment location?
Solar electric generating facility

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Section F: Authorization/Signature

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17. Signature of Responsible Official:
Alice L. Harron

18. Title:
Sr Dr. Development

19. Print Name:
Alice L. Harron

20. Date:
1/28/10

Check List

- ☒ Form(s) signed and dated by authorized official
- ☒ Supplemental Equipment Form (400-E-XX or 400-E-GEN)
- ☒ CEQA Form (400-CEQA) attached
- ☒ Payment for permit processing fee attached

Your application will be rejected if any of the above items are missing.

AQMD USE ONLY	APPLICATION/TRACKING #	TYPE B C D	EQUIPMENT CATEGORY CODE:	FEE SCHEDULE: $	VALIDATION
ENG. A R DATE	ENG. A R DATE	CLASS I III IV	ASSIGNMENT Unit Engineer	CHECK/MONEY ORDER #	AMOUNT $	Tracking #

South Coast Air Quality Management District

Form 400-A

Application For Permit To Construct and Permit To Operate

Mail Application To:
P.O. Box 4944
Diamond Bar, CA 91765

Tel: (909) 396-3385
www.aqmd.gov

Section A: Operator Information

1. Business Name of Operator To Appear On The Permit:
Palen Solar I, LLC

2. Valid AQMD Facility ID (Available on Permit or Invoice issued by AQMD): 161483

3. Owner's Business Name (only if different from Business Name of Operator):

Section B: Equipment Location

4. Equipment Location Address:
For equipment operated at various locations in AQMD's jurisdiction, provide address of initial site

Off Corn Spring Road Exit 10 miles East of Desert Center
Street Address

Desert Center | CA, | 92239
City | State | Zip Code

County: ○ Los Angeles ○ Orange ○ San Bernardino ● Riverside

Contact Name: Elizabeth Ingram

Contact Title: Associate Project Manager Phone: (510) 809-4663

Fax: (510) 524-5516 E-Mail: ingram@solarmillennium.com

Section C: Permit Mailing Address

5. Permit and Correspondence Information:
☐ Check here if same as equipment location address

1625 Shattuck Ave., Suite 270
Street Address

Berkeley | CA | 94709
City | State | Zip Code

Contact Name: Elizabeth Ingram

Contact Title: Associate Project Manager Phone: (510) 809-4663

Fax: (510) 524-5516 E-Mail: ingram@solarmillennium.com

Section D: Application Type

The facility is in ○ RECLAIM ○ Title V ○ RECLAIM & Title V Program (please check if applicable)

6. Reason for Submitting Application (Select only ONE):

- ○ New Construction (Permit to Construct)
- ○ Equipment Operating Without A Permit or Expired Permit*
- ● Administrative Change
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- ○ Registration/Certification
- ○ Streamlined Standard Permit
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- ○ Change of Condition For Permit To Operate
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- ○ Change of Location—Moving to New Site

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(If you checked any of the items in this column, you MUST provide a existing Permit/ Application Number)

* A Higher Permit Processing Fee applies to those items with an asterisk (Rule 301 (c) (1) (D)

7. Estimated Start Date of Operation/Construction (MM/DD/YYYY): 10/01/2010

8. Description of Equipment:
Emergency diesel-fueled fire water pump engine, 300 HP, Unit #1 (A/N 502594)

Change of Owner from Solar Millennium, LLC to Palen Solar I, LLC

9. Is this equipment portable AND will it be operated at different locations within AQMD's jurisdiction? ● No ○ Yes

10. For Identical equipment, how many additional applications are being submitted with this application? (Form 400-A required for each) 1

11. Are you a Small Business as per AQMD's Rule 102 definition? (10 employees or less and total gross receipts are $500,000 or less, or a not-for-profit training center?) ● No ○ Yes

12. Has a Notice of Violation (NOV) or a Notice To Comply (NC) been issued for this equipment?
● No ○ Yes If yes, provide NOV/NC #:

Section E: Facility Business Information

13. What type of business is being conducted at this equipment location?
Solar electric generating facility

14. What is your businesses primary NAICS Code (North American Industrial Classification System)? 221119

15. Are there other facilities in the SCAQMD jurisdiction operated by the same operator? ● No ○ Yes

16. Are there any schools (K-12) within a 1000-ft. radius of the equipment physical location? ● No ○ Yes

Section F: Authorization/Signature

I hereby certify that all information contained herein and information submitted with this application is true and correct.

17. Signature of Responsible Official:

18. Title: Sr Dir, Development

19. Print Name: Alice L. Harron

20. Date: 1/28/10

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Palen Solar I, LLC

2. Valid AQMD Facility ID (Available on Permit or Invoice issued by AQMD): 161484

3. Owner's Business Name (only if different from Business Name of Operator):

Section B: Equipment Location

4. Equipment Location Address:
For equipment operated at various locations in AQMD's jurisdiction, provide address of initial site

Off Corn Spring Road Exit 10 miles East of Desert Center
Street Address

Desert Center | CA, | 92239
City | State | Zip Code

County: ○ Los Angeles ○ Orange ○ San Bernardino ● Riverside

Contact Name: Elizabeth Ingram

Contact Title: Associate Project Manager Phone: (510) 809-4663

Fax: (510) 524-5516 E-Mail: ingram@solarmillennium.com

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(If you checked any of the items in this column, you MUST provide a existing Permit/ Application Number)

* A Higher Permit Processing Fee applies to those items with an asterisk (Rule 301 (c) (1) (D)

7. Estimated Start Date of Operation/Construction (MM/DD/YYYY): 10/01/2010

8. Description of Equipment:
Emergency diesel-fueled fire water pump engine, 300 HP, Unit #2 (A/N 502601)
Change of Owner from Chevron Energy Solutions to Palen Solar I, LLC
Change Facility ID to 161483

9. Is this equipment portable AND will it be operated at different locations within AQMD's jurisdiction? ● No ○ Yes

10. For Identical equipment, how many additional applications are being submitted with this application? (Form 400-A required for each) 1

11. Are you a Small Business as per AQMD's Rule 102 definition? (10 employees or less and total gross receipts are $500,000 or less, or a not-for-profit training center?) ● No ○ Yes

12. Has a Notice of Violation (NOV) or a Notice To Comply (NC) been issued for this equipment?
● No ○ Yes If yes, provide NOV/NC #:

Section E: Facility Business Information

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19. Print Name: Alice L. Harron

20. Date: 1/28/10

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4. Equipment Location Address:
For equipment operated at various locations in AQMD's jurisdiction, provide address of initial site

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Street Address

Desert Center — CA, — 92239
City — State — Zip Code

County: ○ Los Angeles ○ Orange ○ San Bernardino ● Riverside

Contact Name: Elizabeth Ingram

Contact Title: Associate Project Manager — Phone: (510) 809-4663

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7. Estimated Start Date of Operation/Construction (MM/DD/YYYY): 10/01/2010

8. Description of Equipment:
Heat transfer fluid expansion tank/ullage system, Unit #1 (A/N 502592)

Change Owner from Solar Millennium, LLC to Palen Solar I, LLC

9. Is this equipment portable AND will it be operated at different locations within AQMD's jurisdiction? ● No ○ Yes

10. For Identical equipment, how many additional applications are being submitted with this application? (Form 400-A required for each) 1

11. Are you a Small Business as per AQMD's Rule 102 definition?
(10 employees or less and total gross receipts are $500,000 or less, or a not-for-profit training center?) ● No ○ Yes

12. Has a Notice of Violation (NOV) or a Notice To Comply (NC) been issued for this equipment?
● No ○ Yes If yes, provide NOV/NC #:

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17. Signature of Responsible Official:
Alice L. Harron

18. Title:
Sr Dr Development

19. Print Name:
Alice L. Harron

20. Date:
1/28/10

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7. Estimated Start Date of Operation/Construction (MM/DD/YYYY): 10/01/2010

8. Description of Equipment:
Heat transfer fluid expansion tank/ullage system, Unit #2 (A/N 502599)
Change Owner from Chevron Energy Solutions to Palen Solar I, LLC
Change Facility ID to 161483

9. Is this equipment portable AND will it be operated at different locations within AQMD's jurisdiction? ● No ○ Yes

10. For Identical equipment, how many additional applications are being submitted with this application? (Form 400-A required for each) 1

11. Are you a Small Business as per AQMD's Rule 102 definition? (10 employees or less and total gross receipts are $500,000 or less, or a not-for-profit training center?) ● No ○ Yes

12. Has a Notice of Violation (NOV) or a Notice To Comply (NC) been issued for this equipment?
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18. Title: Sr Dir Development

19. Print Name: Alice L Harron

20. Date: 1/28/10

Check List

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Attachment 2
Emergency Generator Application

Prepared for:
Palen Solar I LLC
Palen Solar Power Project



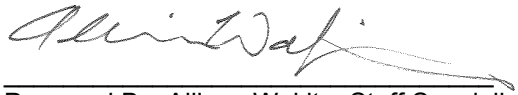
Permit Application for Emergency Generators for the Palen Solar Power Project

AECOM Environment
February 2010
Document No.: 12994-001-5230

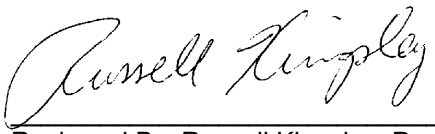
AECOM

Prepared for:
Palen Solar I LLC
Palen Solar Power Project

Permit Application for the Emergency Generators at the Palen Solar Power Project



Prepared By: Allison Wakita, Staff Specialist



Reviewed By: Russell Kingsley, Program Manager, CPP

AECOM Environment
February 2010
Document No.: 12944-001-5230

AECOM

Contents

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List of Tables

1.0 Project Overview

1.1 Introduction

This application is being submitted by Palen Solar I LLC (PSI or Applicant) for two new emergency generators to be installed at the Palen Solar Power Project (PSPP). The Applicant had initially proposed 300-horsepower (hp) emergency generator engines. After re-evaluating the power requirements of an emergency situation, the Applicant is requesting to change the size of the emergency generators for the Project from 300-hp to 2,922-hp. Please cancel application numbers 502595 and 502602 for the 300-Hp generator engines.

This document serves as the Authority to Construction (ATC) application and has been prepared consistent with District requirements. **Section 2.0** of this document provides the equipment description and proposed usage of the engines. **Section 3.0** presents criteria and toxic air contaminant (TAC) emissions and calculation methodologies. **Section 4.0** provides a review of the applicable rules regulations. The proposed engines are compliant with BACT standards. SCAQMD application forms for each of these devices are provided in **Appendix A**.

1.2 Facility Background Information

The Project will have a nominal output of 500 megawatts (MW), and will consist of two adjacent, identical and independent 250 MW plants, Unit 1 and Unit 2. The Project is owned by PSI. The Project will require a Right of Way grant from the Bureau of Land Management because the Project site is on Federal land, and because this project will be a thermal power plant of more than 50 MW, the primary permitting authority on the State level will be the California Energy Commission (CEC). As such, the CEC will look to the District to issue a Determination of Compliance (DOC) rather than the normal Permit to Construct (PTC). The original permit application for the DOC was submitted to the South Coast Air Quality Management District (SCAQMD) in September 2009.

Please note that as originally proposed, PSPP would have been operated by two entities, Chevron Energy Solutions and Solar Millennium. There has been a change in ownership of the PSPP: both Units 1 and 2 will be owned and operated by PSI. The applications presented herein indicate the correct ownership. The change in ownership for the other permit units at the PSPP will be addressed under separate cover.

1.3 Contact Information

The facility contact information is as follows:

Name / Address:	Palen Solar Power Project 0.5 miles north of Interstate 10 at the Corn Springs Road Exit Mailing address to be determined
Facility Contact:	Ms. Elizabeth Ingram Associate Project Developer, Project Development and Permitting
Phone:	(510) 524-4517 x 306
FAX:	(510) 524-5516
e-mail:	ingram@solarmillennium.com

Application preparation contact information is as follows:

Name / Address:	Russell Kingsley, Program Manager AECOM Environment 1220 Avenida Acaso Camarillo, CA 93012
Phone:	805-388-3775
FAX:	805-388-3557
e-mail:	Russ.Kingsley@aecom.com

2.0 Equipment/Process Description

2.1 Equipment Description

The Applicant is proposing to use two 2200 kVa emergency generators, each powered by a 2,922-hp diesel-fired engine to supply electricity to the facility in emergency conditions; each unit will be supplied with one emergency generator. Engine specifications are listed in **Table 2-1**. Manufacturer's specification sheets for the generator engine are provided in **Appendix B** and the MSDS for ultra-low sulfur diesel is provided in **Appendix C**.

Table 2-1 Emergency Generator Engine Specifications

Manufacturer	Cummins
Model	QSK60-G6
Type	4-cycle, Turbocharged, After-cooled
Rating	1,800 rpm, 60 Hz
Fuel Type	Diesel
Maximum Fuel Usage	141.4 gallons/hr
EPA Tier Rating:	Tier 2

At this time, the Applicant plans to order the equipment upon approval of the CEC license, anticipated in 2010. The appropriate design standard for 2010 model year engines greater than 750 horsepower is the Tier 2 standard. The Applicant proposed a Tier 2 engine for the emergency generator based on the emission standards identified in 40 Code of Federal Regulations (CFR), Part 60, Subpart IIII, Standards of Performance for Stationary Compression Ignition Internal Combustion Engines. Pursuant to Section 60.4202(a)(2) of that subpart, engines with a maximum rating of more than 50 horsepower must meet the emission standards listed in 40 CFR 89.112 for all pollutants beginning in 2007. The emission standards listed in 40 CFR 89.112 for engines with rated power greater than 560 kilowatt (kW) (750 Hp) are Tier 2 standards which are: 6.4 grams per kilowatt hour (g/kWh) for NOx and non-methane hydrocarbons (NMHC) combined, 3.5 g/kWh for CO and 0.20 g/kWh for PM.

If the equipment is not ordered until 2011, the appropriate design standard would be the Interim Tier 4 standards, in accordance with the California Airborne Toxic Control Measure (ATCM) for Stationary Compression Ignition Engines. According to the ATCM, new stationary emergency engines must meet the standards for off-road engines of the same model year and maximum rated power as specified in the Off-Road Compression Ignition Engines Standards (Title 13, California Code of Regulations (CCR), Section 2423). Title 13 CCR Section 2423 sets emission standards for the generator engine with model years 2011 and later. The Interim Tier 4 standard applies to the Project generator engine as the engine would be larger than 900 kW (750 horsepower) and would be manufactured between 2011 and 2014. The standards are 0.67 g/kWh for NOx, 0.40 g/kWh for NMHC, 3.5 g/kWh for CO and 0.10 g/kWh for PM.

2.2 Process Description

The emergency generators are required to provide motive power to three principle areas of the facility: 1) Freeze Protection Pump; 2) Balance of Plant (BOP) Motor Control Center (MCC); and 3) Heat Transfer

Fluid (HTF) MCC. The equipment for the BOP MCC and HTF MCC that require emergency power are shown in **Table 2-2**, and there may be other small loads connected to the power supply to allow the facility to shut down safely.

Table 2-2 Emergency Loads

BOP MCC	HTF MCCs	
Heat Trace XFMR	Power supply cabinet channel A - H	Anticondensation heater LV-motors
Main Fire Alarm Panel	Nitrogen system Heater switchboard	HTF control valve behind reheater 1 to 4
CEMS HVAC	Nitrogen system Junction Box-Power	Centralization box signals
480V Power Panel	PLC Main nitrogen supply	Anticondensation heater LV-motor
STG Turning Gear	Field Supervisory Control 1 and 2	Fire alarm control panel supply 1 and 2
ST Turbine Lube Oil Pump	Fiber optic termination cabinet	Centralization box signals
Fire Water Jockey Pump	HTF control system supply 1 and 2	Distribution box heaters
Battery Charger A	Nitrogen control valves in front of expansion vessels	Filler valve of HTF system
UPS Bypass	Tracing of main service water pipe	Tracing of overflow vessel 1 to 8
CEMS Skid	Control valve in ullage pipe	Control valve in ullage pipe
Gen Breaker	Transformer temperature monitoring cabinet	Anticondensation heater LV-motors
GSU Fans Feeder	Shutoff devices	Overflow return pumps
	Control valve in front of reclamation flash vessel	HTF drain pumps

2.3 Operating Schedule

The emergency generators will each be operated for non-emergency use for a maximum of one hour per day, for a total of 50 hours per year, for maintenance and testing purposes.

3.0 Emissions

This section provides an overview of the assumptions and calculation methods used to estimate the emissions from the emergency generators. Criteria pollutant emissions are addressed in **Section 3.1,** and TAC emissions are addressed in **Section 3.2**. More detailed calculations are provided in **Appendix C**.

Tier 2 emission standards were used in the emission calculations. If the equipment is not ordered until 2011, the appropriate design standard would be the Interim Tier 4 standard and NOx, NMHC and PM10 emissions would be lower than the emissions from the Tier 2 engine.

3.1 Criteria Pollutant Emissions

PSPP will operate one 2,922-hp diesel-fired emergency generator engine per power plant unit. Criteria pollutant emissions (i.e., NOx, SOx, CO, VOC, PM10, and PM2.5) are expected from the emergency generator during normal facility operations for maintenance and testing purposes. In accordance with SCAQMD permit application guidelines, the Maximum Hourly Uncontrolled (**MHU**), Maximum Hourly Controlled (**MHC**), Maximum Daily Uncontrolled (**MDU**), Maximum Daily Controlled (**MDC**), Average Hourly Controlled (**AHC**), Average Hourly Uncontrolled (**AHU**), Annual Average (**AA**) and 30-Day Average (**30-DA**) emissions were calculated for the generator engines.

The assumptions made regarding emergency engine operation used as the basis for emission calculations include:

- Two 2,922-hp diesel-fired emergency generator engines;
- The engines will use ultra-low sulfur (15 parts per million by weight [ppmw]) diesel fuel;
- The engines have Tier 2 Certification;
- The engine operating hours are based on a single one-hour test per week per engine, not to exceed 50 hours per year, and does not reflect emergency use; and
- Maximum controlled emissions are equal to maximum uncontrolled emissions because emergency engines do not have add-on controls.

Emission estimates for NOx, VOC, CO and PM10 are based on emission factors for EPA Tier 2 certified engines. Note that the Tier 2 emission standard for non-methane hydrocarbons (NMHC) is combined with NOx. For these emission estimates, the NOx fraction is assumed to be 95 percent of the combined emissions and the balance NMHC. NMHC is assumed to be equivalent to VOC. The calculation procedure for NOx, VOC, CO, and PM10 are similar to one another, only the emission factors differ between the calculations. The Tier 2 emission factors used in the calculations are presented in **Table 3-1**.

Table 3-1 Generator Engine Emission Factors

Pollutant	Tier 2 Emission Factor (g/bhp-hr)
NOx	4.56
VOC	0.24
CO	2.6
PM10	0.15

Emission estimates for SOx are based on estimated fuel use and fuel sulfur content. 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 ppmw.

3.1.1 NOx, CO, VOC, PM10 and PM2.5 Emission Calculations

The daily emissions are based on operating the engine one hour per day at full load for readiness testing. The engine will be operated no more than once per day for testing; therefore, the daily emissions are equal to the hourly emissions. The engine use will be limited to 50 hours per year for maintenance and testing. The maximum hourly (**MHU/MHC**) emissions are calculated using Equation 3-1, the maximum daily calculations (**MDU/MDC**) are calculated using Equation 3-2, and the average annual (**AA**) emissions are calculated using Equation 3-3. The average hourly (**AHU/AHC)** and the 30-day average (**30-DA**) emissions are calculated using Equations 3-4 and 3-5, respectively. These emissions estimates do not include emissions from emergency operations.

Maximum Hourly Uncontrolled and Controlled (MHU/MHC) Emissions

The maximum hourly emissions are calculated according to Equation 3-1.

MHU/MHC (lb/hr) = EF x hp x ÷ conv. factor (lb/g) (Eq. 3-1)

Maximum Daily Uncontrolled and Controlled (MDU/MDC) Emissions

Because engine testing will be operated no more than once per day for one hour for maintenance and testing purposes, the maximum daily emissions are equal to the hourly emissions.

MDU/MDC (lb/day) = **MHU/MHC** x 1 hour/day (Eq. 3-2)

Average Annual (AA) Emissions

The annual average emissions are determined by multiplying the maximum hourly emissions by the annual hours of operation. The engines will be limited to 50 hours per year for maintenance and testing.

AA (lb/yr) = **MHU/MHC** x 50 hr/yr (Eq. 3-3)

Average Hourly Uncontrolled and Controlled (AHU/AHC) Emissions

The average hourly emissions are determined by annual average emissions divided by the total number of hours in a year, according to Equation 3-4.

AHU/AHC (lb/hr) = **AA** ÷ 8,760 hr/yr (Eq. 3-4)

30-Day Average (30-DA) Emissions

The 30-day average emissions are calculated as the MDC multiplied by an adjustment factor for days per month of operation. The operation of the emergency engine is less than 5 days per week; the appropriate adjustment factor is 23/30. The 30-day average emissions are calculated using Equation 3-5.

30-DA = MDU/MDC x adjustment factor (23/30) (Eq. 3-5)

3.1.2 SOx Emission Calculations

SOx emissions are based on fuel use and fuel sulfur content of 15 ppmw. As stated in Section 2.0, the maximum fuel usage of the engine is 141.4 gallons/hour.

Maximum Hourly Uncontrolled and Controlled (MHU/MHC) Emissions

Hourly emissions are calculated according to Equation 3-7.

MHU/MHC (lb/hr) = Fuel x density x duration x sulfur content x weight ratio (SO_2 to sulfur) (Eq. 3-7)

The results of the emissions calculations are presented in **Table 3-2**.

Table 3-2 Emergency Generator Engine Criteria Pollutant Emissions (One Engine)

Pollutant	AHU/AHC (lb/hr)	MHU/MHC (lb/hr)	MDU/MDC (lb/day)	AA (lb/yr)	30-DA (lb/day)
NOx	1.68E-01	29.35	29.35	1,467.44	29.35
VOC	8.82E-03	1.54	1.54	77.23	1.54
CO	9.55E-02	16.73	16.73	836.70	16.73
PM10	5.51E-03	0.97	0.97	48.27	0.97
DPM	5.51E-03	0.97	0.97	48.27	0.97
SOx	1.74E-04	0.031	0.031	1.53	0.031

3.2 Toxic Air Contaminant Emissions

TAC emissions from the emergency generator engines were quantified for routine testing and maintenance operation, which will be limited to no more than one hour per day (total of 50 hours per year), per engine. Emissions were 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. Emission

calculations for PM10 are provided in **Appendix D**, and the results of these calculations are presented in **Table 3-2**.

4.0 Rule Compliance Determination

4.1 Regulation II Permits

4.1.1 Rule 201 Permit to Construct

A person is not allowed to 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 (PTC) for such construction from the Executive Officer. Because the California Energy Commission has plenary authority over power plant permitting and licensing, a DOC may be issued simultaneous with or instead of the PTC. A PTC (or DOC) remains in effect until the application for a permit to operate (PTO, see Rules 202 - 203) is granted, denied, or canceled. This document serves as an application for a PTC for the proposed equipment.

4.1.2 Rule 203 Permit to Operate

A person must not operate or use any equipment, the use of which may cause the issuance of air contaminants, or the use of which may reduce or control the issuance of air contaminants, without first obtaining a written PTO from the Executive Officer or except as provided in Rule 202. The equipment must not be operated contrary to the conditions specified in the PTO. The PSPP will comply with this rule by applying for permits from the SCAQMD as needed, and by operating the equipment according to the conditions specified in the PTO.

4.1.3 Rule 212 Standards for Approving Permits and Issuing Public Notice

The rule requires distribution of public notices to all addresses within a quarter-mile radius of the project boundary if the permit unit emitting air contaminants is located within 1) 1,000 feet from the outer boundary of a school, 2) has criteria pollutant emissions greater than daily maximums as listed in the Rule, or 3) emit TACs that expose an individual to a cancer risk greater than or equal to ten-in-one million. The requirements of this rule are not applicable to the Project because the Project is not located within 1,000 feet of any school, nor is the maximum individual cancer risk greater than ten-in-one million (see Health Risk Assessment [HRA] results, **Section 4.7**).

4.2 Regulation III Fees, Rule 301 Permit Fees

In accordance with Rule 301, the permit application fees and fee schedules are as listed in **Table 4-1**. The fees for the emergency generator engines were inaccurately assessed in the DOC Application that was submitted in September 2009. The emergency engines should have been categorized under IC Engine (51-500 hp) schedule B, but were submitted as schedule C. We have assumed that the fees submitted for the 300-Hp engine can be applied to these applications, and thus, no additional fees are required with this applications. However, if this assumption is incorrect, please contact the individuals identified as Contacts in Section 1.3 above.

Table 4-1 Permit Application Fees

Device	Rule 301 Description	Schedule	Fee
Emergency generator engine – Unit 1	IC Engine, Emergency, > 500 hp	C	$3,244.91
Emergency generator engine – Unit 2	IC Engine, Emergency, > 500 hp	C[1]	$1,622.46
Application Total			$4,867.37
Total Fees Submitted for Emergency Generator Engines in the DOC Application			$4,867.37
Additional Fees Required with this Application			**$0.00**
1. Unit 2 devices are identical to Unit 1 devices and thereby entitled to a 50 percent discount per Rule 301(c)(1)(F).			

4.3 Regulation IV Prohibitions

4.3.1 Rule 401 Visible Emissions

A person is not allowed to discharge into the atmosphere, from any single source of emissions, any air contaminant for a period or periods aggregating more than three minutes in any one hour which is as dark or darker in shade as that designated as No. 1 on the Ringelmann Chart, or of such opacity as to obscure an observer's view to a degree equal to or greater than does smoke which is as dark or darker in shade as that designated as No. 1 on the Ringelmann Chart. The emergency generator meets BACT, and will comply with this Rule by combusting clean fuels.

4.3.2 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. The emergency generator meets BACT, and is expected to comply with this Rule by combusting clean fuels.

4.3.3 Rule 404 Particulate Matter - Concentration

A person is not allowed to discharge into the atmosphere, from any source operation, particulate matter in excess of the concentration limits shown in the rule. The particulate matter emission limits are a function of exhaust flow rate from the device. The generator engine will emit particulate matter, and is subject to and will comply with this rule.

4.3.4 Rule 430 Breakdown Provisions

The owner or operator must report by telephone or other District-approved method any occurrence which constitutes a breakdown condition within one hour of such breakdown or within one hour of the time said person knew or reasonably should have known of its occurrence. Such report must identify the time, specific location, equipment involved, responsible party to contact for further information, and to the extent known, the causes of the breakdown, and the estimated time for repairs. In the case of emergencies that prevent a person from reporting all required information within the one-hour limit, the Executive Officer may extend the time for the reporting of required information provided such person has notified the Executive Officer of the breakdown within the one-hour limit. Within seven calendar days after a reported breakdown has been

corrected, but no later than thirty calendar days from the initial date of the breakdown, unless an extension has been approved in writing by the Executive Officer, the owner or operator must submit a written report to the Executive Officer which includes specific information.

4.3.5 Rule 431.2 Sulfur Content of Liquid Fuels

The purpose of this rule is to limit the sulfur content in diesel and other liquid fuels for the purpose of reducing the formation of SOx and particulates during combustion and to enable the use of add-on control devices for diesel-fueled internal combustion engines. The use of ultra-low sulfur diesel fuel in the generator engine ensures compliance with this rule.

4.3.6 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 emergency generator engine is expected to comply with this requirement through the use of a Tier 2-compliant engine.

4.4 Regulation IX Standards of Performance for New Stationary Sources

Provisions of 40 Code of Federal Regulations (CFR) Part 60, New Source Performance Standards (NSPS) in effect November 7, 2002, are adopted by reference into the SCAQMD rules.

4.4.1 Subpart A General Provisions

Any source subject to an applicable standard under 40 CFR Part 60 is also subject to the general provisions of Subpart A. Because the Project is potentially subject to Subpart IIII, Standards of Performance for Stationary Compression Ignition Internal Combustion Engines, the requirements of Subpart A also will apply. PSPP will comply with the applicable notifications, performance testing, recordkeeping and reporting outlined in Subpart A.

4.4.2 Subpart IIII Standards of Performance for Stationary Compression Ignition Internal Combustion Engines

Subpart IIII is applicable to owners and operators of stationary compression ignition (CI) internal combustion engines that commence construction after July 11, 2005. Relevant to the proposed Project, the rule applies to the emergency fire water pump and generator CI engines as follows:

Non-fire water pump engines manufactured after April 1, 2006;

Fire water pump engines with less than 30 liters per cylinder manufactured after 2009, or

Fire water pump engines manufactured as a certified National Fire Protection Association (NFPA) fire water pump engine after July 1, 2006.

For the purpose of this rule, “manufactured” means the date the owner places the order for the equipment. Based on the timeline projected for obtaining approval of the Project, the applicant expects that the engines will be ordered (and thus manufactured) in 2010. Owners and operators of non-fire water pump engines must comply with the emission standards listed for all pollutants. The limits for the proposed emergency generator are 2.6 g/hp-hr for CO, 4.8 g/hp-hr for NMHC and NOx combined, and 0.15 g/hp-hr for PM. The proposed emergency generator engine meets these standards.

If the equipment is not ordered until 2011, the appropriate design standard would be the Interim Tier 4 standards, in accordance with the California Airborne Toxic Control Measure (ATCM) for Stationary Compression Ignition Engines. According to the ATCM, new stationary emergency engines must meet the standards for off-road engines of the same model year and maximum rated power as specified in the Off-Road Compression Ignition Engines Standards (Title 13, California Code of Regulations (CCR), Section 2423). Title 13 CCR Section 2423 sets emission standards for the generator engine with model years 2011 and later. The Interim Tier 4 standard applies to the Project generator engine as the engine would be larger than 900 kW (750 horsepower) and would be manufactured between 2011 and 2014. The standards are 0.67 g/kWh for NOx, 0.40 g/kWh for NMHC, 3.5 g/kWh for CO and 0.10 g/kWh for PM.

4.5 Regulation XI Source Specific Rules; 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 engines. The diesel engine proposed for this Project is a low-use-rate engines which will operate less than 200 hours per year and which will be used emergency purposes. The generator engine will operate less than 50 hours per year unless operating for emergency purposes. The PSPP will install and maintain an elapsed operating time meter on each engine to substantiate compliance.

4.6 SCAQMD Regulation XIII New Source Review

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. The rules of Regulation XIII provide for the requirements identified below.

4.6.1 BACT

An applicant must provide BACT for all affected pollutants expected to be emitted from a new emissions unit. The emergency generator will comply with BACT with the use of a Tier 2 compliant engine, ultra low sulfur diesel and good combustion practices.

As noted elsewhere, the Applicant plans to order the equipment upon approval of the CEC license, anticipated in 2010. The appropriate design standard for 2010 model year engines greater than 750 horsepower is the Tier 2 standard. The Applicant proposed a Tier 2 engine for the emergency generator based on the emission standards identified in 40 Code of Federal Regulations (CFR), Part 60, Subpart IIII, Standards of Performance for Stationary Compression Ignition Internal Combustion Engines. If the equipment is not ordered until 2011, the appropriate design standard would be the Interim Tier 4 standards, in accordance with the California Airborne Toxic Control Measure (ATCM) for Stationary Compression Ignition Engines.

4.6.2 Offsets

An applicant must provide offsets for new or modified stationary source of PM10, SOx, NOx, CO or VOC for the source's potential to emit when the source's potential to emit equals or exceeds the offset trigger levels identified in the rule. Emergency standby equipment for non-utility electrical power generation is exempt from offset requirements provided that the engine does not exceed 200 hours per years. The PSPP emergency engine is limited to 50 hours per year for maintenance and testing purposes and emergency plus non-

emergency use are not expected to exceed 200 hours of operation per year; thus, the Applicant is not required to provide offsets for the generator engines.

4.7 Regulation XIV Toxics and Other Non-Criteria Pollutants

4.7.1 Rule 1401 New Source Review of Toxic Air Contaminants

This rule specifies limits for maximum individual cancer risk, cancer burden, and non-cancer acute and chronic hazard index from new permit units, relocations, or modifications to existing permit units which emit TAC listed in Table I of the rule. In order to demonstrate compliance with this rule, a Tier 2 Screening Risk Assessment was prepared; the screening assessment is provided in **Appendix E**. The HRA was conducted for each engine individually consistent with SCAQMD policy, as each engine is a single permit unit.

The estimated maximum hourly and annual emissions of DPM were assumed to be equal to the PM10 emissions from the generator; the DPM emissions rates are presented in **Table 3-2** for the single generator engine. As noted elsewhere, Tier 2 emission standards were used in the emission calculations and this health risk assessment. If the equipment is not ordered until 2011, the appropriate design standard would be the Interim Tier 4 standard and DPM emissions would be lower than the emissions from the Tier 2 engine. In that case, the health risk impacts would be lower than the impacts predicted for the Tier 2 engine.

That emission rate is used in a Tier 2 screening risk assessment to determine the MICR, HIC and HIA, using the methodology described in "Risk Assessment Procedures for Rules 1401 and 212, Version 7.0," and the values used in the calculations were taken from Permit Application package "L." The calculations for the MICR and HIC for the residential receptor and worker receptor are attached as in **Appendix E.**

The emissions from the generator engine are stack emissions and, therefore, the risk assessment is based on a point source release operating less than 12 hours per day. The release height for emissions from the generator engine is approximately 23 feet above ground surface through a stack. It was assumed that both the worker receptor and the residential receptor are both more than 1,000 meters from the stack. The appropriate meteorological monitoring (MET) station is Riverside.

Table 4-2 Summary of Risk Calculations

Risk Parameter	Predicted Risk Value	Rule 1401 Limit	Status
MICR - Resident	3.13E-07	1.0E-06	Complies
MICR – Worker	2.59E-07	1.0E-06	Complies
HIC – Worker	1.95E-03	1.0	Complies
HIC – Resident	1.95E-03	1.0	Complies
HIA	N/A	1.0	N/A

4.7.2 Rule 1401.1 Requirements for New and Relocated Facilities Near Schools

This rule further reduces the allowable level of health risk at schools located within 1,000 feet of a new or relocated source emitting Rule 1401 listed TACs. Since the Project is not located within 1,000 feet of a school, this rule is not applicable.

4.7.3 Rule 1470 Requirements for Stationary Diesel-Fueled Internal Combustion or Other Compression Ignition Engines

This rule pertains to emergency stationary diesel-fueled engines greater than 50-hp and establishes fuel requirements, operating requirements and emission standards engines. The rule limits the non-emergency operation of each emergency generator to 50 hours of operation for maintenance and testing purposes.

The Project will limit the non-emergency hours of operation of the emergency engine to one hour per week, not to exceed 50 hours per year, and will install a totalizing hour meter to substantiate compliance with the use limitation. The Project will only use California Air Resources Board (CARB) diesel fuel, also known as ultra-low sulfur diesel, in the emergency generator engine and will retain purchase records and Material Safety Data Sheets (MSDSs) to substantiate compliance with the fuel sulfur requirement. Since there are no schools within 1,000 feet of the Project site, the requirements for engines on school grounds or within 1,000 feet of a school do not apply.

4.8 California Airborne Toxic Control Measure for Stationary Compression Ignition Engines

The California Airborne Toxic Control Measure (ATCM) for CI engines specifies operating requirements and exhaust emission standards for stationary CI engines. In California, DPM is regulated as a TAC. The ATCM for CI engines requires the use of CARB diesel fuel (15 parts per million [ppm] sulfur by weight) and also includes emission standards for criteria pollutants.

At this time, the Applicant plans to order the equipment upon approval of the CEC license, anticipated in 2010. The appropriate design standard for 2010 model year engines greater than 750 horsepower is the Tier 2 standard. If the equipment is not ordered until 2011, the appropriate design standard would be the Interim Tier 4 standards.

The operator will limit the hours of operations of the emergency generator engine to one hour per week, not to exceed 50 hours per year, and will install a totalizing hour meter to substantiate compliance with the use limitation. The facility will use only CARB diesel fuel in the generator engine and retain purchase records and MSDSs to substantiate compliance with the fuel sulfur requirement.

4.9 California Environmental Quality Act (CEQA)

Through a Memorandum of Understanding between the two agencies, the BLM and CEC are conducting a joint review of the PSPP. This joint process will allow BLM to discharge its obligations under the National Environmental Policy Act (NEPA), 42 United States Code §§4321-4347, and also allow the CEC to meet its obligations under CEQA, California Public Resources Code §§21000-21177. Although CEQA and NEPA differ in several respects, they are sufficiently similar and flexible that a single environmental document can be prepared that will comply with both laws. The BLM and CEC are preparing a combined NEPA/CEQA document. The potential environmental impacts of the Project have been addressed by the Applicants in an Application for Certification (AFC) filed with the CEC on August 24, 2009. This AFC is intended to support compliance by BLM and the CEC with the requirements of both NEPA and CEQA in the planned combined NEPA/CEQA document. The CEC will look to the District to issue a DOC rather than the normal PTC. The original permit application for the DOC was submitted to the SCAQMD in September 2009. Form 400-CEQA is provided in **Appendix A**.

Appendix A

Application Forms

South Coast Air Quality Management District

Form 400-A

Application For Permit To Construct and Permit To Operate

Mail Application To:
P.O. Box 4944
Diamond Bar, CA 91765

Tel: (909) 396-3385
www.aqmd.gov

Section A: Operator Information

1. Business Name of Operator To Appear On The Permit:
Palen Solar I, LLC

2. Valid AQMD Facility ID (Available on Permit or Invoice issued by AQMD): 161483

3. Owner's Business Name (only if different from Business Name of Operator):

Section B: Equipment Location

4. Equipment Location Address:
For equipment operated at various locations in AQMD's jurisdiction, provide address of initial site

Off Corn Spring Road Exit 10 miles East of Desert Center
Street Address

Desert Center | CA, | 92239
City | State | Zip Code

County: ○ Los Angeles ○ Orange ○ San Bernardino ● Riverside

Contact Name: Elizabeth Ingram

Contact Title: Associate Project Manager Phone: (510) 809-4663

Fax: (510) 524-5516 E-Mail: ingram@solarmillennium.com

Section C: Permit Mailing Address

5. Permit and Correspondence Information:
☐ Check here if same as equipment location address

1625 Shattuck Ave., Suite 270
Street Address

Berkeley | CA | 94709
City | State | Zip Code

Contact Name: Elizabeth Ingram

Contact Title: Associate Project Manager Phone: (510) 809-4663

Fax: (510) 524-5516 E-Mail: ingram@solarmillennium.com

Section D: Application Type

The facility is in ○ RECLAIM ○ Title V ○ RECLAIM & Title V Program (please check if applicable)

6. Reason for Submitting Application (Select only ONE):

- ● New Construction (Permit to Construct)
- ○ Equipment Operating Without A Permit or Expired Permit*
- ○ Administrative Change
- ○ Equipment On-Site But Not Constructed or Operational
- ○ Title V Application (Initial, Revisions, Modifications, etc.)
- ○ Compliance Plan
- ○ Facility Permit Amendment
- ○ Registration/Certification
- ○ Streamlined Standard Permit
- ○ Permitted Equipment Altered/ Modified Without Permit Approval*
- ○ Proposed Alteration/Modification to Permitted Equipment
- ○ Change of Condition For Permit To Operate
- ○ Change of Condition For Permit To Construct
- ○ Change of Location—Moving to New Site

Existing Or Previous Permit/Application Number:
(If you checked any of the items in this column, you MUST provide a existing Permit/ Application Number)

* A Higher Permit Processing Fee applies to those items with an asterisk (Rule 301 (c) (1) (D)

7. Estimated Start Date of Operation/Construction (MM/DD/YYYY): 10/01/2010

8. Description of Equipment:
Emergency diesel-fueled electrical generator, 2,922 HP, Unit #1 (A/N 502595)

9. Is this equipment portable AND will it be operated at different locations within AQMD's jurisdiction? ● No ○ Yes

10. For Identical equipment, how many additional applications are being submitted with this application? (Form 400-A required for each) 1

11. Are you a Small Business as per AQMD's Rule 102 definition? (10 employees or less and total gross receipts are $500,000 or less, or a not-for-profit training center?) ● No ○ Yes

12. Has a Notice of Violation (NOV) or a Notice To Comply (NC) been issued for this equipment?
● No ○ Yes If yes, provide NOV/NC #:

Section E: Facility Business Information

13. What type of business is being conducted at this equipment location?
Solar electric generating facility

14. What is your businesses primary NAICS Code (North American Industrial Classification System)? 221119

15. Are there other facilities in the SCAQMD jurisdiction operated by the same operator? ● No ○ Yes

16. Are there any schools (K-12) within a 1000-ft. radius of the equipment physical location? ● No ○ Yes

Section F: Authorization/Signature

I hereby certify that all information contained herein and information submitted with this application is true and correct.

17. Signature of Responsible Official:
Alice L. Harron

18. Title:
Sr. Dr. Development

19. Print Name:
Alice L Harron

20. Date:
1/28/10

Check List

- ☒ Form(s) signed and dated by authorized official
- ☒ Supplemental Equipment Form (400-E-XX or 400-E-GEN)
- ☒ CEQA Form (400-CEQA) attached
- ☒ Payment for permit processing fee attached

Your application will be rejected if any of the above items are missing.

AQMD USE ONLY	APPLICATION/TRACKING #	TYPE B C D	EQUIPMENT CATEGORY CODE:	FEE SCHEDULE: $	VALIDATION
ENG. A R DATE	ENG. A R DATE	CLASS I III IV	ASSIGNMENT Unit Engineer	CHECK/MONEY ORDER #	AMOUNT $	Tracking #

South Coast Air Quality Management District

FORM 400-E-13a

Emergency Internal Combustion Engine

Mail Application To:
SCAQMD
P.O. Box 4944
Diamond Bar, CA 91765

Tel: (909) 396-3385

www.aqmd.gov

This form must be accompanied by a completed Application for a Permit to Construct/Operate -Form 400A

Permit to be issued to (Business name of operator to appear on permit):
Palen Solar I, LLC

Street location where the equipment will be operated (for equipment which will be moved to various location in AQMD's jurisdiction, please list the initial location site): Corn Springs Road Exit 10 mi. E. of Desert Center (◉ Fixed ○ Various)

Section A: EQUIPMENT INFORMATION

Internal Combustion Engine

- Manufacturer: Cummins
- Model No.: QSK60-G6
- Serial No.: Unknown
- Date of Manufacture: (mm/dd/yyyy)
- Manufacturer Maximum Rating: 2922.0 BHP @ RPM
- Date of Installation: 10/01/2010 (mm/dd/yyyy)

For an ICE manufactured after 7/18/94, please provide manufacturer's specification and guarantee.

ICE Emergency Function: ◉ Electrical Generator ○ Fire Pump ○ Flood Control ○ Pump Driver ○ Compressor

Type: ◉ Fixed site ○ Portable — How Is This Type of Equipment Used? (Check All That Apply) ☒ Within Facility ☐ Off- Site ☐ Rental

Fuel: ○ Diesel Oil No. 2 ○ LPG ○ Natural Gas ◉ Other: Ultra-low sulfur CARB diesel fuel

Cycle Type: ○ Two Cycle ◉ Four Cycle

Combustion Type: ◉ Lean Burn ○ Rich Burn

No. of Cylinders: ○ Four ○ Six ○ Eight ○ Ten ○ Twelve ◉ Sixteen ○ Other

Aspiration Type: ○ Turbocharged ◉ Turbocharged/Aftercooled ○ Naturally Aspirated ☐ Timing Retarded ≥ 4° (relative to standard timing)

Air Pollution Control (if applicable)

- ○ Selective Catalytic Reduction (SCR)*
- ○ Selective Non-catalytic Reduction (SNCR)*
- ○ Non-selective Catalytic Reduction (NSCR)
- ◉ No Controls
- ○ Air Fuel Ratio Controller
- ○ Other (specify)

* Separate application is required.

Manufacturer: Model No.:

If already permitted, indicate Permit No. Device No.

Section B: OPERATION INFORMATION

Fuel Consumption

Maximum Rated load: 141.400 gal./hr. OR cu. ft./hr Average Load: 141.400 gal./hr. OR cu. ft./hr.

Operating Schedule

Normal:	1	hours/day	1	days/week	50 weeks/yr.
Maximum:	1	hours/day	1	days/week	50 weeks/yr.

Testing & Maintenance (Emergency ICE only): 50 hours/year

CONFIDENTIAL INFORMATION

Under the California Public Records Act, all information in your permit application will be considered a matter of public record and may be disclosed to a third party. If you wish to keep certain items as confidential, please complete the following steps:

(a) Make a copy of any page containing confidential information blanked out. Label this page "public copy."
(b) Label the original page "confidential." Circle all confidential items on the page.
(c) Prepare a written justification for the confidentiality of each confidential item. Append this to the confidential copy.

Serial Number: Unknown

Engine Data

(1) Select year of manufacture and rated horsepower.

(2) Provide actual emission figures from manufacturing specifications (if available) for the Rated Power selected. If engine fuel is LPG or Natural Gas, select Spark Ignition.

(3) The compression ignited diesel fuel internal combustion engine (ICE's) must meet the State of California or EPA's Non-Road Emission Standards as listed below (please provide manufacturer's specification and guarantee.

	Rated Power	Year	Figures	Carbon Monoxide (grams/bhp-hr)	Hydrocarbons (grams/bhp-hr)	Oxides of Nitrogen (grams/bhp-hr)	Particulate Matter (grams/bhp-hr)
Compressor Ignition							
	50 – 750 H.P.						
	○	50 - 100 H.P.	BACT	8.5	1.0	6.9	0.38
			Actual				
	○	100 - 175 H.P.	BACT	8.5	1.0	6.9	0.38
			Actual				
	○	175 - 750 H.P.	BACT	2.6	1.0	3.8	0.15
			Actual				
	751 and greater H.P						
	◉	2000 and	BACT	8.5	1.0	6.9	0.38
			Actual	2.600	0.240	4.560	0.150

		Figures	VOC	NOx	CO
Spark Ignition		For natural gas fired or LPG. The ICE must meet the requirements for BACT as listed below.			
	○	BACT	1.5 grams/bhp-hr	1.5 grams/bhp-hr	2.0 grams/bhp-hr
		Actual			

Section C: APPLICANT CERTIFICATION STATEMENT

I hereby certify that all information contained herein and information submitted with this application is true and correct.

SIGNATURE OF PREPARER:	TITLE OF PREPARER:	
CONTACT PERSON FOR INFORMATION ON THIS EQUIPMENT: Elizabeth Ingram	CONTACT PERSON'S TELEPHONE NUMBER (510) 809-4663	DATE SIGNED:

Serial Number: Unknown

South Coast Air Quality Management District

FORM 400-E-13A

Emergency ICE Attachment A

Official Use Only

Engr. Ini.	
A/N	
Appln Date:	
Class	

Data Input

Applicant	Palen Solar I, LLC	**ID**	161483
Mailing Address	1625 Shattuck Ave, Suite 270, Berkeley, CA 94709		
Equipment Location	Corn Springs Road Exit 10 mi. E. of Desert Center	**Equipment Type**	Fixed site

Equipment Description		
	Manufacturer:	Cummins
	Model No:	QSK60-G6
	Serial No.:	Unknown
	Manufacturer Date:	
	Installation Date:	
	Cylinders:	Sixteen
	HP Rating:	2922.00

Aspiration Type	**Turbocharged**	**Turbocharged/Aftercooled**	**Naturally Aspirated**
	0	X	0
	Turbocharged/Aftercooled		

Driving (ICE Emergency Function)	**Generator**	**Compressor**	**Pump**
	X	0	0
	Electrical Generator		

Emission Factors, g/HP-hr	**VOC**	**NOx**	**CO**	**PM**
	0.240	4.560	2.600	0.150
	(Note: Emission factors taken from engine manufacturer specs included with application			

Retard Timing	**Yes**	**No**

Operating Schedule				
	Hrs/Day Max.	1	**Hrs/Month Max**	4
	Hrs/Day Ave.	1	**Wks/Yr**	50
	Days/Wk.	1		
	Days/Mo	4		

South Coast Air Quality Management District

FORM 400-E-13A

Emergency ICE Attachment A

Official Use Only

A/N:	

Given

HP	2922.00						
G to lb conversion factor	0.0022046						
Operating Schedule	Hrs/Day Max.	1					
	Hrs/Day Avg.	1					
	Days/Wk.	1					
	Days.Mo.	4					
	Hrs/Month Max.	4					
	Wks/Yr.	50					
Emission Factors	VOC	NOx	SOx	CO	PM	PM10	
	0.240	4.560	0.160	2.600	0.150	0.144	
Retard Timing	Yes	No					
Emission Correction Factor	VOC	NOx	SOx	CO	PM	PM10	
	1.000	1.000	1.000	1.000	1.000	1.000	

Computations

	VOC	NOx	SOx	CO	PM	PM10
Emission factor, g/HP-hr	0.240	4.560	0.160	2.600	0.150	0.144
lb/hr.	1.546	29.375	1.031	16.749	0.966	0.928
lb/day Max.	2	29	1	17	1	1
lb/day Avg.	0	3	0	2	0	0
lb/yr.	78.846	1498.125	52.581	854.199	49.266	47.328

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT *ENGINEERING AND COMPLIANCE* APPLICATION PROCESSING AND CALCULATIONS	PAGE	1 of 3	For Official Use Only
	CHECKED BY:		
	A/N:		
	PROCESSED BY:		
	DATE:		

Applicant's Name: Palen Solar I, LLC ID: 161483

Equipment Location: Corn Springs Road Exit 10 mi. E. of Desert Center

Equipment Description:

EQUIPMENT:	INTERNAL COMBUSTION ENGINE
MANUFACTURER:	Cummins
MODEL NO.:	QSK60-G6
FUELED WITH:	Ultra-low sulfur CARB diesel fuel
DRIVING:	Electrical Generator
SERIAL NO.:	Unknown
CYLINDERS:	Sixteen
ASPIRATION:	Turbocharged/Aftercooled
HP RATING:	2922.00

Permit Description:

INTERNAL COMBUSTION ENGINE, Fixed site, Cummins, MODEL NO. QSK60-G6, SERIAL NO. Unknown, Ultra-low sulfur CARB diesel fuel FUELED, Four CYCLES, Sixteen CYLINDERS, Turbocharged/Aftercooled, RATED AT 2922 B.H.P., DRIVING AN EMERGENCY Electrical Generator.

CALCULATIONS
See ATTACHMENT A

EVALUATION:

Rule 212: (Not Applicable if more than 1,000 feet from a school.)

This is a not significant project as defined by this rule. Hence, public notice is not required.

Rule 401:

Based on experience with similar equipment, this engine is expected to comply with the visible emission limits.

Rule 402:

Based on experience with similar equipment, nuisance complaints are not expected.

Rule 404:

Based on experience with similar equipment, compliance with this rule is expected.

Rule 431.2:

Diesel fuel supplied to this equipment must contain 0.05% or less sulfur by weight. Compliance is expected.

Rule 1110.2:

Exempt per Rule 1110.2 (i)(2) and (i)(10).

REGULATION XIII:

Exempt per Rule 1301 (b)(3).

REGULATION XIV:

Exempt per Rule 1401 (g)(1)(F).

CARB-EPA Emission Limits for Nonroad Compression-Ignited Engines:

For engine manufacture date on or after _____ and engine rating between 751 and greater H.P. _____, the following emission limits apply:

	NOx	ROG	CO	PM
Required	6.9	1	8.5	0.4
Actual	4.560	0.240	2.600	0.150
Compliance	Yes	Yes	Yes	Yes

CONDITIONS

1. OPERATION OF THIS EQUIPMENT SHALL BE CONDUCTED IN COMPLIANCE WITH ALL DATA AND SPECIFICATIONS SUBMITTED WITH THE APPLICATION UNDER WHICH THIS PERMIT IS ISSUED.

2. THIS EQUIPMENT SHALL BE PROPERLY MAINTAINED AND KEPT IN GOOD OPERATING CONDITIONS AT ALL TIMES.

3. SULFUR CONTENT OF DIESEL FUEL SUPPLIED TO THE ENGINE SHALL NOT EXCEED 0.05% BY WEIGHT.

4. THIS ENGINE SHALL NOT OPERATE MORE THAN 200 HOURS IN ANY ONE YEAR.

5. THIS ENGINE SHALL NOT OPERATE MORE THAN 50 HOURS IN ANY ONE YEAR FOR MAINTENANCE AND TESTING PURPOSES.

6. AN OPERATIONAL NON-RESETTABLE TOTALIZING TIME METER SHALL BE INSTALLED AND MAINTAINED TO INDICATE THE ENGINE ELAPSED OPERATING TIME.

7. AN ENGINE OPERATING LOG LISTING THE DATE OF OPERATION AND THE ELAPSED TIME, IN HOURS, AND THE REASON FOR OPERATION SHALL BE KEPT AND MAINTAINED ON FILE FOR A MINIMUM OF TWO YEARS AND MADE AVAILABLE TO DISTRICT PERSONNEL UPON REQUEST.

8. IN ADDITION TO MAINTENANCE AND TESTING OF THIS ENGINE, THIS ENGINE SHALL ONLY BE USED FOR EITHER PROVIDING ELECTRICAL POWER TO PORTABLE OPERATIONS OR EMERGENCY POWER TO STATIONARY SOURCES. PORTABLE OPERATIONS ARE THOSE WHERE IT CAN BE DEMONSTRATED THAT BECAUSE OF THE NATURE OF THE OPERATION. IT IS NECESSARY TO PERIODICALLY MOVE THE EQUIPMENT FROM ONE LOCATION TO ANOTHER. EMERGENCIES AT STATIONARY SOURCES ARE THOSE THAT RESULT IN AN INTERRUPTION OF SERVICE OF THE PRIMARY POWER SUPPLY OR DURING STAGE II OR III ELECTRICAL EMERGENCIES DECLARED BY THE CALIFORNIA INDEPENDENT SYSTEM OPERATOR.

9. UPON THE FIFTH DAY AFTER PLACEMENT OF THIS EQUIPMENT INTO OPERATION AT A NEW SITE, THE DISTRICT SHALL BE NOTIFIED VIA TELEPHONE AT 1-877-810-6995 OF THE EXACT NATURE OF THE PROJECT AS FOLLOWS:

   A. THE PERMIT NUMBER OF THE PORTABLE EQUIPMENT.

   B. THE NAME AND TELEPHONE NUMBER OF A CONTACT PERSON.

   C. THE LOCATION WHERE THE PORTABLE EQUIPMENT WILL BE OPERATED.

   D. THE ESTIMATED TIME THE PORTABLE EQUIPMENT WILL BE LOCATED AT THE SITE.

   E. DESCRIPTION OF THE PROJECT.

   F. IF LESS THAN 1/4 MILE, THE DISTANCE TO THE NEAREST SENSITIVE RECEPTOR. SENSITIVE RECEPTORS ARE DEFINED AS LONG-TERM HEALTH CARE FACILITIES, REHABILITATION CENTERS, CONVALESCENT CENTERS, RETIREMENT HOMES, RESIDENCES, SCHOOLS, PLAYGROUNDS, CHILD CARE CENTERS, AND ATHLETIC FACILITIES.

10. THIS ENGINE AND ITS REPLACEMENT UNIT INTENDED TO PERFORM THE SAME OR SIMILAR FUNCTION, SHALL NOT RESIDE AT ANY ONE LOCATION FOR MORE THAN 12 CONSECUTIVE MONTHS. THE PERIOD DURING WHICH THE ENGINE AND ITS REPLACEMENT IS MAINTAINED AT A STORAGE FACILITY SHALL BE EXCLUDED FROM RESIDENCY TIME DETERMINATION.

11. THIS ENGINE SHALL NOT BE REMOVED FROM ONE LOCATION FOR A PERIOD OF TIME, AND THEN IT OR ITS EQUIVALENT ENGINE RETURNED TO THE SAME LOCATION, IN ORDER TO CIRCUMVENT THE PORTABLE ENGINE RESIDENCE TIME REQUIREMENTS.

South Coast Air Quality Management District

FORM 400-E-13a

Emergency Internal Combustion Engine

Mail Application To:
SCAQMD
P.O. Box 4944
Diamond Bar, CA 91765
Tel: (909) 396-3385
www.aqmd.gov

This form must be accompanied by a completed Application for a Permit to Construct/Operate -Form 400A

Permit to be issued to (Business name of operator to appear on permit):
Palen Solar I, LLC

Street location where the equipment will be operated (for equipment which will be moved to various location in AQMD's jurisdiction, please list the initial location site): Corn Springs Road Exit 10 mi. E. of Desert Center ◉ Fixed ○ Various

Section A: EQUIPMENT INFORMATION

Internal Combustion Engine

Manufacturer: Cummins	Model No.: QSK60-G6
Serial No.: Unknown	Date of Manufacture: (mm/dd/yyyy)
Manufacturer Maximum Rating: 2922 ± BHP @ RPM	Date of Installation: 10/01/2010 (mm/dd/yyyy)

For an ICE manufactured after 7/18/94, please provide manufacturer's specification and guarantee.

ICE Emergency Function: ◉ Electrical Generator ○ Fire Pump ○ Flood Control ○ Pump Driver ○ Compressor

Type: ◉ Fixed site ○ Portable — How Is This Type of Equipment Used? (Check All That Apply) ☒ Within Facility ☐ Off- Site ☐ Rental

Fuel: ○ Diesel Oil No. 2 ○ LPG ○ Natural Gas ◉ Other: Ultra-low sulfur CARB diesel fuel

Cycle Type: ○ Two Cycle ◉ Four Cycle

Combustion Type: ◉ Lean Burn ○ Rich Burn

No. of Cylinders: ○ Four ○ Six ○ Eight ○ Ten ○ Twelve ◉ Sixteen ○ Other

Aspiration Type: ○ Turbocharged ◉ Turbocharged/Aftercooled ☐ Timing Retarded ≥ 4° (relative to standard timing) ○ Naturally Aspirated

Air Pollution Control (if applicable)

○ Selective Catalytic Reduction (SCR)* ◉ No Controls
○ Selective Non-catalytic Reduction (SNCR)* ○ Air Fuel Ratio Controller
○ Non-selective Catalytic Reduction (NSCR) ○ Other (specify)

* Separate application is required.

Manufacturer: Model No.:

If already permitted, indicate Permit No. Device No.

Section B: OPERATION INFORMATION

Fuel Consumption

Maximum Rated load: 141.4 ± gal./hr. OR cu. ft./hr Average Load: gal./hr. OR cu. ft./hr.

Operating Schedule

Normal:	1 hours/day	1 days/week	50 weeks/yr.
Maximum:	1 hours/day	1 days/week	50 weeks/yr.

Testing & Maintenance (Emergency ICE only): 50 hours/year

CONFIDENTIAL INFORMATION

Under the California Public Records Act, all information in your permit application will be considered a matter of public record and may be disclosed to a third party. If you wish to keep certain items as confidential, please complete the following steps:
(a) Make a copy of any page containing confidential information blanked out. Label this page "public copy."
(b) Label the original page "confidential." Circle all confidential items on the page.
(c) Prepare a written justification for the confidentiality of each confidential item. Append this to the confidential copy.

Serial Number: Unknown

Engine Data

(1) Select year of manufacture and rated horsepower.

(2) Provide actual emission figures from manufacturing specifications (if available) for the Rated Power selected. If engine fuel is LPG or Natural Gas, select Spark Ignition.

(3) The compression ignited diesel fuel internal combustion engine (ICE's) must meet the State of California or EPA's Non-Road Emission Standards as listed below (please provide manufacturer's specification and guarantee.

Rated Power	Year	Figures	Carbon Monoxide (grams/bhp-hr)	Hydrocarbons (grams/bhp-hr)	Oxides of Nitrogen (grams/bhp-hr)	Particulate Matter (grams/bhp-hr)
Compressor Ignition						
50 – 750 H.P.						
○	50 - 100 H.P.	BACT	8.5	1.0	6.9	0.38
		Actual				
○	100 - 175 H.P.	BACT	8.5	1.0	6.9	0.38
		Actual				
○	175 - 750 H.P.	BACT	2.6	1.0	3.8	0.15
		Actual				
751 and greater H.P						
◉	2000 and	BACT	8.5	1.0	6.9	0.38
		Actual	2.600	0.240	4.560	0.150

		Figures	VOC	NOx	CO
Spark Ignition		For natural gas fired or LPG. The ICE must meet the requirements for BACT as listed below.			
	○	BACT	1.5 grams/bhp-hr	1.5 grams/bhp-hr	2.0 grams/bhp-hr
		Actual			

Section C: APPLICANT CERTIFICATION STATEMENT

I hereby certify that all information contained herein and information submitted with this application is true and correct

SIGNATURE OF PREPARER:	TITLE OF PREPARER:	
CONTACT PERSON FOR INFORMATION ON THIS EQUIPMENT : Elizabeth Ingram	CONTACT PERSON'S TELEPHONE NUMBER (510) 809-4663	DATE SIGNED:

Serial Number: Unknown

South Coast Air Quality Management District

Form 400-A

Application For Permit To Construct and Permit To Operate

Mail Application To:
P.O. Box 4944
Diamond Bar, CA 91765

Tel: (909) 396-3385
www.aqmd.gov

Section A: Operator Information

1. Business Name of Operator To Appear On The Permit: Palen Solar I, LLC

2. Valid AQMD Facility ID (Available on Permit or Invoice issued by AQMD): 161484

3. Owner's Business Name (only if different from Business Name of Operator):

Section B: Equipment Location

4. Equipment Location Address:
For equipment operated at various locations in AQMD's jurisdiction, provide address of initial site

Off Corn Spring Road Exit 10 miles East of Desert Center
Street Address

Desert Center — CA, — 92239
City — State — Zip Code

County: ○ Los Angeles ○ Orange ○ San Bernardino ● Riverside

Contact Name: Elizabeth Ingram

Contact Title: Associate Project Manager Phone: (510) 809-4663

Fax: (510) 524-5516 E-Mail: ingram@solarmillennium.com

Section C: Permit Mailing Address

5. Permit and Correspondence Information:
☐ Check here if same as equipment location address

1625 Shattuck Ave., Suite 270
Street Address

Berkeley — CA, — 94709
City — State — Zip Code

Contact Name: Elizabeth Ingram

Contact Title: Associate Project Manager Phone: (510) 809-4663

Fax: (510) 524-5516 E-Mail: ingram@solarmillennium.com

Section D: Application Type

The facility is in ○ RECLAIM ○ Title V ○ RECLAIM & Title V Program (please check if applicable)

6. Reason for Submitting Application (Select only ONE):

- ● New Construction (Permit to Construct)
- ○ Equipment Operating Without A Permit or Expired Permit*
- ○ Administrative Change
- ○ Equipment On-Site But Not Constructed or Operational
- ○ Title V Application (Initial, Revisions, Modifications, etc.)
- ○ Compliance Plan
- ○ Facility Permit Amendment
- ○ Registration/Certification
- ○ Streamlined Standard Permit
- ○ Permitted Equipment Altered/ Modified Without Permit Approval*
- ○ Proposed Alteration/Modification to Permitted Equipment
- ○ Change of Condition For Permit To Operate
- ○ Change of Condition For Permit To Construct
- ○ Change of Location—Moving to New Site

Existing Or Previous Permit/Application Number:
(If you checked any of the items in this column, you MUST provide a existing Permit/ Application Number)

* A Higher Permit Processing Fee applies to those items with an asterisk (Rule 301 (c) (1) (D)

7. Estimated Start Date of Operation/Construction (MM/DD/YYYY): 10/01/2010

8. Description of Equipment:
Emergency diesel-fueled electrical generator, 2,922 HP, Unit #2 (A/N 502602)
Change Owner from Chevron Energy Solutions to Palen Solar I, LLC
Change Facility ID to 161483

9. Is this equipment portable AND will it be operated at different locations within AQMD's jurisdiction? ● No ○ Yes

10. For Identical equipment, how many additional applications are being submitted with this application? (Form 400-A required for each) 1

11. Are you a Small Business as per AQMD's Rule 102 definition?
(10 employees or less and total gross receipts are $500,000 or less, or a not-for-profit training center?) ● No ○ Yes

12. Has a Notice of Violation (NOV) or a Notice To Comply (NC) been issued for this equipment?
● No ○ Yes If yes, provide NOV/NC #:

Section E: Facility Business Information

13. What type of business is being conducted at this equipment location? Solar electric generating facility

14. What is your businesses primary NAICS Code (North American Industrial Classification System)? 221119

15. Are there other facilities in the SCAQMD jurisdiction operated by the same operator? ● No ○ Yes

16. Are there any schools (K-12) within a 1000-ft. radius of the equipment physical location? ● No ○ Yes

Section F: Authorization/Signature

I hereby certify that all information contained herein and information submitted with this application is true and correct.

17. Signature of Responsible Official: Alice L. Harron

18. Title: Sr Dir, Development

19. Print Name: Alice L. Harron

20. Date: 1/28/10

Check List

- ☒ Form(s) signed and dated by authorized official
- ☒ Supplemental Equipment Form (400-E-XX or 400-E-GEN)
- ☒ CEQA Form (400-CEQA) attached
- ☒ Payment for permit processing fee attached

Your application will be rejected if any of the above items are missing.

AQMD USE ONLY	APPLICATION/TRACKING #	TYPE B C D	EQUIPMENT CATEGORY CODE:	FEE SCHEDULE: $	VALIDATION
ENG. A R DATE	ENG. A R DATE	CLASS I III IV	ASSIGNMENT Unit Engineer	CHECK/MONEY ORDER #	AMOUNT $ / Tracking #

South Coast Air Quality Management District

FORM 400-E-13A

Emergency ICE Attachment A

Official Use Only

Engr. Ini.	
A/N	
Appln Date:	
Class	

Data Input

Applicant	Palen Solar I, LLC	**ID**	161483
Mailing Address	1625 Shattuck Ave, Suite 270 Berkeley, CA 94709		
Equipment Location	Corn Springs Road Exit 10 mi. E. of Desert Center	**Equipment Type**	Fixed site

Equipment Description		
	Manufacturer:	Cummins
	Model No:	QSK60-G6
	Serial No.:	Unknown
	Manufacturer Date:	
	Installation Date:	10/01/2010
	Cylinders:	Sixteen
	HP Rating:	2922.00

Aspiration Type	**Turbocharged**	**Turbocharged/Aftercooled**	**Naturally Aspirated**
	0	X	0
	Turbocharged/Aftercooled		

Driving (ICE Emergency Function)	**Generator**	**Compressor**	**Pump**
	X	0	0
	Electrical Generator		

Emission Factors, g/HP-hr	**VOC**	**NOx**	**CO**	**PM**
	0.240	4.560	2.600	0.150
	(Note: Emission factors taken from engine manufacturer specs included with application			

Retard Timing	**Yes**	**No**

Operating Schedule				
	Hrs/Day Max.	1	**Hrs/Month Max**	4
	Hrs/Day Ave.	1	**Wks/Yr**	50
	Days/Wk.	1		
	Days/Mo	4		

South Coast Air Quality Management District

FORM 400-E-13A

Emergency ICE Attachment A

Official Use Only

A/N:	

Given

HP	2922.00						
G to lb conversion factor	0.0022046						
Operating Schedule	Hrs/Day Max.	1					
	Hrs/Day Avg.	1					
	Days/Wk.	1					
	Days.Mo.	4					
	Hrs/Month Max.	4					
	Wks/Yr.	50					
Emission Factors	VOC	NOx	SOx	CO	PM	PM10	
	0.240	4.560	0.160	2.600	0.150	0.144	
Retard Timing	Yes	No					
Emission Correction Factor	VOC	NOx	SOx	CO	PM	PM10	
	1.000	1.000	1.000	1.000	1.000	1.000	

Computations

	VOC	NOx	SOx	CO	PM	PM10
Emission factor, g/HP-hr	0.240	4.560	0.160	2.600	0.150	0.144
lb/hr.	1.546	29.375	1.031	16.749	0.966	0.928
lb/day Max.	2	29	1	17	1	1
lb/day Avg.	0	3	0	2	0	0
lb/yr.	78.846	1498.125	52.581	854.199	49.266	47.328

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT *ENGINEERING AND COMPLIANCE* APPLICATION PROCESSING AND CALCULATIONS	PAGE	1 of 3	For Official Use Only
	CHECKED BY:		
	A/N:		
	PROCESSED BY:		
	DATE:		

Applicant's Name: Palen Solar I, LLC ID: 161483

Equipment Location: Corn Springs Road Exit 10 mi. E. of Desert Center

Equipment Description:

EQUIPMENT:	INTERNAL COMBUSTION ENGINE
MANUFACTURER:	Cummins
MODEL NO.:	QSK60-G6
FUELED WITH:	Ultra-low sulfur CARB diesel fuel
DRIVING:	Electrical Generator
SERIAL NO.:	Unknown
CYLINDERS:	Sixteen
ASPIRATION:	Turbocharged/Aftercooled
HP RATING:	2922.00

Permit Description:

INTERNAL COMBUSTION ENGINE, Fixed site, Cummins, MODEL NO. QSK60-G6, SERIAL NO. Unknown, Ultra-low sulfur CARB diesel fuel FUELED, Four CYCLES, Sixteen CYLINDERS, Turbocharged/Aftercooled, RATED AT 2922 B.H.P., DRIVING AN EMERGENCY Electrical Generator.

CALCULATIONS
See ATTACHMENT A

EVALUATION:

Rule 212: (Not Applicable if more than 1,000 feet from a school.)

This is a not significant project as defined by this rule. Hence, public notice is not required.

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Based on experience with similar equipment, this engine is expected to comply with the visible emission limits.

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Based on experience with similar equipment, nuisance complaints are not expected.

Rule 404:

Based on experience with similar equipment, compliance with this rule is expected.

Rule 431.2:

Diesel fuel supplied to this equipment must contain 0.05% or less sulfur by weight. Compliance is expected.

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Exempt per Rule 1110.2 (i)(2) and (i)(10).

REGULATION XIII:

Exempt per Rule 1301 (b)(3).

REGULATION XIV:

Exempt per Rule 1401 (g)(1)(F).

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For engine manufacture date on or after _____ and engine rating between 751 and greater H.P. _____, the following emission limits apply:

	NOx	ROG	CO	PM
Required	6.9	1	8.5	0.4
Actual	4.560	0.240	2.600	0.150
Compliance	Yes	Yes	Yes	Yes

CONDITIONS

1. OPERATION OF THIS EQUIPMENT SHALL BE CONDUCTED IN COMPLIANCE WITH ALL DATA AND SPECIFICATIONS SUBMITTED WITH THE APPLICATION UNDER WHICH THIS PERMIT IS ISSUED.

2. THIS EQUIPMENT SHALL BE PROPERLY MAINTAINED AND KEPT IN GOOD OPERATING CONDITIONS AT ALL TIMES.

3. SULFUR CONTENT OF DIESEL FUEL SUPPLIED TO THE ENGINE SHALL NOT EXCEED 0.05% BY WEIGHT.

4. THIS ENGINE SHALL NOT OPERATE MORE THAN 200 HOURS IN ANY ONE YEAR.

5. THIS ENGINE SHALL NOT OPERATE MORE THAN 50 HOURS IN ANY ONE YEAR FOR MAINTENANCE AND TESTING PURPOSES.

6. AN OPERATIONAL NON-RESETTABLE TOTALIZING TIME METER SHALL BE INSTALLED AND MAINTAINED TO INDICATE THE ENGINE ELAPSED OPERATING TIME.

7. AN ENGINE OPERATING LOG LISTING THE DATE OF OPERATION AND THE ELAPSED TIME, IN HOURS, AND THE REASON FOR OPERATION SHALL BE KEPT AND MAINTAINED ON FILE FOR A MINIMUM OF TWO YEARS AND MADE AVAILABLE TO DISTRICT PERSONNEL UPON REQUEST.

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9. UPON THE FIFTH DAY AFTER PLACEMENT OF THIS EQUIPMENT INTO OPERATION AT A NEW SITE, THE DISTRICT SHALL BE NOTIFIED VIA TELEPHONE AT 1-877-810-6995 OF THE EXACT NATURE OF THE PROJECT AS FOLLOWS:

   A. THE PERMIT NUMBER OF THE PORTABLE EQUIPMENT.

   B. THE NAME AND TELEPHONE NUMBER OF A CONTACT PERSON.

   C. THE LOCATION WHERE THE PORTABLE EQUIPMENT WILL BE OPERATED.

   D. THE ESTIMATED TIME THE PORTABLE EQUIPMENT WILL BE LOCATED AT THE SITE.

   E. DESCRIPTION OF THE PROJECT.

   F. IF LESS THAN 1/4 MILE, THE DISTANCE TO THE NEAREST SENSITIVE RECEPTOR. SENSITIVE RECEPTORS ARE DEFINED AS LONG-TERM HEALTH CARE FACILITIES, REHABILITATION CENTERS, CONVALESCENT CENTERS, RETIREMENT HOMES, RESIDENCES, SCHOOLS, PLAYGROUNDS, CHILD CARE CENTERS, AND ATHLETIC FACILITIES.

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11. THIS ENGINE SHALL NOT BE REMOVED FROM ONE LOCATION FOR A PERIOD OF TIME, AND THEN IT OR ITS EQUIVALENT ENGINE RETURNED TO THE SAME LOCATION, IN ORDER TO CIRCUMVENT THE PORTABLE ENGINE RESIDENCE TIME REQUIREMENTS.

South Coast Air Quality Management District

Form 400-CEQA

California Environmental Quality Act (CEQA) Applicability

Mail Application To:
P.O. Box 4944
Diamond Bar, CA 91765

Tel: (909) 396-3385

www.aqmd.gov

The SCAQMD is required by state law, the California Environmental Quality Act (CEQA), to review discretionary permit project applications for potential air quality and other environmental impacts. This form is a screening tool to assist the SCAQMD in clarifying whether or not the project[1] has the potential to generate significant adverse environmental impacts that might require preparation of a CEQA document [CEQA Guidelines §15060(a)].[2] Refer to the attached instructions for guidance in completing this form.[3] For each Form 400-A application, also complete and submit one Form 400-CEQA. If submitting multiple Form 400-A applications for the same project at the same time, only one 400-CEQA form is necessary for the entire project. If you need assistance completing this form, contact Lori Inga at (909) 396-3109.

FACILITY INFORMATION

Business Name of Operator to Appear on the Permit:	Facility ID (6-Digit):
Palen Solar I, LLC	161483

Project Description:

Application for Determination of Compliance/Permit to Construct solar powered electric generating facility

REVIEW FOR EXEMPTION FROM FURTHER CEQA ACTION

Check "Yes" or "No" as applicable

	Yes	No	Is this application for:
A.	◉	○	**A CEQA and/or NEPA document previously or currently prepared that specifically evaluates this project?** If yes, a permit cannot be issued until a Final CEQA document and Notice of Determination is submitted.
B.	○	◉	**A request for a change of permittee only (without equipment modifications)?**
C.	○	◉	**Equipment certification or equipment registration** (qualifies for Rule 222)**?**
D.	○	◉	**A functionally identical permit unit replacement with no increase in rating or emissions?**
E.	○	◉	**A change of daily VOC permit limit to a monthly VOC permit limit?**
F.	○	◉	**Equipment damaged as a result of a disaster during state of emergency?**
G.	○	◉	**A Title V** (i.e., Regulation XXX) **permit renewal (without equipment modifications)?**
H.	○	◉	**A Title V administrative permit revision?**
I.	○	◉	**The conversion of an existing permit into an initial Title V permit?**

If **"Yes"** is checked for any question above, your application does not require additional evaluation for CEQA applicability. Skip to page 2, "SIGNATURES" and sign and date this form.

REVIEW OF IMPACTS WHICH MAY TRIGGER CEQA

Complete Sections I-VI by checking "Yes" or "No" as applicable. To avoid delays in processing your application(s), explain all "Yes" responses on a separate sheet and attach it to this form.

	Yes	No	Section I – General
1.	○	○	**Has this project generated any known public controversy regarding potential adverse impacts that may be generated by the project?** Controversy may be construed as concerns raised by local groups at public meetings; adverse media attention such as negative articles in newspapers or other periodical publications, local news programs, environmental justice issues, etc.
2.	○	○	**Is this project part of a larger project?**
			Section II – Air Quality
3.	○	○	**Will there be any demolition, excavating, and/or grading construction activities that encompass an area exceeding 20,000 square feet?**
4.	○	○	**Does this project include the open outdoor storage of dry bulk solid materials that could generate dust?** If Yes, include a plot plan with the application package.

[1] A "project" means the whole of an action which has a potential for resulting in physical change to the environment, including construction activities, clearing or grading of land, improvements to existing structures, and activities or equipment involving the issuance of a permit. For example, a project might include installation of a new, or modification of an existing internal combustion engine, dry-cleaning facility, boiler, gas turbine, spray coating booth, solvent cleaning tank, etc.

[2] To download the CEQA guidelines, visit http://ceres.ca.gov/env_law/state.html.

[3] To download this form and the instructions, visit http://www.aqmd.gov/ceqa or http://www.aqmd.gov/permit

	Yes	No	
5.	○	○	**Would this project result in noticeable off-site odors from activities that may not be subject to SCAQMD permit requirements?** For example, compost materials or other types of greenwaste (i.e., lawn clippings, tree trimmings, etc.) have the potential to generate odor complaints subject to Rule 402 – Nuisance.
6.	○	○	**Does this project cause an increase of emissions from marine vessels, trains and/or airplanes?**
7.	○	○	**Will the proposed project increase the QUANTITY of hazardous materials stored aboveground onsite or transported by mobile vehicle to or from the site by greater than or equal to the amounts associated with each compound on the attached Table 1?[4]**
			Section III – Water Resources
8.	○	○	**Will the project increase demand for water at the facility by more than 5,000,000 gallons per day?** The following examples identify some, but not all, types of projects that may result in a "yes" answer to this question: 1) projects that generate steam; 2) projects that use water as part of the air pollution control equipment; 3) projects that require water as part of the production process; 4) projects that require new or expansion of existing sewage treatment facilities; 5) projects where water demand exceeds the capacity of the local water purveyor to supply sufficient water for the project; and 6) projects that require new or expansion of existing water supply facilities.
9.	○	○	**Will the project require construction of new water conveyance infrastructure?** Examples of such projects are when water demands exceed the capacity of the local water purveyor to supply sufficient water for the project, or require new or modified sewage treatment facilities such that the project requires new water lines, sewage lines, sewage hook-ups, etc.
			Section IV – Transportation/Circulation
10.			**Will the project result in** (Check all that apply):
	○	○	**a. the need for more than 350 new employees?**
	○	○	**b. an increase in heavy-duty transport truck traffic to and/or from the facility by more than 350 truck round-trips per day?**
	○	○	**c. increase customer traffic by more than 700 visits per day?**
			Section V – Noise
11.	○	○	**Will the project include equipment that will generate noise GREATER THAN 90 decibels (dB) at the property line?**
			Section VI – Public Services
12.			**Will the project create a permanent need for new or additional public services in any of the following areas** (Check all that apply):
	○	○	**a. Solid waste disposal?** Check "No" if the projected potential amount of wastes generated by the project is less than five tons per day.
	○	○	**b. Hazardous waste disposal?** Check "No" if the projected potential amount of hazardous wastes generated by the project is less than 42 cubic yards per day (or equivalent in pounds).

REMINDER: For each Yes checked in the sections above, attach all pertinent information including but not limited to estimated quantities, volumes, weights, etc.

SIGNATURES

I HEREBY CERTIFY THAT ALL INFORMATION CONTAINED HEREIN AND INFORMATION SUBMITTED WITH THIS APPLICATION IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE. I UNDERSTAND THAT THIS FORM IS A SCREENING TOOL AND THAT THE SCAQMD RESERVES THE RIGHT TO CONSIDER OTHER PERTINENT INFORMATION IN DETERMINING CEQA APPLICABILITY.

SIGNATURE OF RESPONSIBLE OFFICIAL OF FIRM:	TITLE OF RESPONSIBLE OFFICIAL OF FIRM:	
Alice L. Harron	Sr. Dir., Development	
TYPE OR PRINT NAME OF RESPONSIBLE OFFICIAL OF FIRM:	**RESPONSIBLE OFFICIAL'S TELEPHONE NUMBER:**	**DATE Signed:**
Alice L. Harron	510-809-4652	1/28/10
SIGNATURE OF PREPARER, IF PREPARED BY PERSON OTHER THAN RESPONSIBLE OFFICIAL OF FIRM:	**TITLE OF PREPARER:**	
Russell Kingsley	Program Manager	
TYPE OR PRINT NAME OF PREPARER:	**PREPARER'S TELEPHONE NUMBER:**	**DATE Signed:**
Russell Kingsley	805.388.3775	2/1/10

THIS CONCLUDES FORM 400-CEQA. INCLUDE THIS FORM AND THE ATTACHMENTS WITH FORM 400-A.

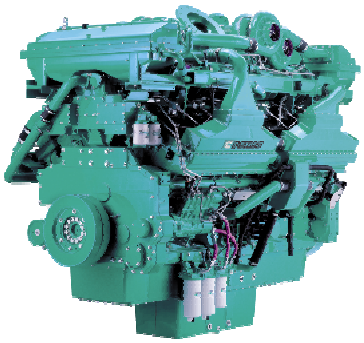
[4] Table 1 – Regulated Substances List and Threshold Quantities for Accidental Release Prevention can be found in the Instructions for Form 400-CEQA.

Appendix B

Equipment Specifications

QSK60-G6

Emissions Compliance
EPA Tier 2 @ 60Hz



> Specification sheet

Our energy working for you.™

Description

The QSK60 is a V 16 cylinder engine with a 60 litre displacement. This Quantum series utilizes sophisticated electronics and premium engineering to provide outstanding performance levels, reliability and versatility for Standby, Prime and Continuous Power applications.

CE	This engine has been built to comply with CE certification.
ISO 9001	This engine has been designed in facilities certified to ISO9001 and manufactured in facilities certified to ISO9001 or ISO9002.

Features

High pressure fuel pump, Modular Common Rail fuel System (MCRS) and state of the art integrated electronic control system provide superior performance, efficiency and diagnostics. The electronic fuel pumps deliver up to 1600 bar injection pressure and eliminate mechanical linkage adjustments. The new MCRS utilizes an electric priming pump which is integrated with the off-engine stage-1 fuel filter head and is controlled and powered by the engine ECM. The stage-2 fuel filters are mounted on-engine

CTT (Cummins Turbo Technologies) HX82/HX83 turbo-charging utilizes exhaust energy with greater efficiency for improved emissions and fuel consumption.

Low Temperature After-cooling - Two-pump Two-loop (2P2L)

Ferrous Cast Ductile Iron (FCD) Pistons - High strength design delivers superior durability.

G-Drive Integrated Design - Each component has been specifically developed and rigorously tested for G-Drive products, ensuring high performance, durability and reliability.

Service and Support - G-Drive products are backed by an uncompromising level of technical support and after sales service, delivered through a world class service network.

1800 rpm (60 Hz Ratings)

Gross Engine Output			Net Engine Output			Typical Generator Set Output					
Standby	Prime	Base	Standby	Prime	Base	Standby (ESP)		Prime (PRP)		Base (COP)	
kWm/BHP			kWm/BHP			kWe	kVA	kWe	kVA	kWe	kVA
2180/2923	1975/2648	1740/2333	2120/2843	1937/2598	1702/2282	2000	2500	1825	2281	1633	2042

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www.cumminsgdrive.com

(01/08) (GDSS169)

General Engine Data

Type	4 cycle, Turbocharged, After-cooled
Bore mm	159
Stroke mm	190
Displacement Litre	60.2
Cylinder Block	Cast iron, 16 cylinder
Battery Charging Alternator	55A
Starting Voltage	24V
Fuel System	Direct injection Cummins MCRS
Fuel Filter	Spin on fuel filters with water separator
Lube Oil Filter Type(s)	Spin on full flow filter
Lube Oil Capacity (l)	280
Flywheel Dimensions	SAE 0

Coolpac Performance Data

Cooling System Design	2 pump - 2 loop
Coolant Ratio	50% ethylene glycol; 50% water
Coolant Capacity (l)	Engine only – not applicable
Limiting Ambient Temp.**	
Fan Power	
Cooling System Air Flow (m^3/s)**	
Air Cleaner Type	Dry replaceable element with restriction indicator

** @ 13 mm H^2O

Ratings Definitions

Emergency Standby Power (ESP):
Applicable for supplying power to varying electrical load for the duration of power interruption of a reliable utility source. Emergency Standby Power (ESP) is in accordance with ISO 8528. Fuel Stop power in accordance with ISO 3046, AS 2789, DIN 6271 and BS 5514.

Limited-Time Running Power (LTP):
Applicable for supplying power to a constant electrical load for limited hours. Limited-Time Running Power (LTP) is in accordance with ISO 8528.

Prime Power (PRP):
Applicable for supplying power to varying electrical load for unlimited hours. Prime Power (PRP) is in accordance with ISO 8528. Ten percent overload capability is available in accordance with ISO 3046, AS 2789, DIN 6271 and BS 5514.

Base Load (Continuous) Power (COP):
Applicable for supplying power continuously to a constant electrical load for unlimited hours. Continuous Power (COP) in accordance with ISO 8528, ISO 3046, AS 2789, DIN6271 and BS 5514.

Weight & Dimensions

Length mm	Width mm	Height mm	Weight (dry) kg
2781	1794	2155	7185

Fuel Consumption 1800 (60 Hz)

%	kWm	BHP	L/ph	US gal/ph
Standby Power				
100	2180	2922	536	141.4
Prime Power				
100	1975	2647	470	124.1
75	1481	1985	381	100.6
50	987	1324	285	75.1
25	494	662	165	43.5
Continuous Power				
100	1740	2332	423	111.6

Cummins G-Drive Engines

Asia Pacific
10 Toh Guan Road
#07-01
TT International Tradepark
Singapore 608838
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Fax 65 6417 2399

Europe, CIS, Middle East and Africa
Manston Park Columbus Ave
Manston Ramsgate
Kent CT12 5BF. UK
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Latin America
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Guarulhos, SP 07180-900
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Phone 55 11 2186 4552
Fax 55 11 2186 4729

Mexico
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Fax 1 763 574 5298

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www.cumminsgdrive.com

(01/08) (GDSS169)

California Environmental Protection Agency AIR RESOURCES BOARD	CUMMINS INC.	EXECUTIVE ORDER U-R-002-0523 New Off-Road Compression-Ignition Engines

Pursuant to the authority vested in the Air Resources Board by Sections 43013, 43018, 43101, 43102, 43104 and 43105 of the Health and Safety Code; and

Pursuant to the authority vested in the undersigned by Sections 39515 and 39516 of the Health and Safety Code and Executive Order G-02-003;

IT IS ORDERED AND RESOLVED: That the following compression-ignition engines and emission control systems produced by the manufacturer are certified as described below for use in off-road equipment. Production engines shall be in all material respects the same as those for which certification is granted.

MODEL YEAR	ENGINE FAMILY	DISPLACEMENT (liters)	FUEL TYPE	USEFUL LIFE (hours)
2010	ACEXL060.AAD	60.0	Diesel	8000

SPECIAL FEATURES & EMISSION CONTROL SYSTEMS	TYPICAL EQUIPMENT APPLICATION
Direct Diesel Injection, Turbocharger, Charge Air Cooler, Engine Control Module	Generator Set

The engine models and codes are attached.

The following are the exhaust certification standards (STD) and certification levels (CERT) for hydrocarbon (HC), oxides of nitrogen (NOx), or non-methane hydrocarbon plus oxides of nitrogen (NMHC+NOx), carbon monoxide (CO), and particulate matter (PM) in grams per kilowatt-hour (g/kw-hr), and the opacity-of-smoke certification standards and certification levels in percent (%) during acceleration (Accel), lugging (Lug), and the peak value from either mode (Peak) for this engine family (Title 13, California Code of Regulations, (13 CCR) Section 2423):

RATED POWER CLASS	EMISSION STANDARD CATEGORY		EXHAUST (g/kw-hr)					OPACITY (%)		
			HC	NOx	NMHC+NOx	CO	PM	ACCEL	LUG	PEAK
kW > 560	Tier 2	STD	N/A	N/A	6.4	3.5	0.20	N/A	N/A	N/A
		CERT	--	--	5.4	0.5	0.09	--	--	--

BE IT FURTHER RESOLVED: That for the listed engine models, the manufacturer has submitted the information and materials to demonstrate certification compliance with 13 CCR Section 2424 (emission control labels), and 13 CCR Sections 2425 and 2426 (emission control system warranty).

Engines certified under this Executive Order must conform to all applicable California emission regulations.

This Executive Order is only granted to the engine family and model-year listed above. Engines in this family that are produced for any other model-year are not covered by this Executive Order.

Executed at El Monte, California on this 23 day of July 2009.

Annette Hebert, Chief
Mobile Source Operations Division

Engine Model Summary Template

U-12-002-0525
Attachment
7/8/2009

Engine Family	1.Engine Code	2.Engine Model	3.BHP@RPM (SAE Gross)	4.Fuel Rate: mm/stroke @ peak HP (for diesel only)	5.Fuel Rate: (lbs/hr) @ peak HP (for diesels only)	6.Torque @ RPM (SEA Gross)	7.Fuel Rate: mm/stroke@peak torque	8.Fuel Rate: (lbs/hr)@peak torque	9.Emission Control Device Per SAE J1930
ACEXL060.AAD	0930:FR6526	QSK60-G	2922@1800	629	1017.9	N/A	N/A	N/A	DDI,ECM,TC,CAC
ACEXL060.AAD	0930:FR6528	QSK60-G	3251@1800	702	1137	N/A	N/A	N/A	DDI,ECM,TC,
ACEXL060.AAD	2769:FR6602	QSK60-G	2922@1800	620	1003.3	NA	NA	NA	DDI,ECM,TC,
ACEXL060.AAD	2769:FR6671	QSK60-G	2922@1800	620	1003.3	N/A	N/A	N/A	DDI,ECM,TC,
ACEXL060.AAD	2769:FR6684	QSK60-G	2922@1800	620	1003.3	N/A	N/A	N/A	DDI,ECM,TC,
ACEXL060.AAD	2770:FR6646	QSK60-G	2922@1800	634	1025.6	N/A	N/A	N/A	DDI,ECM,TC,
ACEXL060.AAD	2770:FR6646	QSK60-G	2332@1500	586	790	N/A	N/A	N/A	DDI,ECM,TC,
ACEXL060.AAD	2770:FR6682	QSK60-G	2785@1800	597	966.9	N/A	N/A	N/A	DDI,ECM,TC,
ACEXL060.AAD	2770:FR6682	QSK60-G	2255@1500	554	747.2	N/A	N/A	N/A	DDI,ECM,TC,
ACEXL060.AAD	3141:FR6644	QSK60-G	2922@1800	616	997	N/A	N/A	N/A	DDI,ECM,TC,
ACEXL060.AAD	3143:FR6645	QSK60-G	3315@1800	702	1137	N/A	N/A	N/A	DDI,ECM,TC,
ACEXL060.AAD	3178:FR6665	QSK60-G	2705@1500	676	911.6	N/A	N/A	N/A	DDI,ECM,TC,
ACEXL060.AAD	8595:FR6525	QSK60-G	2922@1800	634	1026.1	NA	NA	NA	DDI,ECM,TC,
ACEXL060.AAD	8595:FR6525	QSK60-G	2334@1500	590	796.3	NA	NA	NA	DDI,ECM,TC,
ACEXL060.AAD	8595:FR6528	QSK60-G	3251@1800	702	1137	N/A	N/A	N/A	DDI,ECM,TC,

12502 Exchange Drive, Suite 404
Stafford, TX 77477 - USA
Phone: (281) 240-5335
Fax: (281) 240-4774
bschultz@hitecusa.com

February 11, 2009

Mark Freyenberger
Kiewit Power Engineers

Subject: Budgetary Quotation 09 -066 -HPP
KPE 2008045

Dear Mark.

We are pleased to offer the following budgetary proposal for the supply of one (1) 2200kVA, single output, Hitec CPS systems to provide uninterrupted, continuous and conditioned power to your critical applications.

As you will see, I have assumed our PGM and the GDP disconnect breaker are to be installed in the enclosure, and that the switchgear, line reactor, controls, etc will be installed in an existing building. The PGM module will include high deflection vibration mounts. We will design the enclosure for a seismic zone 4 application, but neither the enclosure nor other equipment has any seismic certifications or stamps. This standard Hitec equipment, as proposed, has been installed successfully by users at numerous locations in California.

Delivery time after receipt of a technically cleared purchase order is indicated on the proposal. A detailed project schedule will be developed by our assigned project manager upon receipt of the purchase order.

We hope that this proposal meets your requirements. Should you have any questions after your review, please contact us. We will be pleased to meet with you to discuss any of the features outlined in the following pages.

Best regards,

Bob Schultz
Hitec Power Protection, Inc.

cc: Jaime Hummer, Air Power Consultants, Lenexa, KS

Budgetary Quotation: 09-066-HPP
Date: February 11, 2009

12502 Exchange Drive, Suite 404
Stafford, TX 77477 - USA
Phone: (281) 240-5335
Fax: (281) 240-4774
bschultz@hitecusa.com

One Hitec Diesel Rotary CPS System rated 2200kVA (1760kW), Single Output, 480Vac, 60 Hz at 0.8pf in accordance with Hitec standard specification.

Item	Qty	Description
A1		CPS system to include
	1	Power Generating Module (PGM) with • Diesel engine • Free Wheel Clutch • Induction coupling • 480Vac, 60Hz alternator • PGM will have high deflection vibration mounts
	1	Unit Control Panel (UCP) – interface and controls for CPS
	1	Unit Reactor Panel (URP) – Line reactor Dry-type core and coil construction with bus stub connection at coils and Hitec standard enclosure.
	1	Redundant Diesel Starting System comprising: • Dual, redundant, starting motors • Batteries and external charger for redundant starting motors • Redundant Starting Panel (RSP) - rectifier to supply 24VDC from generator for redundant starting motors
	1	Daily fuel tank, UL142, 150 gallon with automatic and manual transfer pumps, level alarms, rupture basin and control
	1	Remote radiator (110°F max ambient) with single electric fan and motor starter
	1	Exhaust silencer, critical grade
	1	Main Power Board (MPB) - 480V Switchgear according to single line, Q1, Q2, Q3
	1	Generator Disconnect Panel (GDP) - 480V manually operated circuit breaker
	1	First fluid fill - includes engine oil, clutch oil, coolant and greases
	1	Black start control to allow starting of unit without presence of utility power
	1	Remote monitoring software package (QMS) with modem
	NOTE:	Load bank and LB breakers are not included. Fuel oil is not included; #2 diesel fuel to be supplied by others
A2	1	Sound attenuated drop-over enclosure for field installation by others of PGM Module and GDP. Included in enclosure are: • Day tank • Exhaust silencer • Ventilation louvers with controls • Enclosure lights, receptacles and service panel • Roof mounting structure for radiator • Radiator motor starter • Open bottom for mounting by others on belly tank • UL142 belly tank (approx 2500 gallon) - PGM, GDP and drop-over enclosure to be mounted on tank by others at site.
	NOTE:	Enclosure and tank quoted are Hitec's standard construction designed as zone 4 seismic. Seismic certification or engineer stamp not included.

Item	Qty	Description
A3	1	Factory witness testing of PGM per Hitec specification and procedure. Costs for travel expenses are not included in this quotation. Lodging and meals while at the factory for one trip of two individuals are included.
A4	1	Packing, loading and transport of the equipment according to Incoterms 2000, DDP (Delivered Duty Paid), Job Site or designated receiving location, contiguous 48 states.
A5	1	Start-up and commissioning of the Diesel CPS system at site after the electrical and mechanical installation work are completed by others. Customer is responsible for supplying one certified electrician to assist full time in installation review and correction as needed. Load banks and connection/disconnection are to be provided by others.
A6	1	Site Acceptance Testing per standard Hitec specification and procedures.
A7	1	Project Management and Application Engineering to assist with technical support, Hitec documentation and specifications, installation guidelines, data sheets, electrical drawings, etc.
A8	1	Training during 2 to 3 days at site following immediately after the start-up and commissioning
A9	1	Third party certification of all control panels supplied by Hitec to UL standards.
A10	1	All components - exclusive of the enclosure-mounted PGM and GDP - to be mounted and wired by others in existing building. Power and control wiring between enclosures and buildings by others. Electrical and mechanical work for installation of equipment is excluded. Compliance to state and local codes is the responsibility of the customer. Seismic certifications or stamps are not included.

Total Budgetary Price Items A1 - A10 **$2,175,000.00** **Lot net**

Prices are DDP, Job Site or designated receiving location, contiguous 48 states.
Prices do not include sales, use, excise or any similar taxes, fees, or permits that are not part of Incoterms 2000 DDP.

DELIVERY
Delivery is estimated 28 to 30 weeks ARO.

TERMS of PAYMENT
Prices are based on the following payments, subject to credit approval. All invoices are payable net 30 days from the date of the invoice.

- 30% invoiced at date of order.
- 30% invoiced at date of transmittal of submittal documents.
- 30% invoiced at date of factory acceptance test.
- 10% invoiced at date of site acceptance testing, not to exceed 45 days after date of delivery at designated receiving location.

Quotation is budgetary.

TERMS AND CONDITIONS OF SALES

GENERAL

The equipment materials and services (collectively, "Products") which are set forth on the face hereof will be sold by Hitec Power Protection, Inc. ("Company") only upon the following terms and conditions of sale. These terms are intended to cover all transactions of Company and Customer hereunder, including sales and use of Products and all related matters, including technical advice and services. This document, together with any additional writing signed by an officer of Company, represents a complete and exclusive statement of the agreement between the parties and may not be modified or supplemented by oral representations, Customer's purchase order or any other document submitted by Customer, a course of dealing, Company's performance or delivery of Products, or in any way other. Objection is made to any such attempted modification or supplementation. References on the face hereof to Customer's purchase order or to Customer's specification and similar requirements are solely to describe the Products and such purchase order or other communications are not incorporated herein. Catalogues, circulars, and similar pamphlets of Company are issued for general information purposes only and do not modify the provisions hereof. None of the Standard Terms and conditions of Sale herein set forth may be added to, modified, superseded, or otherwise altered, except by a written instrument, signed by an officer of Company. To the extent not otherwise provided herein, the terms of this agreement shall be those provided by the Uniform Commercial Code in effect in the State of Texas on the date hereof which would be provided if the parties were silent as to those terms.

QUOTATIONS

All purchase orders issued by Customer based on Company's quotations are subject to credit approval and final approval and acceptance by Company, and shall not constitute a contract of sale until such approval and acceptance is made in writing by Company's order acknowledgment or sales confirmation. Company's quotations are based on Company's understanding of the specifications and data submitted by Customer. Customer bears the responsibility for any ambiguity in such specifications and data. In the event any terms or provisions of a purchase order as accepted are inconsistent with these Standard Terms and Conditions of Sale, the terms and provisions of these Standard Terms and Conditions of Sale shall control.

SALES CONFIRMATIONS

A sales confirmation or order acknowledgment issued by Company pursuant to Customer's purchase order constitutes an expression of acceptance of such purchase order, but such expression of acceptance is expressly conditioned upon Customer's assent to the Standard Terms and Conditions of Sale as herein set forth, which assent will be deemed to have been given unless notice cancellation of the purchase order is received by Company within 10 days following the sales confirmation date. Where Company does not issue either a quotation or sales confirmation, and ships Products pursuant to Customer's purchase order, such sale shall be subject to Company's Standard Terms and Conditions of Sale, as set forth on Company's invoice. Each accepted purchase order shall constitute an independent transaction and Customer shall pay for same in accordance with the terms specified therein.

CANCELLATIONS AND POSTPONEMENTS

Purchase orders with respect to which Company has issued a sales confirmation or order acknowledgment may be canceled by Customer in writing within 10 days following the sales confirmation date; thereafter, no such purchase order may be canceled by Customer without written consent of Company (which consent Company may withhold in its sole discretion). Company's consent may, at its option, be predicated upon a cancellation charge. Any delays or postponements in work to be performed by Company, caused wholly or in part by or at the request of Customer, will allow Company to invoice Customer for the work performed up to the date of the delay or postponement.

PRICES

All quotations and sales prices are FOB Company's plant in Stafford, Texas unless otherwise noted. Prices are subject to adjustment by Company after 30 days from the date of the quotation unless otherwise stated. Except as provided on the face hereof, or as hereinafter provided, prices include packing and crating for Products destined within the continental United States, excluding Alaska. An additional charge will be made for export packing and crating. If Customer requests any modification of an accepted purchase order which change causes, in Company's sole discretion, an increase or decrease in the cost of or time required for performance of the affected purchase order by Company, an equitable adjustment shall be made in the applicable price or delivery schedule, or both, and the affected purchase order, as the case may be, shall be modified accordingly in writing. Nothing in this provision shall require Company to implement any change or to continue to perform under this agreement or any affected purchase order until mutual agreement has been reached in writing regarding any such equitable adjustments.

TAXES

Quotations and the prices set forth on the face hereof do not include sales, use, excise or other similar taxes. Unless Customer provides Company with a tax exemption certificate acceptable to the applicable taxing authorities, an amount equal to any sales, use, excise, or other tax which may be imposed upon the sales or use of the items covered by the quotation or this order acknowledgment, shall be added to the prices set forth on the face hereof. Customer shall be responsible for all sales, use, excise or other similar taxes imposed on this transaction, whether or not

included in Company's invoice, and whether or not such amount would, in the absence of this agreement, be due and payable by Customer or Company. If Customer fails to timely submit resale exemption information or if Customer's resale exemption is rejected by a taxing authority, Customer shall pay any tax due as a result.

ITEMS FURNISHED BY CUSTOMER

Prices and delivery dates for Products for which Customer furnishes components, plans, patterns, tools, or other items are based upon such items being received in usable condition, within the required time, and in such quantities as may be required, with transportation charges prepaid to Company's plant in Stafford, Texas. If defects are found in items furnished by Customer, Company will notify Customer and may charge additional expenses incurred, and extend the delivery dates of the Products, as a consequence of such defects. Company assumes no responsibility for loss or damage to items furnished by Customer where such loss or damage is due to circumstances beyond its control.

TERMS OF PAYMENT

Invoices shall be paid to Company at its offices in Stafford, Texas without setoffs or deductions of any kind. Payments on invoices shall be due thirty (30) days from the date of the invoice, unless otherwise specified on the face hereof. All invoices shall be dated (i) the date of shipment, unless Customer requests shipment to be delayed, in which case the invoice shall be dated the date of completion of manufacture of the Products or (ii), if milestones are specified, the date of the milestone event to which progress payments have been indexed in the quotation, specification, on the face hereof or in other contract documents. All purchase orders shall be accompanied by irrevocable standby letters of credit in the amount of the order, issued by a bank and in a form satisfactory to Company and valid for a period of 90 days after the last scheduled delivery date. Amounts not timely paid, whether related to a purchase order or any other indebtedness, shall bear interest thereafter at the rate of the lesser of (i) eighteen percent per annum or (ii) the maximum no usurious contract rate of interest permitted by law. Whenever reasonable grounds for insecurity arise with respect to performance by Customer, Company may demand modified terms of payment from those specified on the face hereof or on any invoice including without limitation accelerated payment terms, full payment prior to delivery, the provision of additional collateral or additional letters of credit, and Company may refuse to make delivery pending satisfactory modification of the terms of payment. Company retains title in all equipment sold, for security purposes only, until full payment is received. Customer grants Company a security interest in the Products sold hereunder, replacements therefore and additions thereto and all other equipment heretofore or hereafter sold by Company to Customer to secure Customer's present or future obligations to Company and the proceeds of all the foregoing. Company may file this instrument as a financing statement. Upon Company's request, Customer will execute financing statements evidencing the security interest granted herein. Customer appoints Company as it's attorney-in-fact to execute any such financing statement. Upon Company's request, Customer will execute financing statements evidencing the security interest granted herein. Customer appoints Company as its attorney-in-fact to execute any such financing statement. If Customer intends to relocate the Products sold hereunder prior to full payment therefore, Customer will give Company thirty (30) days' prior written notice thereof including therein the new address where such items will be kept. In the event Customer does not pay an invoice when due, Customer agrees to pay Company interest as provided above and any collection costs (including without limitation reasonable attorney fees) incurred by Company to obtain payment.

DELIVERY AND ACCEPTANCE

Unless otherwise specified herein, all shipments are FOB Company's plant in Stafford, Texas with Customer paying all shipping costs. In the absence of written shipping instructions from Customer, Company may ship the products collect freight to Customer by any common carrier which it deems in its sole discretion satisfactory. All delivery dates which may be set forth are estimates of the time normally required to deliver such Products and are subject to change without limitation by Company notwithstanding negotiations between Company and Customer. Delivery dates will be calculated from the date that Company has received all information necessary to permit Company to proceed with work immediately and without interruption. Company will make all reasonable efforts to conform to delivery estimates but will not be liable for delays resulting from its failure to deliver in accordance with delivery estimates. Company may make partial deliveries and invoice separately for each delivery. Customer shall inspect and accept or reject the Products within twenty (20) days after delivery. Failure to timely reject shall be deemed an acceptance. Acceptances are irrevocable. All claims whatsoever by Customer, except claims under applicable warranties, shall be made within such 20-day period or are waived.

TITLE: RISK OF LOSS

Customer shall obtain and maintain insurance coverage on the Products against all risks of loss or damage in an amount equal to at least the unpaid balance of the purchase price, if any. If Company shall so request, all such policies shall name Company as an additional insured and Customer will deliver to Company a completed certificate or certificates of insurance signed by an authorized representative of each of Customer's insurance carriers involved, certifying that such insurance has been issued and is in full force and that if such insurance is canceled or changed so as to affect the coverage, at least thirty days prior written notice of such cancellation of change will be sent to Company. Company's responsibility terminates upon the delivery of Products to a common carrier or Customer-furnished carrier for transportation, FOB Company's plant in Stafford, Texas. The Products herein referred to, the title thereto (except for security purposes as provided above), and any risk of loss, shall be considered as being transferred

to Customer upon delivery to the common carrier for transportation, Customer or Customer's designee. No claims for shortages, damages, or other failure in transit may be made by Customer against Company. Notwithstanding the foregoing, Products held by Company at Customer's request beyond the scheduled delivery date shall be at Customer's risk.

WARRANTY: LIABILITY LIMITATION

Company warrants that the Products and parts of its own design and manufacture shall be, at the time of delivery, free from defects in material and workmanship under normal use and service preventive maintenance performed per Hitec factory and manufacturers instructions within the Warranty Period (as defined). All claims for defective products or parts under this warranty must be made in writing immediately upon discovery and, in any event, within the Warranty Period. The term "Warranty Period" refers to the period prior to the first to occur of (i) the date on which the Product is sold or transferred by Customer to any party, or (ii) eighteen (18 months) from shipment of the Products or (iii) twelve (12) months after the date of start-up. In the case of parts which are purchased from Company separately by Customer and are not installed by Company, claims must be made within ninety (90) days from shipment of the applicable item because Company has no control over the installation of such part or the equipment on which it is installed. Customer must notify Company in writing of any defect or warranty claim immediately upon discovery and shall permit Company to inspect the Product so Company may determine its warranty obligations. Failure of Customer to give Company written notice of nonconformance of Products to Company's warranty immediately upon discovery and, in any event, prior to expiration of the Warranty Period, shall be conclusive of (i) Customer's final acceptance of and full satisfaction with the Products and (ii) Company's fulfillment of its warranty in all respects. Company does not warrant any Products or parts which are used, rebuilt or not new or not manufactured by Company however, Company will assign to Customer whatever warranties Company has received from the manufacturer of any products or parts not manufactured cy Company to the extent such warranties can be assigned to Customer. Company's warranty covers parts, labor , travel and living expenses of Company personnel (within North America). Items not covered by this warranty are expendables such as fuses, light bulbs, fuel filters, etc. Customer shall be responsible for all third party charges associated with warranty services, including, but not limited to, rigging, drayage, and taxes. Company shall not be responsible for providing warranty service to remedy any defect caused by any replaced parts or by repairs, alterations, modifications or changes unless made by Company's authorized service personnel. Repairs or replacements are warranted as described herein for the remainder of the original Warranty Period. Company shall not be responsible for damages or defects resulting from shipment, improper handling, storage, installation, operation or maintenance. The determination of the cause and existence of a defect by Company shall be conclusive. Repairs and/or replacements not covered by the warranty shall be charged to Customer at Company's standard field service rates. Company's warranty does not guarantee that its Products will be electrically compatible with any other electrical or electronic equipment, when sold as an individual item. Customer's sole and exclusive remedy and Company's sole and exclusive liability under this warranty is expressly limited, at the sole option of Company, to the repair, replacement or refund of the purchase price of any Products which upon examination Company determines to its sole satisfaction to be defective within the Warranty Period. If Company elects to repair or replace Product which fail to conform to Company's warranty, Company shall have a reasonable time in which to make the repair or replacement and shall deliver the repaired or replaced Products to Customer, FOB, Company's plant in Stafford, Texas. Upon settlement of its obligations, if any, under this warranty, Company, at its option shall be entitled to the return of the defective Product or parts(s). **COMPANY DISCLAIMS ALL OTHER WARRANTIES, WHETHER EXPRESS, IMPLIED OR STATUTORY (INCLUDING, WITHOUT LIMITAITON, WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE), AND ANY AGREEMENTS, REPRESENTATIONS, AFFIRMATION OR WARRANTIES, WHETHER ORAL OR WRITTEN, MADE BY ANY AGENT, EMPLOYEE OR REPRESENTATIVE OF COMPANY OR AS SET FORTH IN ANY PURCHASE ORDER OF CUSTOMER UNLESS AND EXCEPT AS SPECIFICALLY SET FORTH HEREIN.** Company shall not be liable for losses based on downtime, overhead, the negligence of Customer or Company or any of their employees or agents, property damage, lost production or profits or for incidental, consequential or special damages of any kind arising from or attributable to this agreement, the Products or the manufacture, assembly, sale, use, repair, maintenance, claim, whether in contract, tort (including negligence) or otherwise, arising out of, connected with or resulting from the manufacture, assembly, delivery, sale, use, repair, maintenance, replacement or operation of any Product sold hereunder will not exceed the price allocable to the Product or any part thereof which give rise to the claim. Every cause of action based on this agreement or the items sold hereunder by Customer against Company shall be brought not later than the expiration of the applicable Warranty Period. If Customer has assets of at least $5 million, Customer waives all provisions of the Texas Deceptive Trade Practices – Consumer Protection Act to the extent which such waiver is effective pursuant to Section 17.42 of the Texas Business and Commerce Code.

INDEMNITY

Customer hereby agrees to indemnify, defend and hold harmless Company, its affiliates, and their respective agents and employees (indemnities") from all claims, suits or proceedings based on a claim of personal injuries or death property damage, product liability or any other liability of any kind under any legal theory of liability arising out of or attributable to the manufacture, assembly, delivery, sale, use, repair, maintenance, replacement or operation of the Products without regard to whether the Products are alleged to have contributed to or caused the basis for such claim or whether such claim was alleged to be contributed to or caused by an indemnities sole or concurrent negligence,

defective products, or other breach of duty on the part of an indemnity, whether such claims suits or proceedings are by Customer or by third parties. Customer shall indemnify and hold harmless indemnities from and against any and all claims, damages, losses, liabilities, judgments, settlements, costs, and expensed (including but not limited to attorney's fees) incurred or awarded in such claims, suits or proceedings.

FORCE MAJEURE

Company shall not be liable for any losses, delays, or failure to deliver Products, repair or replace Products, or otherwise perform under this agreement resulting in whole or in part from any causes beyond its control. Such causes include without limitation strikes or other labor disputes involving its employees, the employees of common carriers, or the employees of suppliers, inability to obtain material or transportation, commercial impracticability, acts of God, acts of government, war, riot, insurrection, sabotage, fire, explosion, floods, weather, governmental orders or regulations, inability to secure any necessary governmental or other permits, court orders, breakdown of machinery, accidents, defects in part or equipment of whatever cause, actions or inactions of Customer or its agents, employees or representatives, or other causes, similar or dissimilar, over which the Company has no control.

MISCELLANEOUS

All notices, demands and other communications which may or are required to be given hereunder or with respect hereto shall be in writing, shall be given either by personal delivery, facsimile transmission or by registered or certified mail, return receipt requested, and shall be deemed to have been given or made when personally delivered, or when received as evidences by return receipt or confirmation of facsimile transmission addressed to the respective parties at the address shown on the front of this order acknowledgment. This agreement and the rights and obligations hereunder shall not be assignable by any party hereto without the prior written consent of all other parties. All of the terms and provisions of this agreement shall be binding upon and inure to the benefit of and be enforceable by the heirs, successors and permitted assigns of the signatories hereto.

The captions used in this agreement are for convenience only and are not to be construed in interpreting this agreement. This agreement may be signed and delivered in two or more counterparts, each of which shall be deemed an original and all of which together will constitute one and the same instrument. This agreement may be amended only by a written instrument signed by each party hereto. This agreement shall be governed by and construed in accordance with the substantive laws of the State of Texas without regard to principles of conflicts of law. Each party hereto hereby submits to the jurisdiction of the courts of the State of Texas and the federal courts in and for the Southern District of Texas in connection with any matter relating to this agreement and any other document executed in connection herewith.

THE TRADE TERMS OF THE INTERNATIONAL CHAMBER OF COMMERCE

WHAT IS A TRADE TERM?

A trade term is a combination of letters or words, which specifies certain obligations within the sales contract.

WHAT OBLIGATIONS DOES A TRADE TERM SPECIFY?

The trade term specifies the

1. Transfer of risk
- when the seller has the right to claim for the contract price even if the goods are lost, damaged or short-delivered.

2. Transfer of obligations
- where and how the seller must make the goods available to the buyer and how the buyer must take delivery of the goods.

3. Division of costs
- how the normal costs relating to the export and import of goods should be divided between the seller and the buyer.

WHAT ARE INCOTERMS?

INCOTERMS are a set of international rules for the interpretation of the 13 trade terms published by the International Chamber of Commerce (ICC).

Responsibilities are simply and clearly defined by referring to one of the ICC INCOTERMS. Thus the risk of misunderstanding and subsequent disputes is eliminated.

TRADE TERMS AND NAMED POINT OF DELIVERY

After the chosen trade term one should state
- the named point where the costs transfer and
- "...Incoterms 2000"

For instance "CIF Hamburg Incoterms 2000".

TRADE TERMS AND MODE OF TRANSPORT

The use of trade terms in connection with different modes of transport in the export and import of goods is described below.

\+ = recommended
\- = not recommended

TRADE TERM / MODE OF TRANSPORT

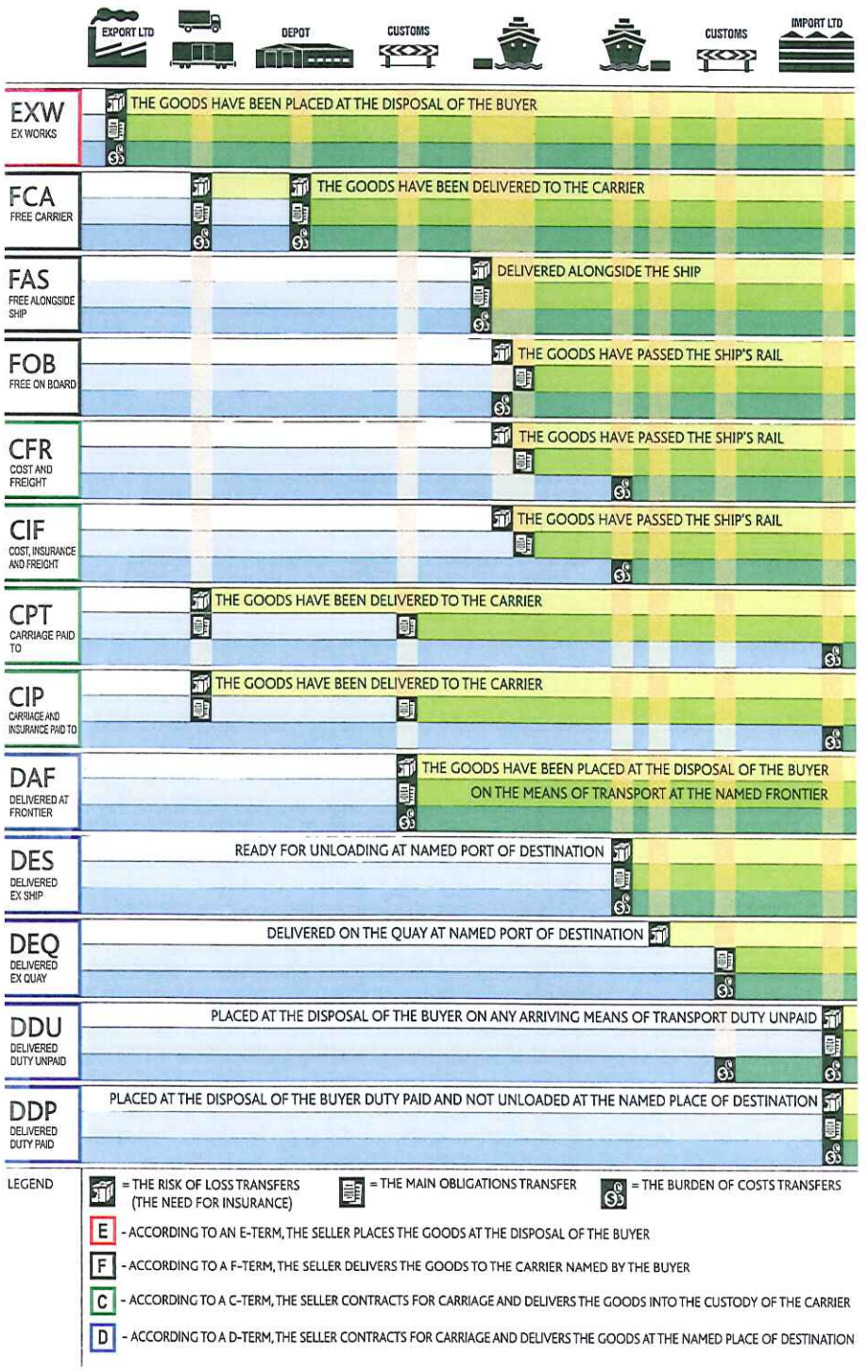
	Sea	Road	Rail	Air	Container	Combined transport
EXW	+	+	+	+	+	+
FCA	+	+	+	+	+	+
FAS	+	-	-	-	-	-
FOB	+	-	-	-	-	-
CFR	+	-	-	-	-	-
CIF	+	-	-	-	-	-
CPT	+	+	+	+	+	+
CIP	+	+	+	+	+	+
DAF	-	-	-	-	-	-
DES	+	-	-	-	-	-
DEQ	+	-	-	-	-	-
DDU	+	+	+	+	+	+
DDP	+	+	+	+	+	+

TRADE TERMS AND CARGO INSURANCE

The need for cargo insurance follows the risk of loss or damage, i.e. each party arranges for insurance for the part of the carriage when the goods are at his risk.

According to the terms CIF and CIP the seller must arrange cargo insurance in favour of the buyer.

This brochure is our summary of the contents of the trade terms.



	THE SELLER MUST		THE BUYER MUST	
EXW	- provide appropriate packing and marking - place the goods at the disposal of the buyer at the named place of delivery - on request assist the buyer with the export documentation		- take delivery of the goods and contract for the carriage to the final destination	EXW
FCA	- provide appropriate packing and marking - load the goods on the means of transport nominated by the buyer (delivery at the seller's premises) or place the goods at the disposal of the carrier nominated	by the buyer, not unloaded, in the seller's means of transport (delivery at the depot or elsewhere) - carry out the export procedures and provide the buyer with the document received for the delivery of the goods	- take delivery of the goods, loaded, on the means of transport (delivery at seller's premises) or take delivery of the goods on the arriving means of transport, not unloaded, and carry out unloading, storage, and loading of the goods (delivery at depot or elsewhere) - carry out import procedures and contract of carriage to the final destination	FCA
FAS	- provide appropriate packing and markin - place the goods at the disposal of the buyer alongside the ship - carry out the export procedures	- provide the buyer with the document received for the delivery of the goods	- take delivery of the goods alongside the ship - carry out the import procedures and the carriage to the final destination	FAS
FOB	- provide appropriate packing and marking - deliver the goods on board the ship at the port of shipment - carry out the export procedures	- provide the buyer with the document received for the delivery of the goods	- take delivery of the goods on board the ship at the port of shipment - carry out the import procedures and the carriage to the final destination	FOB
CFR	- provide appropriate packing and marking - contract for the carriage and pay the freight to the port of destination - deliver the goods on board the ship at the port of shipment	- carry out the export procedures - provide the buyer with the transport document without delay	- accept delivery of goods at the port of shipment and receive them from the carrier at the port of destination - carry out the import procedures and the carriage to the final destination	CFR
CIF	- provide appropriate packing and marking - contract for the carriage and pay the freight to the port of destination - deliver the goods on board the ship at the port of shipment	- carry out the export procedures - contract and pay for agreed cargo insurance in favour of the buyer - provide the buyer with the transport document and cargo insurance document without delay	- agree on the cargo insurance with the seller - accept delivery of goods at the port of shipment and receive them from the carrier at the port of destination - carry out the import procedures and the carriage to the final destination	CIF
CPT	- provide appropriate packing and marking - contract for the carriage and pay the freight to the place of destination - deliver the goods to the carrier	- carry out the export procedures - provide the buyer with the transport document without delay	- accept delivery of goods at the place of dispatch and receive them from the carrier at the place of destination - carry out the import procedures and the carriage to the final destination	CPT
CIP	- provide appropriate packing and marking - contract for the carriage and pay the freight to the place of destination - deliver the goods to the carrier	- carry out the export procedures - contract and pay for agreed cargo insurance in favour of the buyer - provide the buyer with the transport document and cargo insurance document without delay	- agree on the cargo insurance with the seller - accept delivery of goods at the place of dispatch and receive them from the carrier at the place of destination - carry out the import procedures and the carriage to the final destination	CIP
DAF	- provide appropriate packing and marking - place the goods at the disposal of the buyer on the arriving means of transport at the frontier not unloaded	- carry out the export procedures - provide the buyer with the document received for the delivery of the goods	- take delivery of the goods on the arriving means of transport, not unloaded - carry out the unloading of the goods from the means of transport of the seller, storage, import procedures and carriage to the final destination	DAF
DES	- provide appropriate packing and marking - carry out the export procedures - place the goods at the disposal of the buyer on board the ship at the named port of destination	- provide the buyer with the document received for the delivery of the goods	- take delivery of the goods on board at the port of destination - carry out the unloading of the goods - carry out the import procedures and carriage to the final destination from the named port of discharge	DES
DEQ	- provide appropriate packing and marking - carry out the export procedures - place the goods at the disposal of the buyer on the quay at the named port of destination	- provide the buyer with the document received for the delivery of the goods	- take delivery of the goods on the quay at the port of destination - carry out the import procedures and the carriage to the final destination	DEQ
DDU	- provide appropriate packing and marking - carry out the export procedures	- place the goods at the disposal of the buyer at the named place of destination not unloaded - provide the buyer with the document received for the delivery of the goods	- take delivery of the goods at the final destination - carry out the unloading of the goods - carry out the import procedures	DDU
DDP	- provide appropriate packing and marking - carry out the export and import procedures	- place the goods at the disposal of the buyer at the named place of destination not unloaded	- take delivery of the goods at the final destination - carry out the unloading of the goods	DDP

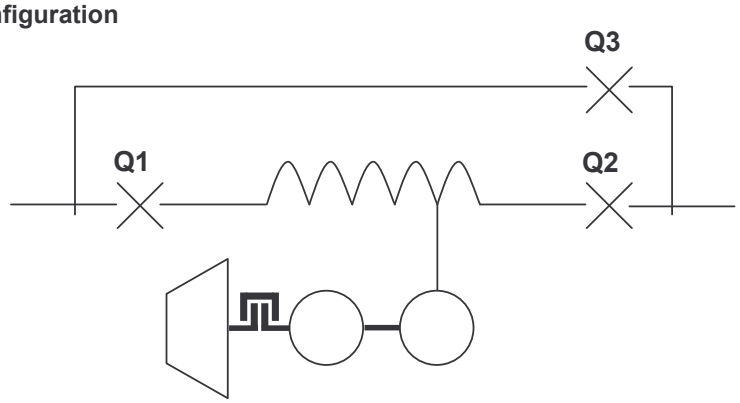
Typical Customer Provided Activities

The following items summarize some typical activities to be provided by customer's selected electrical, rigging and mechanical contractors.

- Crane rigging for placement of equipment at site and securing equipment in its final fixed location.
- Installation of the cooling system, including piping and flexes
- Installation of the exhaust system
- Installation of all fuel system and piping
- Installation of room ventilation system in existing building
- Installation of the PGM and GDP on base tank
- Electrical connections internal to the existing building
- Electrical connections internal to enclosure
- Field connections between PGM enclosure and components in existing building

Single UPS system

Configuration



Circuit breakers
Q1 : NB utility circuit breaker
Q2 : NB Load circuit breaker
Q3 : NB Bypass circuit breaker

Operation modes:
Utility mode
Utility mode is the operation mode that is also named “power conditioning”. Circuit breakers Q1 and Q2 are closed and the diesel engine is not running. The NB load is fed by conditioned power of the utility, via the reactor. The UPS is improving power factor, filtering harmonics, correcting utility anomalies and keeping output voltage at a constant level.

Diesel mode
If utility is out of tolerance, the diesel engine is supplying the NB load. Only circuit breaker Q2 is closed and the diesel engine is running at constant speed.

Bypass mode
In bypass mode, Q3 is closed and Q2 is open, Q1 can be either open or closed. Utility is feeding the load.

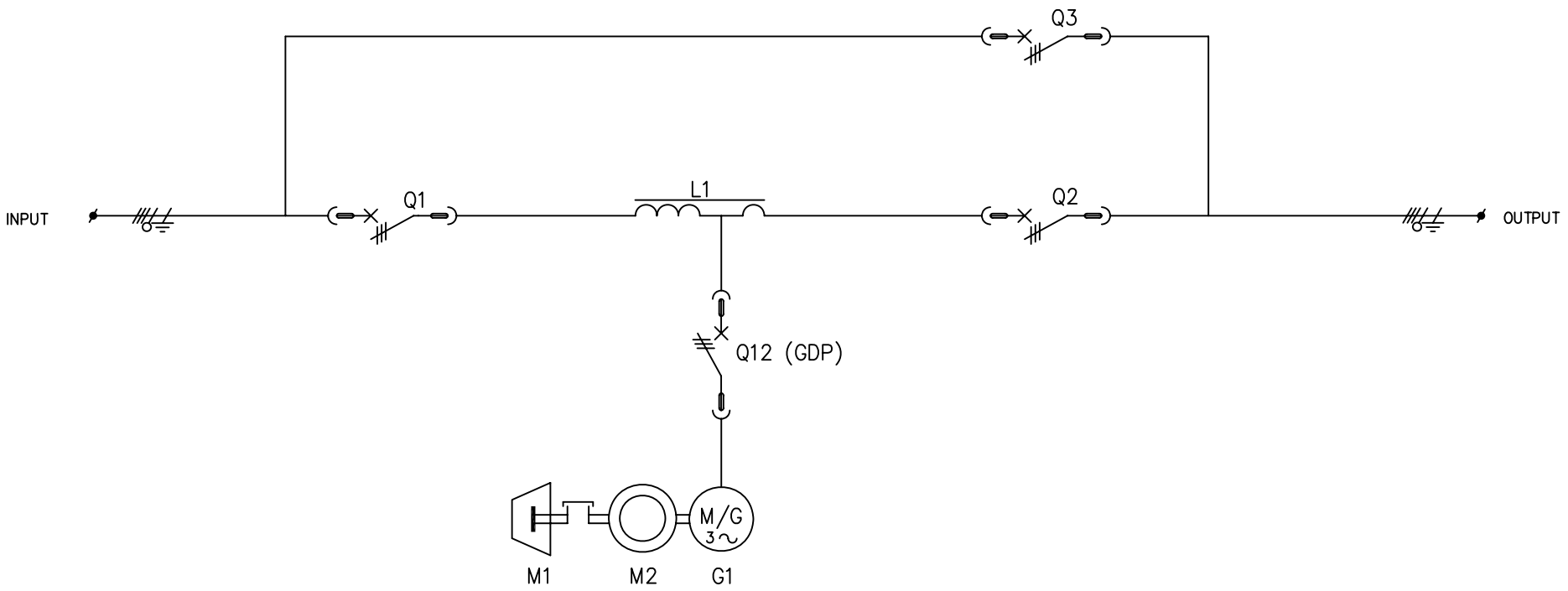
Utility failure / Diesel mode
With a utility outage the NB utility circuit breaker Q1 will open and the diesel engine will start. The UPS will continuously monitor the utility for voltage and frequency for return of these (parameters) within tolerances to retransfer to utility mode.

Retransfer, synchronizing and paralleling
If the utility returns within tolerances the generator will synchronise with the utility. It will run in synchronism with the utility during utility acceptance time and then parallel with the utility by closing NB utility circuit breaker Q1.

Bypass mode
The bypass circuit breaker is closed if the unit is taken out of operation. Switching over to bypass mode from utility mode (from Q2 to Q3) will be make-before-break.

Table

Mode	Q1	Q2	Q3	Diesel
Utility mode	Closed	Closed	Open	Stop
Bypass mode	Open or Closed	Open	Closed	Stop or Running
Diesel mode	Open	Closed	Open	Running



title	SINGLE LINE DIAGRAM UPS–SYSTEM SINGLE OPERATION	HITEC Power Protection	UEG97063		
			drawn	97-07-31	W.HEMMER	sheet 1
			ch'd			
revision		Hitec Power Protection bv – The Netherlands	app'd			of

AutoCAD version: 10.0 Menufile: SETUP.MNU DOS filename: UEG97063.DWG

HITEC STANDARD ENCLOSURES

All Hitec enclosures are NEMA 3R, walk-in type, designed to the following standards unless specified under a separate document. Other parameters are available upon request.

Sound Attenuation	85dBA @ 23 feet, clear field environment, 5 ft above ground level
Wind Load	Designed for 80 MPH
Rain	Designed for 4" per hour
Roof Load	Designed for 30PSF
Ambient Temp	PGM Operating: 32º to 104ºF PGM Non-Operating: -4º to 158ºF
Relative Humidity	PGM Operating: 0 to 95% for 32º to104ºF PGM Non-Operating: 0 to 95% including condensation
Barometric Pressure	Sea level to 3280ft.
Seismic Zone	None
Fire Proofing	None

Codes and Standards; applicable sections of

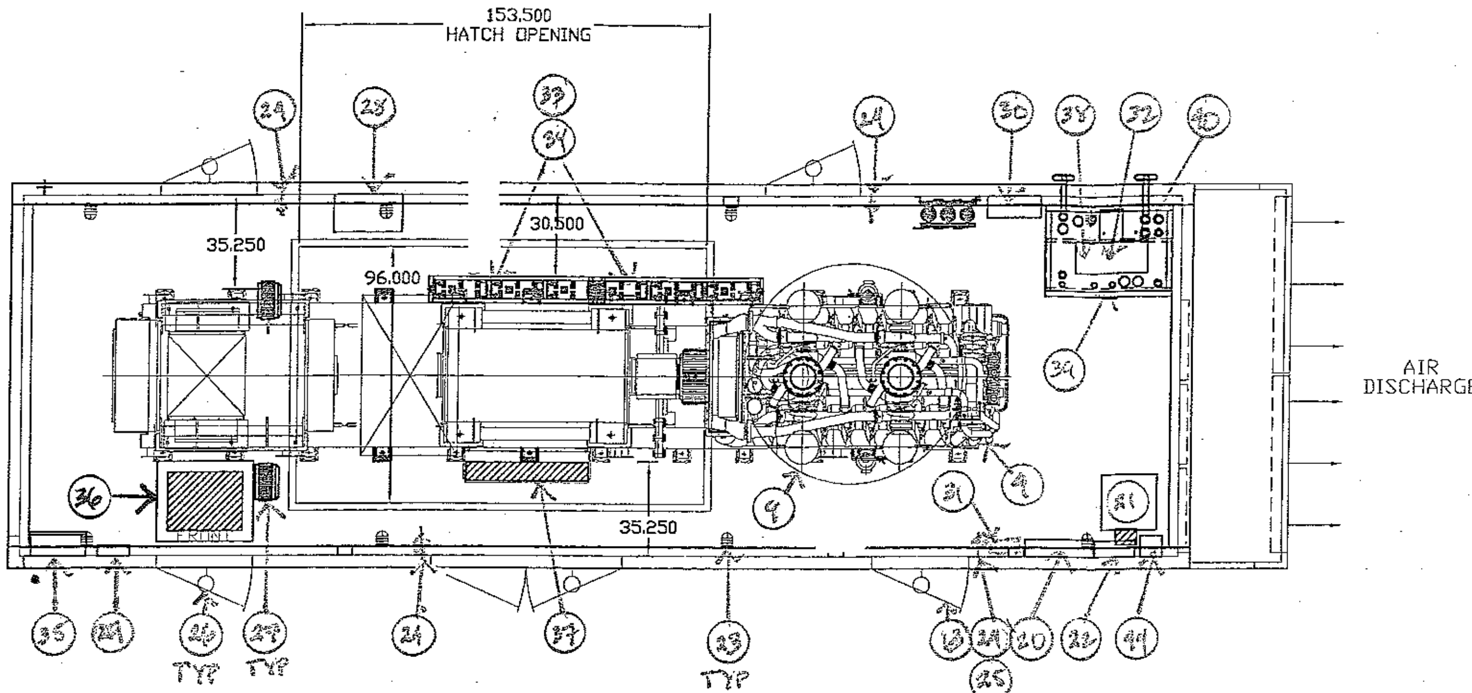
UBC	ASME B31
NEC	NFPA-30
ANSI	CSA

Construction

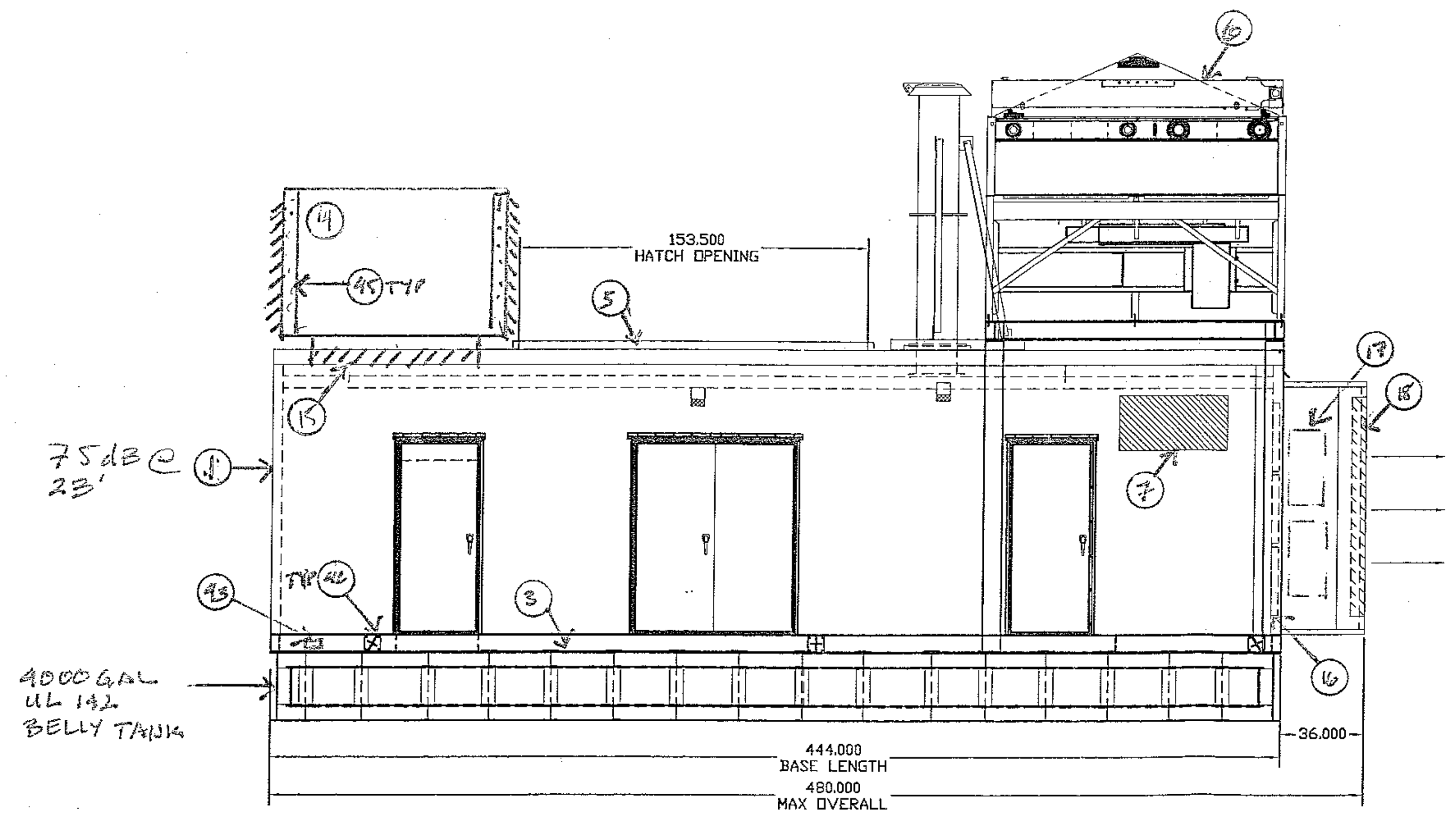
Base frame	Continuous ship channel base frame around entire perimeter
Corners	Vertical 4" x 4" square columns at each corner and in mid section
Exterior walls	14 gage galvanealed skin with 4" stiffeners on 24" centers.
Insulation	4" of 4lb/ft^3 of mineral wool insulation for sound attenuation and thermal insulation. Covered with 2mil polyethylene over insulation
Interior walls	Interior of enclosure lined with 22 gage galvanized perforated metal.
Roof	14 gage galvanealed material, 4" mineral wool, 16" centerline on stiffeners and a raised seam exterior to add additional roof support and rigidity.
Sound baffling	8" fully insulated sound deadening devices that have a step broke radius inlet and tapered discharge.
Painting	primed, polyurethane finish coat, ANSI 61, gray
Base Tank, if applicable	UL 142/UL 2085 Carbon steel, exterior primed and painted black

NOTE

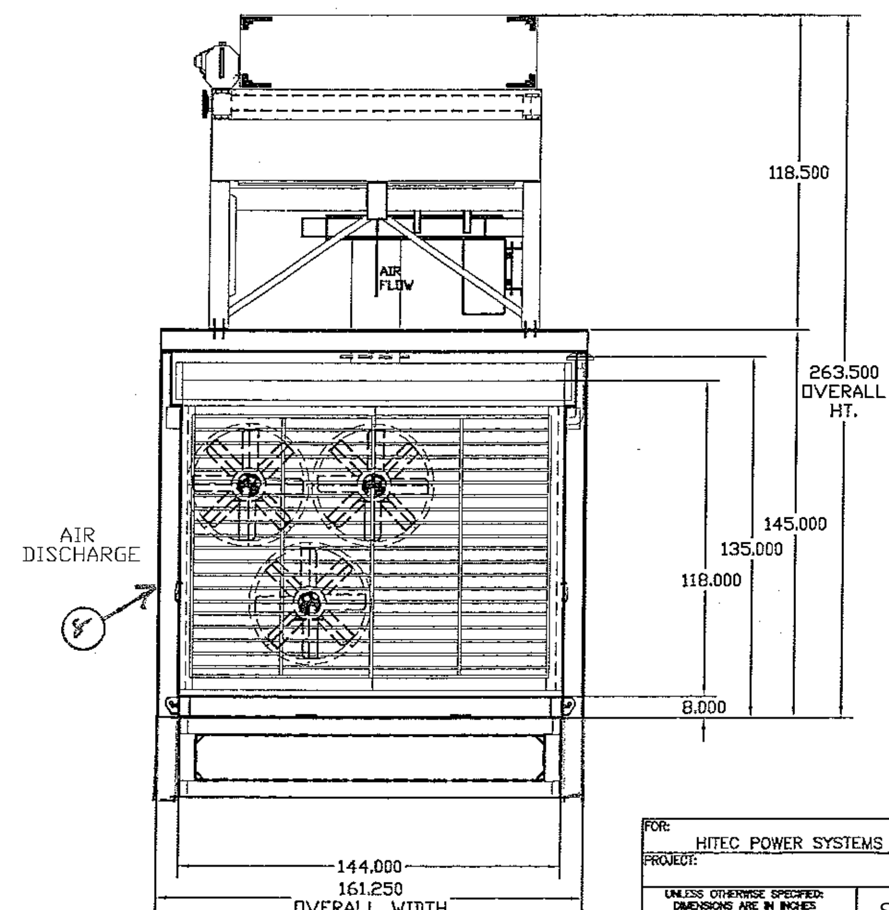
Any local codes/standards, state codes/standards, engineer's stamps, certifications, tests or other requirements are not part of the quotation unless specifically mentioned in the quotation. If applicable, the customer should furnish the appropriate specifications and requirements to Hitec for re-quote.



TOP VIEW



SIDE VIEW



DISCHARGE END VIEW

ITEM	QTY:	DESCRIPTION
1	1	[redacted] PACKAGE- DROP OVER CONSTRUCTION
2	A/R	4.5"D WALL PANEL- INSULATED, MARINE GRADE ALUMINUM CONSTRUCTION
3	1	DROP-OVER ENCLOSURE FRAME
4	1	HITEC ROTARY UPS- 2000KW, [redacted]
5	1	ROOF HATCH- REMOVABLE, FOR INDUCTION COUPLING SERVICE
6	1	EXTERIOR MOUNTED RADIATOR- ROCORE HB88, HITEC PROVIDED, SHIPPED LOOSE
7	1	RADIATOR PIPING ACCESS AREA- 24" X 48", [redacted]
8	1	RADIATOR FRAME STRUCTURE- SHIPPED LOOSE, INSTALLED BY CONTRACTOR
9	1	EXHAUST SILENCER- INTERIOR MOUNT, W/ EXHAUST OUTLET ON TOP
10	2	EXHAUST FLEX PIPE- HITEC PROVIDED
11	3	EXHAUST EXTENSION SUPPORTS- SHIPPED LOOSE
12	2	EXHAUST EXTENSION SECTION- W/ RAIN CAP & SUPPORTS, SHIPPED LOOSE
13	4	PERSONNEL ENTRANCE DOORS- PAD LOCKABLE
14	1	AIR INTAKE HOOD W/ FIXED INTAKE LOUVER ASSEMBLY- FOR VENTILATION
15	1	MOTORIZED INTAKE DAMPER ASSEMBLY
16	1	GRAVITY DISCHARGE DAMPER ASSEMBLY
17	4	VENTILATION FAN- INSTALLED IN DISCHARGE HOOD
18	1	AIR DISCHARGE HOOD- W/ FANS
19	1	HAND PUMP - FOR FUEL SUPPLY TO DAY TANK, NOT SHOWN
20	1	DISTRIBUTION PANEL-480VAC, 100A MAIN
21	1	TRANSFORMER- 30kVA, 480:120/208V, CEILING MOUNTED
22	1	SERVICE PANEL- 120/208V, 100A MAIN, 3ø4W
23	8	LIGHT FIXTURE- VAPOR TIGHT, AC
24	4	LIGHT SWITCH
25	2	GFCI RECEPTACLE
26	4	EXTERIOR LIGHT FIXTURE- VAPOR TIGHT, W/ PHOTOCELL
27	2	ENCLOSURE HEATER- CEILING MOUNTED, W/ THERMOSTAT
28	1	BATTERY CHARGER- HITEC PROVIDED
29	1	AUXILIARY CONNECTION BOX
30	1	FUEL CONTROL PANEL
31	1	VENTILATION CONTROL PANEL
32	1	REDUNDANT START PANEL (RSP)- W/ DRIP PAN, HITEC PROVIDED
33	2	STARTING BATTERY SET- HITEC PROVIDED
34	2	BATTERY RACK
35	1	SAXON RADIATOR MOTOR CONTROL PANEL- HITEC PROVIDED
36	1	OUTPUT CIRCUIT BREAKER CUBICLE (GDP)- [redacted] By GC.
37	1	POWER GENERATING MODULE (PGM) CONNECTION BOX- HITEC PROVIDED
38	1	FUEL DAY TANK- ELEVATED, 150 GAL. PRIMARY W/ 225 GAL. RUPTURE, U.L. 142
39	1	DAY TANK FUEL FITTINGS & VENTS
40	1	FUEL OIL COOLER- FOR ENGINE FUEL RETURN TO DAY TANK, MOUNTED ABOVE TANK
41	1	FUEL/WATER SEPARATOR- RACOR 79/1000FGV, HITEC PROVIDED
42	6	REMOVABLE LIFT LUG
43	2	GROUND LUG- LOCATION: RIGHT REAR, FRONT LEFT
44	1	100A DISCONNECT
45	24	24X24X2 500FPM AIR FILTERS

FINISH COLOR:	UNDETERMINED
EST. ENCL. FRAME WEIGHT:	5,000 LBS
EST. ENCLOSURE WEIGHT:	9,000 LBS
EST. DAY TANK WT., DRY:	2,000 LBS
EST. RADIATOR WT., DRY:	12,000 LBS
EST. RAD. FRAME WEIGHT:	3,000 LBS
EST. DISCHARGE HOOD WT.:	1,500 LBS
EST. MISC. WEIGHT:	5,000 LBS
EST. DRY SHIPPING WT:	37,500 LBS
APPROXIMATE OVERALL DIMENSIONS	
LENGTH:	570"
WIDTH:	194.6"
HEIGHT:	263.5"
DAY TANK CAPACITY:	150 GAL.
RUPTURE BASIN CAPACITY:	150% 225 GAL.

NOTES:

AIR FLOW REQUIREMENTS:
COOLING- 55,500 CFM
COMBUSTION- 6,475 CFM
TOTAL- 61,975 CFM
MAXIMUM WALL PANEL WIDTH- 24"

DROP OVER ENCLOSURE FRAME TO INSTALL DIRECTLY ON CUSTOMER PROVIDED PAD.
GASKET MATERIAL, PROVIDED W/ SHIPMENT, TO BE INSTALLED BETWEEN FRAME & PAD.

ZONE	REV	DESCRIPTION	DATE	APPROVED
-	-	-	-	-

FOR: HITEC POWER SYSTEMS

PROJECT:

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES
TOLERANCES: FRACTIONAL ± 1/64" DECIMAL ± .001"

S.C.#: QTE#11314F | P.O.#: P71100

DRAWN: X | DATE: X

CHECKED: - | -

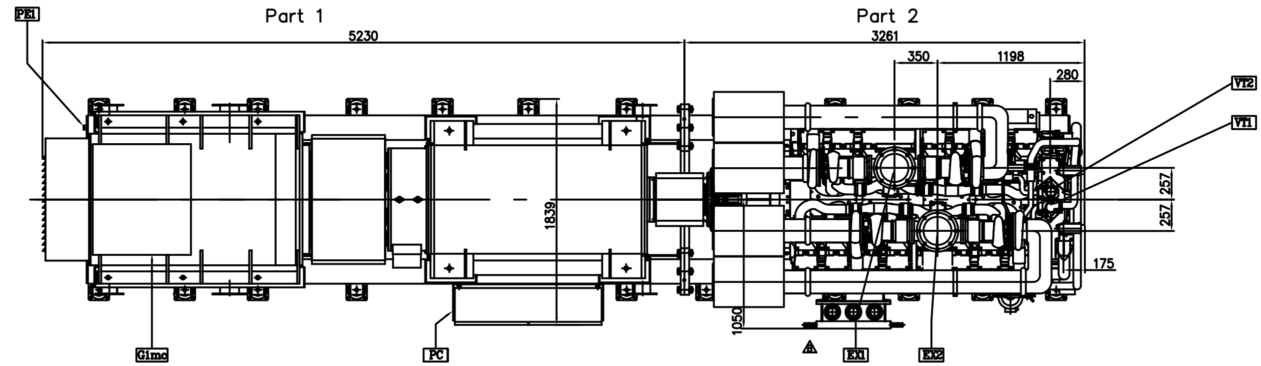
DESIGN:

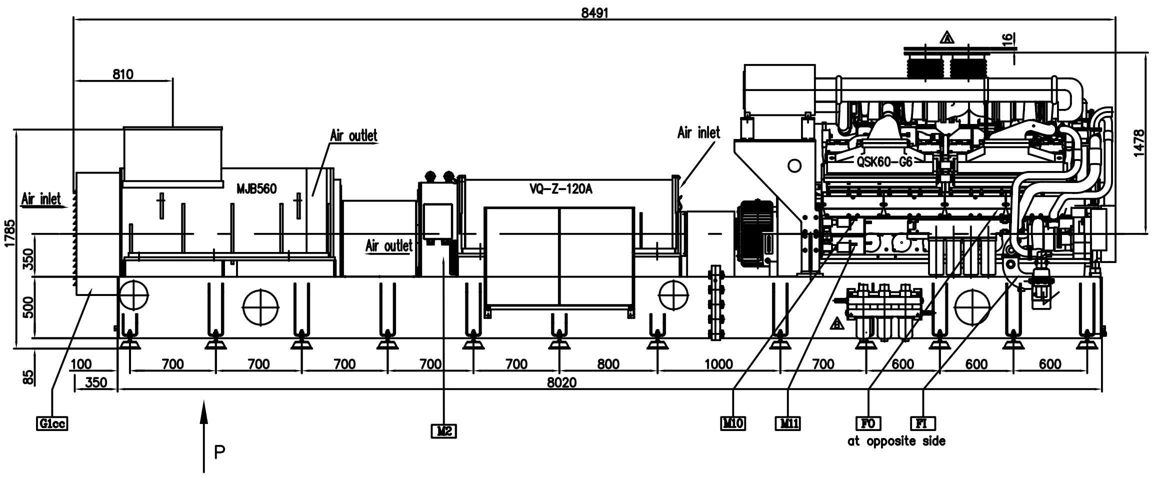
SAMPLE ENCLOSURE

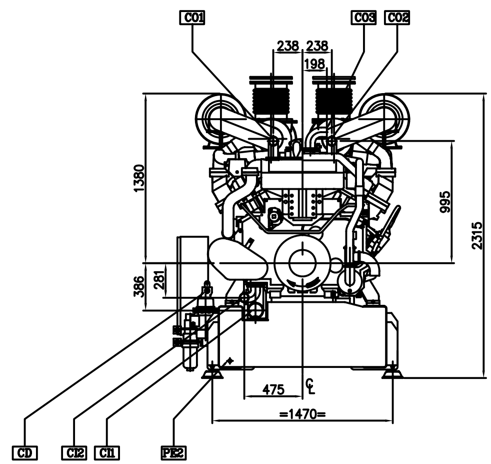
DROP--OVER THERMALLY INSULATED ENCLOSURE GENERAL ARRANGEMENT
FOR A 2,000KW ROTARY UPS

DRAWING NO. X | REV. X

SCALE: 1" = 6' | SHEET 01



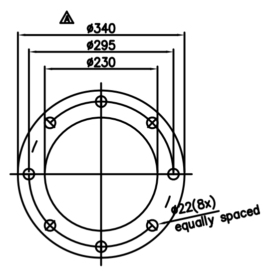




Flexible outlet

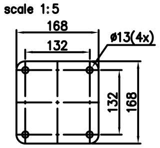
detail D

scale 1:5



View P

scale 1:5



Customer electrical installation			Customer mechanical installation		
Item	Loc.	Remarks	Item	Loc.	Remarks
			CD	F6	Crankcase oil drain
Gimc	C2	Generator main connection	CI1	F6	Coolant inlet ø127
			CI2	F6	Aux/ coolant inlet ø76,2
M2	F3	Connection induction coupling	CO1	D6	Coolant outlet ø76,2
			CO2	D7	Coolant outlet ø76,2
M10	F4	Connection starting motor 1	CO3	D7	Coolant outlet ø76,2
M11	F4	Connection starting motor 2			
PE1	A1	Connection earthing M12			
PE2	F6	Connection earthing M12			
			EX1	C4	Flexible exhaust outlet (Detail D)
PC	C3	PGM box connection	EX2	C5	Flexible exhaust outlet (Detail D)
			FD	F6	Fluid drain 3/4"BSP
			FI	F5	Fuel inlet 1 1/16"-12-2A
			FO	F4	Fuel outlet 1 1/16-12-2A
			OS		Oil supply
			VT1	B6	Coolant vent. line 1.1/16"UNF
			VT2	B6	Intercooler coolant vent. line 1.1/16"UNF

Mass Part 1: ±14000 kg

Mass Part 2: ± 9300 kg

Total mass : ±23300 kg

rev.	revision	date	par.
A	Exhaust flexibles added	08-08-2007	H.V.
B	Fuel filters added	04-07-2007	B.D

dim. without tolerance ± 1 — ISO 1302 ✓

scale 1: 20 — ISO 1101 — ISO 128

type: MJB560/VQ-Z/QSK60-G6

	date	name
drwn.	16-05-2007	H.V.
chkd.	04-07-2007	
seen		

order

U P S

HITEC Power Protection

title: Dimension sketch Power Module Unit 4.2 & 4.3 (Left Construction)

dwg.no. DRW-2200326-324

sheet 1 / 2 sh.

rev. B

ref. DRW-400142-301

replaces

Hitec Power Protection bv - the Netherlands

A1

SPECIFICATION 891
Diesel UPS/CPS

Item	Description	Specified Data	See Note	Rev. #
	Specification Summary			
	This specification covers the design, fabrication, testing and delivery of a Diesel UPS/CPS system in accordance with this specification and stated Standards.			
1	**Environmental Parameters**			
1.1	Application	**Indoor**	13.1	
1.2	Location	**Blythe, California U.S.**		
1.3	Altitude (Ft. above MSL)	**395**		
1.4	Ambient Temperature Range (Deg. F)	**33 to 110**		
1.5	Average Ambient Temperature (Deg. F)	**71**		
1.6	Average Relative Humidity (%)	**40%**		
1.7	Seismic Zone	**See Section 1B**		
1.8	Special Seismic Requirements	**Yes**		
1.9	Environment Contamination Level (IEEE Std C57.19.100-1995)	**Medium**		
1.10	Plant Access for Freight			
1.11	Rail	**See Section 1B**		
1.12	Truck	**See Section 1B**		
1.13	Barge	**See Section 1B**		
2	**Drawings Supplied as part of this Specification**			
2.1	General Arrangement	**N/A**		
2.2	Electrical One-Line	**N/A**		
2.3	Other	**N/A**		
3	**General Requirements**			
3.1	Quantity to be Quoted	**One (1)**		
3.2	Max. Output Rating (kVA)	**2200 kVA**		
3.3	Frequency (Hz)	**60 Hz**		
3.4	Input Voltage (kV)	**480 V**		
3.5	Output Voltage (kV)	**480 V**		
3.6	Voltage deviation	**+/- 1%**		
3.7	Voltage asymmetry	**<2%**		
3.8	Harmonic distortion	**<3.5%**		
3.9	Harmonic filtering	**>95%**		
3.10	Frequency deviation	**<0.5%**		
3.11	Short Circuit Current (kA)	**37 kA**		
3.12	Nominal P.F.	**0.8**		
3.13	Efficiency	**>95%**		
3.14	Color Scheme	**RAL 7032**		
3.15	Diesel Engine	**Manufacturer Standard**		
4	**Options**			
4.1	Modular Enclosure for Diesel UPS/CPS Equipment	**Included**		
4.2	Output Configuration	**Single Output**		
5	**Spare Parts**			
5.1	Manufacturer Recommended Start-Up Spare Parts	**Included**		
5.2	Manufacturer Recommended Two-Year Spare Parts	**N/A**		
6	**Commercial Requirements**			
6.1	Supply Bond, 100%, 12 months from date of order	**Included**		
6.2	Warranty, 18 months minimum from date of delivery	**Included**		
6.3	Extended Warranty (5 year)	**N/A**		

SPECIFICATION 891
Diesel UPS/CPS

Item	Description	Specified Data	See Note	Rev. #
6.4	Freight to JOBSITE	**Included**		
6.5	Transfer of title at JOBSITE	**Included**		
7	**Required Testing**			
7.1	Manufacturer's Standard Testing:	**Included**		
7.2	Witness Test:	**Option**		
8	**Codes and Standards**			
8.1	Follow All the Latest Applicable Standards and Codes Including but Not Limited To:			
8.2	American National Standards Institute (ANSI)			
8.3	American Society of Testing and Materials (ASTM)			
8.4	Institute of Electrical and Electronic Engineers (IEEE)			
8.5	National Electric Code (NEC)			
8.6	National Electrical Manufacturers Association (NEMA)			
8.7	National Electric Safety Code (NESC)			
8.8	National Fire Protection Association (NFPA)			
8.9	Underwriters Laboratories (UL)			
8.10	Occupational Safety & Health Act (OSHA)			
9	**Data to be supplied by Vendor**			
9.1	Overall Dimensions of UPS/CPS (Length x Width x Height)	see drawing		
9.2	Enclosure Dimensions (Length x Width x Height)	see drawing		
9.3	Max. Output Rating (kVA)	2200		
9.4	Frequency (Hz)	60		
9.5	Input Voltage (kV)	480		
9.6	Output Voltage (kV)	480		
9.7	Voltage deviation	±1%		
9.8	Voltage asymmetry	<2%		
9.9	Harmonic distortion	<3.5% linear load		
9.10	Harmonic filtering	>95%		
9.11	Frequency deviation	typically set to go to diesel at ±0.5%		
9.12	Short Circuit Current (kA)	up to 14X		
9.13	Nominal P.F.	0.8		
9.14	Efficiency	>95% @ FL		
9.15	Color Scheme	RAL7032 & RAL 5012; engine std manufacturer color		
9.16	Diesel Engine	Cummins QSK60-G6		
9.17	Rear Access Required?	for swgr		
9.18	Additional Aux Power Requirements?	NA, power rating is net		
10	**Training and Start-up Supervision**			
10.1	Unit Rates ($/Man Hour)	NA		
10.2	Expenses, meals, lodging, auto, travel included	NA		
10.3	Recommended Erection Assistance (8hr Days)	included		
10.4	Recommended Training Period (8hr Days)	2 days, included		
11	**Commercial & Delivery**			
11.1	Site Delivery Time From Receipt of Order (Weeks)	30 weeks ARO		
11.2	Place of Manufacture (City, State, Country)	Almelo, NL for CPS; other matl USA		
11.3	Transfer of Title (Jobsite, Port of Entry, or Other)	**JOBSITE**		
11.4	Period of Quote Validity (days):	budgetary		
11.5	Date of Quotation	2/11/2009		
12	**Quotation Cost Breakdown Requirements**			

SPECIFICATION 891
Diesel UPS/CPS

Item	Description	Specified Data	See Note	Rev. #
	Manufacturer:	**Hitec Power Protection**		
	Show cost of each listed item:	**(rounded)**		
12.1	ELECTRICAL EQUIPMENT:	**$1,574,000**		
12.2	EQUIPMENT ENCLOSURE:	**$300,000**		
12.3	STARTUP/ERECTION ASSISTANCE: commissioning/site tests	**$160,000**		
12.4	TRAINING:	**$7,000**		
12.5	SPARE PARTS SPECIFIED:	**incl in equipment**		
12.6	START-UP SPARE PARTS:	**incl in equipment**		
12.7	TWO-YEAR SPARE PARTS:	**N/A**		
12.8	FREIGHT:	**$87,000**		
12.9	100% SUPPLY BOND:	**$12,000**		
12.10	CUSTOMS/DUTIES AND IMPORT FEES:	**$35,000**		
12.11	OTHER COSTS NOT LISTED (DESCRIBE):			
12.12	TOTAL, D.D.P. JOBSITE: Budgetary	**$2,175,000**		

13	Additional Comments
13.1	Quote shall include price for standalone modular building enclosure. Layout shall be typical and Manufacturer shall provide proposed layout drawing.
13.2	
13.3	
13.4	
13.5	

Appendix C

Ultra Low Sulfur Diesel MSDS

Material Safety Data Sheet

MSDS ID NO.: 0290MAR019
Revision date: 10/23/2009

1. CHEMICAL PRODUCT AND COMPANY INFORMATION

Product name: Marathon No. 2 Ultra Low Sulfur Diesel 15 ppm Sulfur Max
Synonym: Ultra Low Sulfur Diesel No. 2 15 ppm Sulfur Max; Ultra Low Sulfur Diesel No. 2 15 ppm Sulfur Max with Polar Plus; No. 2 Diesel, Motor Vehicle Use, Undyed; No. 2 Diesel, Motor Vehicle Use, Undyed, with Polar Plus; ULSD No. 2 Diesel 15 ppm Sulfur Max; ULSD No. 2 Diesel 15 ppm Sulfur Max with Polar Plus; No. 2 MV 15 Diesel; No. 2 MV 15 Diesel with Polar Plus.
Chemical Family: Petroleum Hydrocarbon
Formula: Mixture

Manufacturer:
Marathon Petroleum Company LLC
539 South Main Street Findlay OH 45840

Other information: 419-421-3070
Emergency telephone number: 877-627-5463

2. COMPOSITION / INFORMATION ON INGREDIENTS

No. 2 Ultra Low Sulfur Diesel is a complex mixture of paraffins, cycloparaffins, olefins and aromatic hydrocarbon chain lengths predominantly in the range of C9-C16. Can contain small amounts of dye and other additives (<0.15%) which are not considered hazardous at the concentrations used.

Product information:

Name	CAS Number	Weight %	ACGIH Exposure Limits:	OSHA - Vacated PELs - Time Weighted Ave	Other:
Marathon No. 2 Ultra Low Sulfur Diesel	68476-30-2	100			

Component Information:

Name	CAS Number	Weight %	ACGIH Exposure Limits:	OSHA - Vacated PELs - Time Weighted Ave	Other:
Saturated Hydrocarbons	Mixture	70-80			
Aromatic Hydrocarbons	Mixture	17-25			
Unsaturated Hydrocarbons	Mixture	3-6			
Naphthalene	91-20-3	0.01-0.5	= 10 ppm TWA = 15 ppm STEL	= 10 ppm TWA = 50 mg/m^3 TWA = 15 ppm STEL = 75 mg/m^3 STEL	

Notes: The manufacturer has voluntarily elected to reflect exposure limits contained in OSHA's 1989 air contaminants standard in its MSDS's, even though certain of those exposure limits were vacated in 1992.

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

NO. 2 DIESEL IS A COLORLESS LIQUID. THIS PRODUCT IS CONSIDERED TO BE A COMBUSTIBLE LIQUID PER THE OSHA HAZARD COMMUNICATION STANDARD AND SHOULD BE KEPT AWAY FROM HEAT, FLAME AND SOURCES OF IGNITION. NEVER SIPHON THIS PRODUCT BY MOUTH. IF SWALLOWED, THIS PRODUCT MAY GET SUCKED INTO THE LUNGS (ASPIRATED) AND CAUSE LUNG DAMAGE OR EVEN DEATH. PROLONGED OR REPEATED SKIN CONTACT CAN CAUSE DEFATTING AND DRYING OF THE SKIN WHICH MAY PRODUCE SEVERE IRRITATION OR DERMATITIS.

OSHA WARNING LABEL:

WARNING.
COMBUSTIBLE LIQUID.
ASPIRATION (INADVERTENT SUCTION) OF LIQUID INTO THE LUNGS CAN PRODUCE CHEMICAL PNEUMONIA OR EVEN DEATH.
PRODUCES SKIN IRRITATION UPON PROLONGED OR REPEATED CONTACT.

CONSUMER WARNING LABEL:

A CONSUMER WARNING LABEL IS NOT APPLICABLE FOR THIS PRODUCT.

Inhalation: Exposure to high vapor concentrations may produce headache, giddiness, vertigo, and anesthetic stupor.

Ingestion: Ingestion may result in nausea, vomiting, diarrhea and restlessness. Aspiration (inadvertent suction) of liquid into the lungs must be avoided as even small quantities in the lungs can produce chemical pneumonitis, pulmonary edema/hemorrhage and even death.

Skin contact: Prolonged and repeated liquid contact can cause defatting and drying of the skin and can lead to irritation and/or dermatitis.

Eye contact: Produces little or no irritation on direct contact with the eye.

Carcinogenic Evaluation:

Product information:

Name	IARC Carcinogens:	NTP Carcinogens:	ACGIH - Carcinogens:	OSHA - Select Carcinogens:
Marathon No. 2 Ultra Low Sulfur Diesel 68476-30-2	NE			

Notes: The International Agency for Research on Cancer (IARC) has determined that there is inadequate evidence for the carcinogenicity of diesel fuel/fuel oil in humans. IARC determined that there was limited evidence for the carcinogenicity of marine diesel fuel in animals. Distillate (light) diesel fuels were not classifiable as to their carcinogenicity to humans (Group 3A).

IARC has determined that there is sufficient evidence for the carcinogenicity in experimental animals of diesel engine exhaust and extracts of diesel engine exhaust particles. IARC determined that there is only limited evidence for the carcinogenicity in humans of diesel engine exhaust. However, IARC's overall evaluation has resulted in the IARC designation of diesel engine exhaust as probably carcinogenic to humans (Group 2A) because of the presence of certain engine exhaust components.

Component Information:

Name	IARC Carcinogens:	NTP Carcinogens:	ACGIH - Carcinogens:	OSHA - Select Carcinogens:
Naphthalene 91-20-3	Monograph 82 [2002]	Reasonably Anticipated To Be A Human Carcinogen male rat-clear evidence; female rat-clear evidence; male mice-no evidence; female mice-some evidence	A4 - Not Classifiable as a Human Carcinogen	Present

Notes: The International Agency for Research on Cancer (IARC) and the Environmental Protection Agency (EPA) have determined that naphthalene could be a possible human carcinogen.

4. FIRST AID MEASURES

Inhalation: If affected, move person to fresh air. If breathing is difficult, administer oxygen. If not breathing or if no heartbeat, give artificial respiration or cardiopulmonary resuscitation (CPR). Immediately call a physician. If symptoms or irritation occur with any exposure, call a physician.

Skin contact: Wash with soap and large amounts of water. Remove contaminated clothing. If symptoms or irritation occur, call a physician.

Ingestion: If swallowed, do not induce vomiting and do not give liquids. Immediately call a physician.

Eye contact: Flush eyes with large amounts of tepid water for at least 15 minutes. If symptoms or irritation occur, call a physician.

Medical conditions aggravated by exposure: Pre-existing skin conditions and respiratory disorders may be aggravated by exposures to components of this product.

5. FIRE FIGHTING MEASURES

Suitable extinguishing media: For small fires, Class B fire extinguishing media such as CO2, dry chemical, foam (AFFF/ATC) or water spray can be used. For large fires, water spray, fog or foam (AFFF/ATC) can be used. Fire fighting should be attempted only by those who are adequately trained and equipped with proper protective equipment.

Specific hazards: This product has been determined to be a combustible liquid per the OSHA Hazard Communication Standard and should be handled accordingly. For additional fire related information, see NFPA 30 or the North American Emergency Response Guide 128.

Special protective equipment for firefighters: Avoid using straight water streams. Water spray and foam (AFFF/ATC) must be applied carefully to avoid frothing and from as far a distance as possible. Avoid excessive water spray application. Keep surrounding area cool with water spray from a distance and prevent further ignition of combustible material. Keep run-off water out of sewers and water sources.

Flash point: 120-190 F
Autoignition temperature: 489 F
Flammable limits in air - lower (%): 0.7
Flammable limits in air - upper (%): 5.0

NFPA rating:
Health: 1
Flammability: 2
Instability: 0
Other: -

6. ACCIDENTAL RELEASE MEASURES

Personal precautions: Keep public away. Isolate and evacuate area. Shut off source if safe to do so. Eliminate all ignition sources. Advise authorities and National Response Center (800-424-8802) if the product has entered a water course or sewer. Notify local health and pollution control agencies, if appropriate. Contain liquid with sand or soil. Recover and return free product to proper containers. Use suitable absorbent materials such as vermiculite, sand, or clay to clean up residual liquids.

7. HANDLING AND STORAGE

Handling:

Comply with all applicable EPA, OSHA, NFPA and consistent state and local requirements. Use appropriate grounding and bonding practices. Store in properly closed containers that are appropriately labeled and in a cool well-ventilated area. Do not expose to heat, open flames, strong oxidizers or other sources of ignition. Do not cut, drill, grind or weld on empty containers since they may contain explosive residues.

Avoid repeated and prolonged skin contact. Never siphon this product by mouth. Exercise good personal hygiene including removal of soiled clothing and prompt washing with soap and water.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

PERSONAL PROTECTIVE EQUIPMENT

Engineering measures: Local or general exhaust required when using at elevated temperatures that generate vapors or mists.

Respiratory protection: Use approved organic vapor chemical cartridge or supplied air respirators when material produces vapors that exceed permissible limits or excessive vapors are generated. Observe respirator assigned protection factors (APFs) criteria cited in federal OSHA 1910.134. Self-contained breathing apparatus should be used for fire fighting.

Skin and body protection: Neoprene, nitrile, polyvinyl alcohol (PVA), polyvinyl chloride and polyurethane gloves to prevent skin contact.

Eye protection: No special eye protection is normally required. Where splashing is possible, wear safety glasses with side shields.

Hygiene measures: No special protective clothing is normally required. Select protective clothing depending on industrial operations. Use mechanical ventilation equipment that is explosion-proof.

9. PHYSICAL AND CHEMICAL PROPERTIES:

Appearance:	Colorless Liquid
Physical state (Solid/Liquid/Gas):	Liquid
Substance type (Pure/Mixture):	Mixture
Color:	Colorless

9. PHYSICAL AND CHEMICAL PROPERTIES:

Odor:	Not applicable.
Molecular weight:	180
pH:	Neutral
Boiling point/range (5-95%):	360-550 F
Melting point/range:	Not determined.
Decomposition temperature:	Not applicable.
Specific gravity:	C.A. 0.8
Density:	6.76 lbs/gal
Bulk density:	No data available.
Vapor density:	4-5
Vapor pressure:	1-10 mm Hg @ 100 F
Evaporation rate:	No data available.
Solubility:	Negligible
Solubility in other solvents:	No data available.
Partition coefficient (n-octanol/water):	No data available.
VOC content(%):	10%
Viscosity:	1.3-2.1 @ 50 C

10. STABILITY AND REACTIVITY

Stability:	The material is stable at 70 F, 760 mm pressure.
Polymerization:	Will not occur.
Hazardous decomposition products:	Combustion produces carbon monoxide, aldehydes, aromatic and other hydrocarbons.
Materials to avoid:	Strong oxidizers such as nitrates, perchlorates, chlorine, fluorine.
Conditions to avoid:	Excessive heat, sources of ignition and open flames.

11. TOXICOLOGICAL INFORMATION

Acute toxicity:

Product information:

Name	CAS Number	Inhalation:	Dermal:	Oral:
Marathon No. 2 Ultra Low Sulfur Diesel	68476-30-2	No data available	No data available	No data available

Lifetime skin painting studies in animals with similar distillate fuels have produced weak to moderate carcinogenic activity following prolonged and repeated exposure. Similar middle distillates, when tested at nonirritating dose levels, did not show any significant carcinogenic activity indicating that this tumorigenic response is likely related to chronic irritation and not to dose. Repeated dermal application has produced severe irritation and systemic toxicity in subacute toxicity studies. Some components of this product, have been shown to produce a species specific, sex hormonal dependent kidney lesion in male rats from repeated oral or inhalation exposure. Subsequent research has shown that the kidney damage develops via the formation of a alpha-2µ-globulin, a mechanism unique to the male rat. Humans do not form alpha-2µ-globulin, therefore, the kidney effects resulting from this mechanism are not relevant in humans. Some components of this product were found to be positive in a few mutagenicity tests while negative in the majority of others. The exact relationship between these results and human health is not known.

Summary of health effect data on distillate fuel components:

This product may contain >0.1% naphthalene. Exposure to naphthalene at 30 ppm for two years caused an increased incidence in lung tumors in female mice. Exposure to 30-60 ppm naphthalene for 2 years caused tumors in the tissue lining of the nose and upper respiratory tract in male and female rats. Evidence of inflammation and tissue injury in target tissues (female mouse lung and rat nose) indicated that cytotoxicity played a significant role in the tumor response. Oral administration of 133-267 mg/kg/day of naphthalene in mice for up to 90 days did not produce mortality, systemic toxicity, adversely affect organ or body weight or produce changes in blood. Repeated oral administration of naphthalene produced an anemia in dogs. Repeated intraperitoneal doses of naphthalene produced lung damage in mice. Repeated high doses of naphthalene has caused the formation of cataracts and retinotoxicity in the eyes of rats and rabbits due to accumulation of 1,2-naphthoquinone, a toxic metabolite. Effects in human eyes is uncertain and not well documented. Pregnant rats administered intraperitoneal doses of naphthalene during gestation gave birth to offspring that had delayed heart and bone development. Pregnant mice given near lethal doses of naphthalene showed no significant maternal toxicity and a reduction in the number of pups per litter, but no gross abnormalities in offspring. Suppressed spermatogenesis and progeny development have been reported in mice, rats and guinea pigs after exposure to high concentrations of naphthalene in their drinking water. Certain groups or individuals, i.e., infants, Semites, Arabs, Asians and Blacks, with a certain blood enzyme deficiency (glucose-6-phosphate dehydrogenase) are particularly susceptible to hemolytic agents and can rapidly develop hemolytic anemia and systemic poisoning from ingestion or inhalation of naphthalene.

Summary of health effect information on diesel engine exhaust:

Chronic inhalation studies of whole diesel engine exhaust in mice and rats produced a significant increase in lung tumors. Combustion of kerosine and/or diesel fuels produces gases and particulates which include carbon monoxide, carbon dioxide, oxides of nitrogen and/or sulfur and hydrocarbons. Significant exposure to carbon monoxide vapors decreases the oxygen carrying capacity of the blood and may cause tissue hypoxia via formation of carboxyhemoglobin.

12. ECOLOGICAL INFORMATION

Ecotoxicity effects:

Product can cause fouling of shoreline and may be harmful to aquatic life in low concentrations. The 96 hour LL50 values for an accomadated fraction (WAF) of fuel oil ranged from 3.2 to 65 mg/l in fish and 2-210 mg/l in invertebrates. EL50 values for inhibition of algal growth ranged from 1.8 to 2.9 mg/l for No. 2 fuel oil and from 10 to 78 mg/l for diesel fuel. This product does not concentrate or accumulate in the food chain. If released to soil and water, this product is expected to biodegrade under both aerobic and anaerobic conditions.

13. DISPOSAL CONSIDERATIONS

13. DISPOSAL CONSIDERATIONS

Cleanup Considerations: This product as produced is not specifically listed as an EPA RCRA hazardous waste according to federal regulations (40 CFR 261). However, when discarded or disposed of, it may meet the criteria of an "characteristic" hazardous waste. This material could become a hazardous waste if mixed or contaminated with a hazardous waste or other substance(s). It is the responsibility of the user to determine if disposal material is hazardous according to federal, state and local regulations.

14. TRANSPORT INFORMATION

49 CFR 172.101:

DOT:

Transport Information: This material when transported via US commerce would be regulated by DOT Regulations.

Proper shipping name:	Fuel Oil, No. 2
UN/Identification No:	NA 1993
Hazard Class:	3
Packing group:	III
DOT reportable quantity (lbs):	Not applicable.

TDG (Canada):

Proper shipping name:	Fuel Oil, No. 2
UN/Identification No:	NA 1993
Hazard Class:	3
Packing group:	III
Regulated substances:	Not applicable.

15. REGULATORY INFORMATION

US Federal Regulatory Information:

US TSCA Chemical Inventory Section 8(b): This product and/or its components are listed on the TSCA Chemical Inventory.

OSHA Hazard Communication Standard: This product has been evaluated and determined to be hazardous as defined in OSHA's Hazard Communication Standard.

EPA Superfund Amendment & Reauthorization Act (SARA):

SARA Section 302: This product contains the following component(s) that have been listed on EPA's Extremely Hazardous Substance (EHS) List:

Name	CERCLA/SARA - Section 302 Extremely Hazardous Substances and TPQs
Saturated Hydrocarbons	NA
Aromatic Hydrocarbons	NA
Unsaturated Hydrocarbons	NA
Naphthalene	NA

SARA Section 304: This product contains the following component(s) identified either as an EHS or a CERCLA Hazardous substance which in case of a spill or release may be subject to SARA reporting requirements:

Name	CERCLA/SARA - Hazardous Substances and their Reportable Quantities
Saturated Hydrocarbons	NA
Aromatic Hydrocarbons	NA
Unsaturated Hydrocarbons	NA
Naphthalene	= 100 lb final RQ = 45.4 kg final RQ

SARA Section 311/312 The following EPA hazard categories apply to this product:

Acute Health Hazard
Fire Hazard
Chronic Health Hazard

SARA Section 313: This product contains the following component(s) that may be subject to reporting on the Toxic Release Inventory (TRI) From R:

Name	CERCLA/SARA 313 Emission reporting:
Saturated Hydrocarbons	None
Aromatic Hydrocarbons	None
Unsaturated Hydrocarbons	None
Naphthalene	= 0.1 % de minimis concentration

State and Community Right-To-Know Regulations:
The following component(s) of this material are identified on the regulatory lists below:

Saturated Hydrocarbons

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	Not Listed.
Pennsylvania Right-To-Know:	Not Listed.
Massachusetts Right-To Know:	Not Listed.
Florida substance List:	Not Listed.
Rhode Island Right-To-Know:	Not Listed
Michigan critical materials register list:	Not Listed.
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Not Listed
New Jersey - Environmental Hazardous Substances List:	Not Listed
Illinois - Toxic Air Contaminants	Not Listed
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Not Listed

Aromatic Hydrocarbons

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	Not Listed.
Pennsylvania Right-To-Know:	Not Listed.
Massachusetts Right-To Know:	Not Listed.
Florida substance List:	Not Listed.
Rhode Island Right-To-Know:	Not Listed

Saturated Hydrocarbons

Michigan critical materials register list:	Not Listed.
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Not Listed
New Jersey - Environmental Hazardous Substances List:	Not Listed
Illinois - Toxic Air Contaminants	Not Listed
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Not Listed

Unsaturated Hydrocarbons

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	Not Listed.
Pennsylvania Right-To-Know:	Not Listed.
Massachusetts Right-To Know:	Not Listed.
Florida substance List:	Not Listed.
Rhode Island Right-To-Know:	Not Listed
Michigan critical materials register list:	Not Listed.
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Not Listed
New Jersey - Environmental Hazardous Substances List:	Not Listed
Illinois - Toxic Air Contaminants	Not Listed
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Not Listed

Naphthalene

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	carcinogen, initial date 4/19/02
New Jersey Right-To-Know:	sn 1322
Pennsylvania Right-To-Know:	Environmental hazard
Massachusetts Right-To Know:	Present
Florida substance List:	Not Listed.
Rhode Island Right-To-Know:	Toxic; Flammable
Michigan critical materials register list:	Not Listed.
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	carcinogen
New Jersey - Environmental Hazardous Substances List:	SN 1322 TPQ 500 lb
Illinois - Toxic Air Contaminants	Present

Saturated Hydrocarbons

New York - Reporting of Releases Part 597 - = 1 lb RQ land/water
List of Hazardous Substances: = 100 lb RQ air

Canadian Regulatory Information:

Canada DSL/NDSL Inventory: This product and/or its components are listed either on the Domestic Substances List (DSL) or are exempt.

Name	Canada - WHMIS: Classifications of Substances:	Canada - WHMIS: Ingredient Disclosure:
Naphthalene	B4, D2A	1 %

16. OTHER INFORMATION

Additional Information: No data available.

Prepared by: Mark S. Swanson, Manager, Toxicology and Product Safety

The information and recommendations contained herein are based upon tests believed to be reliable. However, Marathon Petroleum Company LLC (MPC) does not guarantee their accuracy or completeness nor shall any of this information constitute a warranty, whether expressed or implied, as to the safety of the goods, the merchantability of the goods, or the fitness of the goods for a particular purpose. Adjustment to conform to actual conditions of usage maybe required. MPC assumes no responsibility for results obtained or for incidental or consequential damages, including lost profits arising from the use of these data. No warranty against infringement of any patent, copyright or trademark is made or implied.

End of Safety Data Sheet

Appendix D

Emissions Calculations

Emergency Engine Criteria Pollutant Emission Calculations

Table D.1 Diesel ICE Emission Factors	
Pollutant	**Emergency Generator**
	EPA Tier 2[1]
	Emission Factors (g/bhp-hr)
NOx[2]	4.56
NMHC (VOC)[2]	0.24
CO	2.6
PM10	0.15

Table D.2 Reference Data		
Parameter	**Value**	**Units**
Horsepower	2922	**hp**
Daily Hours	1	**hr/dy**
Annual Hours	50	**hr/year**
Fuel Consumption	7,000	Btu/hp-hr
Fuel Use	141.4	gal/hr
Sulfur Content	15	ppmw
Heating Value Diesel	137,000	Btu/gal
Density Diesel	7.2	lb/gal
Conversion kg to lbs	0.454	kg/lb
Conversion g to lbs	454	g/lb
Conversion lb to tons	2,000	lb/ton
Conversion lb to metric tons	2,205	lb/metric ton
Molecular Weight S	32	lb/mol
Molecular Weight SO_2	64	lb/mol

Table D.3 Emissions for One Diesel Powered Emergency Generator						
Pollutant	**Emission Factor (g/bhp-hr)**	**AHU/AHC (lb/hr)**	**MHU/MHC (lb/hr)**	**MDU/MDC (lb/day)**	**AA (lb/yr)**	**30-DA (lb/day)**
NOx	4.56	1.68E-01	29.35	29.35	1467.44	22.50
VOC	0.24	8.82E-03	1.54	1.54	77.23	1.18
CO	2.6	9.55E-02	16.73	16.73	836.70	12.83
PM10	0.15	5.51E-03	0.97	0.97	48.27	0.74
DPM	0.15	5.51E-03	0.97	0.97	48.27	0.74
SOx	---	1.74E-04	0.031	0.031	1.53	0.023

Notes:

[1]Subpart III of 40 CFR Part 60 - Certification Requirements for Stationary Fire Pump Engines and Non Fire Pump Engines for model year 2009 and later

[2]Emission limit for NMHC+NOx assuming 95% NOx

Appendix E

Health Risk Assessment

TIER 2 SCREENING RISK ASSESSMENT REPORT

Stack Data		Units
Hour/Day	1	hr/day
Day/Week	1	day/wk
Week/Year	50	wk/yr
Does source have TBACT?	NO	
Point or Volume Source ?	P	P or V
Stack Height or Building Height	23	feet
Distance-Residential	1000	meters
Distance-Commercial	1000	meters
Meteorological Station	Riverside	

Source Type:	Diesel ICE
Screening Mode (**NO** = Tier 1 or Tier 2; **YES** = Tier	NO

Diesel PM Emissions	0.97	lb/hr
	48.27	lb/year
	0.02	ton/year

2. Tier 2 Risk Assessment Data

MET Factor	0.82

Dispersion Factors tables

2	For Chronic X/Q
6	For Acute X/Q

Dilution Factors (ug/m3)/(tons/yr)

Receptor	X/Q
Residential	0.05
Commercial	0.05

Adjustment and Intake Factors

	AFann	DBR	EVF
Residential	1	302	0.96
Worker	4.2	149	0.38

TIER 2 SCREENING RISK ASSESSMENT REPORT

3. Rule 1401 Compound Data

Compound	Qtons	CP	MP MICR Resident	MP MICR Worker	MP Chronic Resident	MP Chronic Worker	REL Chronic	REL Acute
Diesel eshaust particulates - particulates from diesel fueled interal combustion engine exhaust	2.41E-02	1.10E+00	1.00	1.00	1.00	1.00	5	---

4. Emission Calculations

Compound	Hourly Emissions (lb/hr)	Annual Emissions (lb/yr)	Annual Emissions (ton/yr)
Diesel PM	9.65E-01	4.83E+01	2.41E-02
Total	**9.65E-01**	**4.83E+01**	**2.41E-02**

5a. MICR

MICR = CP (mg/(kg-day))^-1 * Q (ton/yr) * (X/Q) * AFann * MET * DBR * EVF * 1.E-6 * MP

Compound	Residential	Commercial
Diesel PM	3.16E-07	2.59E-07
Total	**3.16E-07**	**2.59E-07**
Less than 1 in a Million?	**YES**	**YES**

5b. Cancer Burden	
X/Q for one-in-a-million:	---
Distance (meter)	---
Area (km2):	---
Population per square mile:	---
Square miles per square km	---
Population per square km:	---
Cancer Burden:	---

TIER 2 SCREENING RISK ASSESSMENT REPORT

6. Hazard Index

HIA = [Q(lb/hr) * (X/Q)max] * AF / Acute REL

HIC = [Q(ton/yr) * (X/Q) * MET * MP] / Chronic REL

Target Organs	Acute	Chronic	Acute Pass/Fail	Chronic Pass/Fail
Alimentary system (liver) - AL	---	---	---	---
Bones and teeth - BN	---	---	---	---
Cardiovascular system - CV	---	---	---	---
Developmental - DEV	---	---	---	---
Endocrine system - END	---	---	---	---
Eye	---	---	---	---
Hematopoietic system - HEM	---	---	---	---
Immune system - IMM	---	---	---	---
Kidney - KID	---	---	---	---
Nervous system - NS	---	---	---	---
Reproductive system - REP	---	---	---	---
Respiratory system - RES	---	1.98E-04	---	PASS
Skin	---	---	---	---

6a. Hazard Index Acute

HIA = [Q(lb/hr) * (X/Q)max] *AF/ Acute REL

	HIA - Residential									
Compound	AL	CV	DEV	EYE	HEM	IMM	NS	REP	RESP	SKIN
Diesel PM	---	---	---	---	---	---	---	---	---	---
Total	---	---	---	---	---	---	---	---	---	---

	HIA - Commercial									
Compound	AL	CV	DEV	EYE	HEM	IMM	NS	REP	RESP	SKIN
Diesel PM	---	---	---	---	---	---	---	---	---	---
Total	---	---	---	---	---	---	---	---	---	---

6b. Hazard Index Chronic

HIC = [Q(ton/yr) * (X/Q) * MET * MP] / Chronic REL

	HIC - Residential												
Compound	AL	BN	CV	DEV	END	EYE	HEM	IMM	KID	NS	REP	RESP	SKIN
Diesel PM	---	---	---	---	---	---	---	---	---	---	---	1.98E-04	---
Total	---	---	---	---	---	---	---	---	---	---	---	1.98E-04	---

	HIC - Worker												
Compound	AL	BN	CV	DEV	END	EYE	HEM	IMM	KID	NS	REP	RESP	SKIN
Diesel PM	---	---	---	---	---	---	---	---	---	---	---	1.98E-04	---
Total	---	---	---	---	---	---	---	---	---	---	---	1.98E-04	---

Attachment 3
Emission Calculations

Auxiliary Boiler Criteria Pollutant Emission Calculations

Table E.3-1a Reference Data		
	Auxiliary Boiler	
Parameter	Value	Units
Heater Capacity	35	MMBtu/hr
Maximum Daily Operating Hours[1]	15	hrs/day 25% load
	12	hr/day full load
Annual Operating Hours[1]	5,100	hrs/yr
	12	% at full load
	88	% at 25% load
Conversion lb to tons	2,000	lb/ton
Conversion lb to metric tons	2,205	lb/metric ton
Heating Value LPG	91.5	MMBtu/ 10^3 gal
F-factor	8,710	scf/MMBtu
Conversion grains to lbs	7,000	gr/lb
Molecular Weight NOx	46	lb/mol
Molecular Weight CO	28	lb/mol
Molecular Volume	379	scf/mol

Table E.3-1b Emissions for the One LPG Fired Auxiliary Boiler								
Pollutant	Emission Factor	Units	Emission Factor (lb/MMBtu)	Emissions				
				AHU/AHC (lb/hr)	MHU/MHC (lb/hr)	MDU/MDC (lb/day)	AA (lb/yr)	30-DA (lb/day)
NOx[2]	9.0	ppm @ 3% O_2	1.11E-02	0.07	0.39	5.15	644	5.15
VOC[3]	0.005	lb/MMBtu	5.00E-03	0.03	0.18	2.32	290	2.32
CO	50	ppm @ 3% O_2	3.76E-02	0.25	1.31	17.42	2,179	17.42
PM10	0.01	lb/MMBtu	1.00E-02	0.07	0.35	4.64	580	4.64
PM2.5[4]	0.01	lb/MMBtu	1.00E-02	0.07	0.35	4.64	580	4.64
SOx[5]	0.0113	lb/MMBtu	1.13E-02	0.03	0.40	5.24	283	5.24

Notes:

[1] The boiler will operate a maximum of 2 hours per day at full load to assist with start up operations, a maximum of 10 hours per day for HTF freeze protection, and a maximum of 15 hours per day at partial load (25%) in standby mode to maintain steam seals. The Maximum single day would have 2 hours at 100% load for startup support, 10 hours at 100% load for freeze protection and 5 hours at 25% load in standby. Maximum annual operation for freeze protection would be 100 hours per year. Maximum operation for startup would be 500 hours per year, and maximum operation in standby mode would be 4,500 hours per year.

[2] For NOx and CO, EF = (ppm/10^6) * f-factor * MW/ MV

[3] VOC and PM emission factor taken from vendor data

[4] PM2.5 emissions are assumed to be equivalent to PM10 emissions.

[5] SOx emission factor is taken from SCAQMD 2009 AER General Reporting Instructions Book for LPG

Emergency Engine Criteria Pollutant Emission Calculations

Table E.3-2a Diesel ICE Emission Factors		
Pollutant	Fire Water Pump	Emergency Generator
	EPA Tier 3[1]	EPA Tier 2[1]
	Emission Factors (g/bhp-hr)	Emission Factors (g/bhp-hr)
NOx[2]	2.85	4.56
NMHC (VOC)[2]	0.15	0.24
CO	2.6	2.6
PM10	0.15	0.15

Table E.3-2b Engine Data					
Source	Horsepower	Daily Hours	Annual Hours	Fuel Use	
	(hp)	(hr)	(hr)	(gal/hr)	(gal/yr)
Emergency Fire Water Pump	300	1	50	15.3	766
Emergency Generator	2922	1	50	141.4	7070

Table E.3-2c Reference Data		
Parameter	Value	Units
Fuel Consumption	7,000	Btu/hp-hr
Sulfur Content	15	ppmw
Heating Value Diesel	137,000	Btu/gal
Density Diesel	7.2	lb/gal
Conversion kg to lbs	0.454	kg/lb
Conversion g to lbs	454	g/lb
Conversion lb to tons	2,000	lb/ton
Conversion lb to metric tons	2,205	lb/metric ton
Molecular Weight S	32	lb/mol
Molecular Weight SO_2	64	lb/mol

Table E.3-2d Emissions for One Diesel Powered Emergency Fire Water Pump						
Pollutant	Emission Factor (g/bhp-hr)	AHU/AHC (lb/hr)	MHU/MHC (lb/hr)	MDU/MDC (lb/day)	AA (lb/yr)	30-DA (lb/day)
NOx	2.85	1.07E-02	1.88	1.88	94.16	1.88
VOC	0.15	5.66E-04	0.10	0.10	4.96	0.10
CO	2.6	9.81E-03	1.72	1.72	85.90	1.72
PM10	0.15	5.66E-04	0.10	0.10	4.96	0.10
PM2.5	0.15	5.66E-04	0.10	0.10	4.96	0.10
SOx	---	1.89E-05	0.003	0.003	0.17	0.003

Table E.3-2e Emissions for One Diesel Powered Emergency Generator						
Pollutant	Emission Factor (g/bhp-hr)	AHU/AHC (lb/hr)	MHU/MHC (lb/hr)	MDU/MDC (lb/day)	AA (lb/yr)	30-DA (lb/day)
NOx	4.56	1.68E-01	29.35	29.35	1467.44	29.35
VOC	0.24	8.82E-03	1.54	1.54	77.23	1.54
CO	2.6	9.55E-02	16.73	16.73	836.70	16.73
PM10	0.15	5.51E-03	0.97	0.97	48.27	0.97
PM2.5	0.15	5.51E-03	0.97	0.97	48.27	0.97
SOx	---	1.74E-04	0.031	0.031	1.53	0.031

Notes:

[1]Subpart III of 40 CFR Part 60 - Certification Requirements for Stationary Fire Pump Engines and Non Fire Pump Engines for model year 2009 and later

[2]Emission limit for NMHC+NOx assuming 95% NOx

Cooling Tower Particulate Emission Calculations

Table E.3-3a Reference Data		
Parameter	**Value**	**Units**
Daily Operating Hours	16	hrs/day
Annual Operating Hours	3,700	hrs/yr
Density Water	8.35	lb/gal
Conversion min to hours	60	min/hr
PM10 Fraction of TSP	100	%
PM2.5 Fraction of PM10	100	%

Table E.3-3b Cooling Tower Data		
Parameter	**Value**	**Units**
Water Circulation Rate	6,034	gpm
Total Liquid Drift	0.00050	%
Maximum TDS of Circulated Water	2,000	ppmw

Table E.3-3c Emissions for One Cooling Tower Unit					
Pollutant	**AHU/AHC (lb/hr)**	**MHU/MHC (lb/hr)**	**MDU/MDC (lb/day)**	**AA (lb/yr)**	**30-DA (lb/day)**
PM10	0.013	0.030	0.48	111.8	0.48
PM2.5	0.013	0.030	0.48	111.8	0.48

Notes:

TSP Emission Rate = based on USEPA AP-42, Section 13.4 Wet Cooling Towers, Table 13.4-1, modified to design

HTF Ullage System Vent Emissions

Table E.3-4a Reference Data			
Parameter	**Value**	**Units**	**Reference**
Daily Operating Hours	2	hrs/day	Design Basis
Annual Operating Hours	400	hrs/yr	Design Basis
Conversion lbs to tons	2,000	lb/ton	Constant
Controlled HTF Vent Emissions	0.75	lb/hr	Assumed
	1.5	lb/day	Assumed
Pollution Control Efficiency	98%	%	Design Basis

Table E.3-4b VOC Emissions for One HTF Ullage System Vent								
	AHU (lb/hr)	**AHC (lb/hr)**	**MHU (lb/hr)**	**MHC (lb/hr)**	**MDU (lb/day)**	**MDC (lb/day)**	**AA (lb/yr)**	**30-DA (lb/day)**
HTF Vent	1.71	0.034	37.50	0.75	75.00	1.50	300	1.50

Fugitive Emissions

Table E.3-5a Reference Data			
Daily Operating Hours		24	Design Basis
Annual Operating Days		365	Design Basis
Equipment	**Component Count[1]**	**Emission Factor[2] (kg/hr/source)**	**Emission Factor (lb/hr)**
Valves	3050	8.40E-06	5.65E-02
Pump Seals	4	2.40E-05	2.12E-04
Connectors	7594	7.50E-06	1.26E-01
Pressure Relief Valves	10	8.40E-06	1.85E-04

Table E.3-5b Fugitive VOC Emissions for One Power Plant Unit					
	AHU/AHC (lb/hr)	**MHU/MHC (lb/hr)**	**MDU/MDC (lb/day)**	**AA (lb/yr)**	**30-DA (lb/day)**
Fugitive VOC	0.18	0.18	4.38	1,598	4.38

Notes:

[1] Component count is per power plant unit, sized from the Beacon Solar Energy Project

[2] Emission factors from EPA 1995 Protocol for Equipment Leak Emission Estimates, Table 2-4. Oil and Gas Production Operations Average Emission Factors, Heavy Oil

Summary of Power Plant Unit Criteria Pollutant Emissions

Table E.3-6a Summary of Average Hourly Uncontrolled (AHU) Emissions for One Power Plant Unit

Source	lb/hr					
	NOx	VOC	CO	PM10	PM2.5	SOx
Auxiliary Boiler	0.074	0.033	0.249	0.066	0.066	0.032
Emergency Fire Pump Engine	0.011	0.001	0.010	0.001	0.001	0.000
Emergency Generator	0.168	0.009	0.096	0.006	0.006	0.000
Cooling Tower	--	--	--	0.013	0.013	--
HTF Vent	--	1.712	--	--	--	--
HTF Fugitives	--	0.182	--	--	--	--
Total[1]	**0.25**	**1.94**	**0.35**	**0.09**	**0.09**	**0.03**

Table E.3-6b Summary of Average Hourly Controlled (AHC) Emissions for One Power Plant Unit

Source	lb/hr					
	NOx	VOC	CO	PM10	PM2.5	SOx
Auxiliary Boiler	0.074	0.033	0.249	0.066	0.066	0.032
Emergency Fire Pump Engine	0.011	0.001	0.010	0.001	0.001	0.000
Emergency Generator	0.168	0.009	0.096	0.006	0.006	0.000
Cooling Tower	---	---	---	0.013	0.013	---
HTF Vent	---	0.034	---	--	--	---
HTF Fugitives	---	0.182				
Total[1]	**0.25**	**0.26**	**0.35**	**0.09**	**0.09**	**0.03**

Table E.3-6c Summary of Maximum Hourly Uncontrolled (MHU) Emissions for One Power Plant Unit

Source	lb/hr					
	NOx	VOC	CO	PM10	PM2.5	SOx
Auxiliary Boiler	0.39	0.18	1.31	0.35	0.35	0.40
Emergency Fire Pump Engine	1.88	0.10	1.72	0.10	0.10	0.00
Emergency Generator	29.35	1.54	16.73	0.97	0.97	0.03
Cooling Tower	---	---	---	0.03	0.03	---
HTF Vent	---	37.50	---	---	--	---
HTF Fugitives	---	0.18	--	--	--	--
Total[1]	**31.62**	**39.50**	**19.77**	**1.44**	**1.44**	**0.43**

Table E.3-6d Summary of Maximum Hourly Controlled (MHC) Emissions for One Power Plant Unit

Source	lb/hr					
	NOx	VOC	CO	PM10	PM2.5	SOx
Auxiliary Boiler	0.39	0.18	1.31	0.35	0.35	0.40
Emergency Fire Pump Engine	1.88	0.10	1.72	0.10	0.10	0.00
Emergency Generator	29.35	1.54	16.73	0.97	0.97	0.03
Cooling Tower	---	---	---	0.03	0.03	---
HTF Vent	---	0.75	---	---	--	---
HTF Fugitives		0.18				
Total[1]	**31.62**	**2.75**	**19.77**	**1.44**	**1.44**	**0.43**

Table E.3-6e Summary of Maximum Daily Uncontrolled (MDU) Emissions for One Power Plant Unit

Source	lb/day					
	NOx	VOC	CO	PM10	PM2.5	SOx
Auxiliary Boiler	5.15	2.32	17.42	4.64	4.64	5.24
Emergency Fire Pump Engine	1.88	0.10	1.72	0.10	0.10	0.00
Emergency Generator	29.35	1.54	16.73	0.97	0.97	0.03
Cooling Tower	---	---	---	0.48	0.48	---
HTF Vent	---	75.00	---	---	--	---
HTF Fugitives	---	4.38	--	--	--	--
Total[1]	**36.38**	**83.34**	**35.87**	**6.19**	**6.19**	**5.27**

Table E.3-6f Summary of Maximum Daily Controlled (MDC) Emissions for One Power Plant Unit

Source	lb/day					
	NOx	VOC	CO	PM10	PM2.5	SOx
Auxiliary Boiler	5.15	2.32	17.42	4.64	4.64	5.24
Emergency Fire Pump Engine	1.88	0.10	1.72	0.10	0.10	0.00
Emergency Generator	29.35	1.54	16.73	0.97	0.97	0.03
Cooling Tower	---	---	---	0.48	0.48	---
HTF Vent	---	1.50	---	---	--	---
HTF Fugitives		4.38				
Total[1]	**36.38**	**9.84**	**35.87**	**6.19**	**6.19**	**5.27**

Summary of Power Plant Unit Criteria Pollutant Emissions

Table E.3-6g Summary of Annual Average (AA) Emissions for One Power Plant Unit						
Source	lb/yr					
	NOx	VOC	CO	PM10	PM2.5	SOx
Auxiliary Boiler	644.5	290.1	2,179.3	580.1	580.1	283.4
Emergency Fire Pump Engine	94.2	5.0	85.9	5.0	5.0	0.2
Emergency Generator	1,467.4	77.2	836.7	48.3	48.3	1.5
Cooling Tower	--	--	--	111.8	111.8	--
HTF Vent	--	300.0	--	--	--	--
HTF Fugitives	--	1,598.2	--	--	--	--
Total[1]	**2,206.1**	**2,270.4**	**3,101.9**	**745.1**	**745.1**	**285.1**

Table E.3-6h Summary of 30-Day Average Emissions for One Power Plant Unit						
Source	lb/day					
	NOx	VOC	CO	PM10	PM2.5	SOx
Auxiliary Boiler	5.15	2.32	17.42	4.64	4.64	5.24
Emergency Fire Pump Engine	1.88	0.10	1.72	0.10	0.10	0.00
Emergency Generator	29.35	1.54	16.73	0.97	0.97	0.03
Cooling Tower	---	---	---	0.48	0.48	---
HTF Vent	---	1.50	---	---	--	---
HTF Fugitives	---	4.38	--	--	--	--
Total[1]	**36.38**	**9.84**	**35.87**	**6.19**	**6.19**	**5.27**

Note:

[1]Onsite and offsite vehicle emissions are not included in the power plant unit summary tables.

Maintenance Vehicle Criteria Emissions for the Project

Table E.3-7a 2013 Motor Vehicle Reference Data

Vehicle Use	Vehicle Type	Distance			Vehicle Class	Emission Factors								
		Miles/task	Miles/day	Miles/yr		CO (lb/mi)	VOC (lb/mi)	NOx (lb/mi)	SOx (lb/mi)	Exh. PM10 (lb/mi)	Tire + Brake PM10 (lb/mi)	Diesel PM (lb/mi)	Exh. PM2.5 (lb/mi)	Tire + Brake PM2.5 (lb/mi)
Mirror Wash Truck	Water Trucks, Freightliner 5000 gallon	476	159	37,128	HHDT-DSL	2.12E-03	4.24E-04	4.16E-03	4.14E-05	1.19E-04	1.40E-04	1.19E-04	1.09E-04	4.60E-05
Weed Abatement	Water Trucks, Freightliner 5000 gallon	316	46.2	1,263	HHDT-DSL	2.12E-03	4.24E-04	4.16E-03	4.14E-05	1.19E-04	1.40E-04	1.19E-04	1.09E-04	4.60E-05
Soil Stabilizer Application	Water Trucks, Freightliner 5000 gallon	2688	46.2	10,753	HHDT-DSL	2.12E-03	4.24E-04	4.16E-03	4.14E-05	1.19E-04	1.40E-04	1.19E-04	1.09E-04	4.60E-05
Water Trucks	Water Trucks, Freightliner 5000 gallon	2.9	2.9	1,071	HHDT-DSL	2.12E-03	4.24E-04	4.16E-03	4.14E-05	1.19E-04	1.40E-04	1.19E-04	1.09E-04	4.60E-05
Maintenance Vehicles	On-Site Pick Up Truck 1/2 Ton	—	101	33,476	LDT2-CAT	1.20E-03	4.16E-05	9.18E-05	1.07E-05	1.07E-05	4.59E-05	—	9.90E-06	1.64E-05

Notes:

The emission factors, except fugitive emissions from entrained road dust, were compiled by running the California Air Resources Board's EMFAC2007 (version 2.3) Burden Model and dividing calculated daily emissions by daily vehicle-miles-traveled.

All the emission factors account for the emissions from start, running and idling exhaust. In addition, the VOC emission factors take into account diurnal, hot soak, running and resting emissions.

The daily and annual VMT are estimated based on the following assumptions (See Table E.3-20 for more details):

Mirror washing occurs 2 times per week for six months a year and once per week for the other 6 months per year, a total of 78 times per year;
Application of soil stabilizers in the solar field quarterly;
Application of weed killer in the solar field quarterly;
Full solar field inspection occurs 18 times per year; and
93,000 gallons of water is applied to the solar field per day at a rate of 3 gallons per square yard.

Table E.3-7b Fugitive Road Dust Emission Factors

Vehicle Type	Vehicle Class	Average Vehicle Weight (tons)	Silt Content[2] (%)	Emission Factors[1]		
				Uncontrolled PM10 (lb/mi)	Controlled PM10[3] (lb/mi)	Controlled PM2.5[4] (lb/mi)
Mirror Wash Truck	HHDT-DSL	26	15.76	5.065	1.013	0.215
Weed Abatement	HHDT-DSL	26		5.065	1.013	0.215
Soil Stabilizer Application	HHDT-DSL	26		5.065	1.013	0.215
Water Trucks	HHDT-DSL	26		5.065	1.013	0.215
Maintenance Vehicles	LDT2-CAT	3		1.917	0.383	0.081

Notes:

[1]Emission Factor [lb/mi] = 1.5 x (silt content [%] / 12)$^{0.9}$ x (vehicle weight [tons] / 3)$^{0.45}$
Reference: AP-42, Section 13.2.2, December 2003 for industrial unpaved roads
[2]Silt Content = 15.76%. Based on Grain Size Distribution in the Soils Report, Appendix B of the AFC
[3]Assumes soils stabilizers contribute a control efficiency of 80%
[4]PM2.5 Fraction of PM10 in Unpaved Road Dust = 0.212 from Appendix A, Final–Methodology to Calculate Particulate Matter (PM) 2.5 and PM 2.5 Significance Thresholds, SCAQMD, October 2006

Maintenance Vehicle Criteria Emissions for the Project

Table E.3-7c Motor Vehicle Combustion Criteria Pollutant Emissions for the Project

Vehicle	CO	VOC	NOx	SOx	Exh. PM10	Fug. PM10	Diesel PM	Exh. PM2.5	Fug. PM2.5
	AHU/AHC								
	(lb/hr)								
Mirror Wash Truck	0.009	0.002	0.018	0.000	0.001	4.294	0.001	0.000	0.910
Weed Abatement	0.000	0.000	0.001	0.000	0.000	0.146	0.000	0.000	0.031
Soil Stabilizer Application	0.003	0.001	0.005	0.000	0.000	1.244	0.000	0.000	0.264
Water Trucks	0.000	0.000	0.001	0.000	0.000	0.124	0.000	0.000	0.026
Maintenance Vehicles	0.005	0.000	0.000	0.000	0.000	1.465	—	0.000	0.311
Total[1]	**0.017**	**0.003**	**0.024**	**0.000**	**0.001**	**7.273**	**0.001**	**0.001**	**1.542**
	MHU/MHC								
	(lb/hr)								
Mirror Wash Truck	0.042	0.008	0.082	0.001	0.002	20.094	0.002	0.002	4.260
Weed Abatement	0.012	0.002	0.024	0.000	0.001	5.853	0.001	0.001	1.241
Soil Stabilizer Application	—	—	—	—	—	—	—	—	—
Water Trucks	0.006	0.001	0.012	0.000	0.000	2.974	0.000	0.000	0.631
Maintenance Vehicles	0.015	0.001	0.001	0.000	0.000	12.808	—	0.000	2.715
Total[1]	**0.076**	**0.013**	**0.120**	**0.001**	**0.004**	**41.729**	**0.003**	**0.003**	**8.847**
	MDU/MDC								
	(lb/day)								
Mirror Wash Truck	0.337	0.067	0.660	0.007	0.019	160.750	0.019	0.017	34.082
Weed Abatement	0.098	0.020	0.192	0.002	0.005	46.824	0.005	0.005	9.928
Soil Stabilizer Application	—	—	—	—	—	—	—	—	—
Water Trucks	0.006	0.001	0.012	0.000	0.000	2.974	0.000	0.000	0.631
Maintenance Vehicles	0.122	0.004	0.009	0.001	0.001	102.462	—	0.001	21.723
Total[2]	**0.562**	**0.092**	**0.874**	**0.010**	**0.026**	**313.010**	**0.025**	**0.024**	**66.362**
	AA								
	(lb/yr)								
Mirror Wash Truck	78.8	15.8	154.4	1.5	4.4	37,615.5	4.4	4.1	7,975.1
Weed Abatement	2.7	0.5	5.3	0.1	0.2	1,279.7	0.2	0.1	271.3
Soil Stabilizer Application	22.8	4.6	44.7	0.4	1.3	10,894.6	1.3	1.2	2,309.8
Water Trucks	2.3	0.5	4.5	0.0	0.1	1,085.6	0.1	0.1	230.2
Maintenance Vehicles	40.3	1.4	3.1	0.4	0.4	12,833.7	—	0.3	2,721.0
Total	**146.8**	**22.7**	**211.9**	**2.4**	**6.3**	**63,709.2**	**6.0**	**5.8**	**13,507.4**
	30-DA								
	(lb/day)								
Mirror Wash Truck	0.337	0.067	0.660	0.007	0.019	160.8	0.019	0.017	34.08
Weed Abatement	0.098	0.020	0.192	0.002	0.005	46.8	0.005	0.005	9.93
Soil Stabilizer Application	—	—	—	—	—	—	—	—	—
Water Trucks	0.006	0.001	0.012	0.000	0.000	3.0	0.000	0.000	0.63
Maintenance Vehicles	0.122	0.004	0.009	0.001	0.001	102.5	—	0.001	21.72
Total	**0.562**	**0.092**	**0.874**	**0.010**	**0.026**	**313.0**	**0.025**	**0.024**	**66.36**

Notes:

[1] Houly emissions assume that each event has an eight hour work-day period.

[2] Daily emissions assumes that weed abatement and soil stabilizer application do not occur on the same day. Weed abatement miles are used to calculate daily emissions

Offsite Vehicle Emissions for the Project

Table E.2-7b Refueling Maintenance Vehicle Reference Data

Vehicle Use	Vehicle Type	Refueling Parameters					
		Maintenance Miles (mi/yr)	Fuel Consumption Associated with Maintenance (gal/year)	Refueling Trips Required (trips/yr)	Max Refueling Trips Required per Event (trips/event)	Assumed Refueling Events per Year	Miles Associated with Refueling (miles/yr)
Mirror Wash Truck	Water Trucks, Freightliner 5000 gallon	37,128	6,884.1	34.4	1.91	12.0	3,360.0
Soil Stabilizer Application	Water Trucks, Freightliner 5000 gallon	1,263	234.2	1.2	0.29		
Weed Abatement	Water Trucks, Freightliner 5000 gallon	10,753	1,993.9	10.0	2.49		
Water Trucks	Water Trucks, Freightliner 5000 gallon	1,071	198.7	1.0	0.003		
Maintenance Vehicles	On-Site Pick Up Truck 1/2 Ton	33,476	1,948.4	64.9	0.2	52.0	1300

Table E.3-8a Delivery Vehicle Reference Data

Maximum Propane Usage	gal/year/ power plant unit	663,279	---	---	---
Total Propane Usage for the Project	gal/year	1,326,557	—	—	—
Vehicle Use	—	Propane Delivery	Misc. Delivery	Miscellaneous Solar Vehicle Refueling	Maintenance Truck Refueling
Vehicle Type	—	Water Pull (8000 gallon) CAT	Off-Site Low Boy Trucks	Water Trucks, Freightliner 4000 gallon	Off-Site Low Boy Trucks
Vehicle Class	—	HHDT-DSL	HHDT-DSL	HHDT-DSL	0
		2009	2009	2009	2013
Fuel Type	---	Diesel	Diesel	Diesel	Gasoline
Fuel Consumption	gal/mile	0.1854	0.1854	0.1854	5.52E-02
Number of Trips	Trips per day	1	2	1	2
	Trips per year	166	120	12.0	52.0
Destination	---	Riverside	Riverside	Riverside	Blythe
Round Trip Distance	miles/trip	280	280	280	25
Miles Traveled	miles/day	280	560	280	50
	miles/year	46,430	33,600	3,360	1,300

Table E.3-8b Delivery Truck Emission Factors

Trip Type	2009 Motor Vehicle Emission Factors								
	CO	VOC	NOx	SOx	Exh. PM10	PM10 Tire + Brake	Diesel PM	Exh. PM2.5	PM2.5 Tire + Brake
	(lb/mi)	(lb/mi)	(lb/mi)	(lb/mi)	(lb/mi)	(lb/mi)	(lb/mi)	(lb/mi)	(lb/mi)
Propane Delivery	9.8E-03	2.6E-03	3.5E-02	3.9E-05	1.5E-03	1.4E-04	1.5E-03	1.4E-03	4.7E-05
Miscellaneous Delivery	9.8E-03	2.6E-03	3.5E-02	3.9E-05	1.5E-03	1.4E-04	1.5E-03	1.4E-03	4.7E-05
Diesel Truck Refueling	9.8E-03	2.6E-03	3.5E-02	3.9E-05	1.5E-03	1.4E-04	1.5E-03	1.4E-03	4.7E-05
Maintenance Vehicles Refueling	1.20E-03	4.16E-05	9.18E-05	1.07E-05	1.07E-05	4.59E-05	---	9.90E-06	1.64E-05

Note:
The emission factors, except fugitive emissions from entrained road dust, were compiled by running the California Air Resources Board's EMFAC2007 (version 2.3) Burden Model and dividing calculated daily emissions by daily vehicle-miles-traveled.

Table E.3-8c Motor Vehicle Entrained Paved Road PM10 Emission Factors

Vehicle Type	On-Road Average Vehicle Weight (tons)[1]	Road Type	Silt Loading (g/m^2)[2]	PM10 Emission Factor (lb/mi)[3]	PM2.5 Emission Factor (lb/mi)[4]
Propane Delivery	2.6	Collector	0.035	0.0009	0.0004
Miscellaneous Delivery	2.6	Collector	0.035	0.0009	0.0004
Diesel Truck Refueling	2.6	Collector	0.035	0.0009	0.0004
Maintenance Vehicles	2.6	Collector	0.035	0.0009	0.0004

Note:
[1] Average on-road vehicle weight in Riverside County portion of Mojave Desert Air Basin from ARB Emission Inventory Methodology 7.9, Entrained Paved Road Dust (1997)
[2] From ARB Emission Inventory Methodology 7.9, Entrained Paved Road Dust (1997)
[3] Emission factor [lb/mi] = 0.016 (Silt Loading/2)$^{0.65}$ (Weight/3)$^{1.5}$,
from ARB Emission Inventory Methodology 7.9, Entrained Paved Road Dust (1997)
[4] PM2.5 emission factor [lb/hr] = PM10 emission factor [lb/hr] x PM2.5 fraction of PM10
PM2.5 Fraction of PM10 in Paved Road Dust = 0.169 from Appendix A, Final–Methodology to Calculate Particulate Matter (PM) 2.5 and PM 2.5 Significance Thresholds, SCAQMD, October 2006

Table E.3-8d Delivery Truck Criteria Pollutant Emission for the Project

Trip Type	Daily Emissions								
	CO	VOC	NOx	SOx	Exh. PM10	Fug PM10	Diesel PM	Exh. PM2.5	Fug PM2.5
	(lb/day)								
Propane Delivery	2.739	0.723	9.788	0.011	0.421	0.303	0.421	0.388	0.133
Miscellaneous Delivery	5.477	1.445	19.576	0.022	0.843	0.605	0.843	0.775	0.266
Diesel Truck Refueling	2.739	0.723	9.788	0.011	0.421	0.303	0.421	0.388	0.133
Maintenance Vehicles	0.060	0.002	0.005	0.001	0.001	0.049	—	0.000	0.022
Total	**11.02**	**2.89**	**39.16**	**0.04**	**1.69**	**1.26**	**1.69**	**1.55**	**0.55**
Trip Type	**Annual Emissions**								
	CO	VOC	NOx	SOx	Exh. PM10	Fug PM10	Diesel PM	Exh. PM2.5	Fug PM2.5
	(lb/yr)								
Propane Delivery	454.13	119.81	1623.01	1.82	69.86	50.18	69.86	64.28	22.05
Miscellaneous Delivery	328.65	86.70	1174.54	1.32	50.56	36.31	50.56	46.51	15.96
Diesel Truck Refueling	32.86	8.67	117.45	0.13	5.06	3.63	5.06	4.65	1.60
Maintenance Vehicles	1.56	0.05	0.12	0.01	0.01	1.28	—	0.01	0.58
Total	**817.2**	**215.2**	**2,915.1**	**3.3**	**125.5**	**91.4**	**125.5**	**115.5**	**40.2**

Summary of Project Criteria Pollutant Emissions

Table E.3-9a Summary of Average Hourly Uncontrolled (AHU) Emissions for the Project

Source	lb/hr					
	NOx	VOC	CO	PM10	PM2.5	SOx
Auxiliary Boilers	0.15	0.07	0.50	0.13	0.13	0.06
Emergency Fire Pump Engines	0.02	0.00	0.02	0.001	0.001	0.000
Emergency Generators	0.34	0.02	0.19	0.011	0.011	0.000
Cooling Towers	---	---	---	0.03	0.03	--
HTF Vents	---	3.42	---	---	--	---
HTF Fugitives	---	0.36	--	--	--	--
Onsite Maintenance Vehicles	0.024	0.003	0.017	7.273	1.543	0.000
Total[1]	**0.53**	**3.88**	**0.72**	**7.44**	**1.71**	**0.07**

Table E.3-9b Summary of Average Hourly Controlled (AHC) Emissions for the Project

Source	lb/hr					
	NOx	VOC	CO	PM10	PM2.5	SOx
Auxiliary Boilers	0.15	0.07	0.50	0.13	0.13	0.06
Emergency Fire Pump Engines	0.02	0.00	0.02	0.001	0.001	0.000
Emergency Generators	0.34	0.02	0.19	0.011	0.011	0.000
Cooling Towers	---	---	---	0.03	0.03	--
HTF Vents	---	0.07	---	---	--	---
HTF Fugitives	---	0.36	--	--	--	--
Onsite Maintenance Vehicles	0.024	0.003	0.017	7.273	1.543	0.000
Total[1]	**0.53**	**0.52**	**0.72**	**7.44**	**1.71**	**0.07**

Table E.3-9c Summary of Maximum Hourly Uncontrolled (MHU) Emissions for the Project

Source	lb/hr					
	NOx	VOC	CO	PM10	PM2.5	SOx
Auxiliary Boilers	0.78	0.35	2.63	0.70	0.70	0.79
Emergency Fire Pump Engines	3.77	0.20	3.44	0.20	0.20	0.01
Emergency Generators	58.70	3.09	33.47	1.93	1.93	0.06
Cooling Towers	---	---	---	0.06	0.06	--
HTF Vents	---	75.00	---	---	--	---
HTF Fugitives	---	0.36	--	--	--	--
Onsite Maintenance Vehicles	0.12	0.01	0.08	41.73	8.85	0.00
Total[1]	**63.36**	**79.02**	**39.61**	**44.62**	**11.74**	**0.86**

Table E.3-9d Summary of Maximum Hourly Controlled (MHC) Emissions for the Project

Source	lb/hr					
	NOx	VOC	CO	PM10	PM2.5	SOx
Auxiliary Boilers	0.78	0.35	2.63	0.70	0.70	0.79
Emergency Fire Pump Engines	3.77	0.20	3.44	0.20	0.20	0.01
Emergency Generators	58.70	3.09	33.47	1.93	1.93	0.06
Cooling Towers	---	---	---	0.06	0.06	--
HTF Vents	---	1.50	---	---	--	---
HTF Fugitives	---	0.36	--	--	--	--
Onsite Maintenance Vehicles	0.12	0.01	0.08	41.73	8.85	0.00
Total[1]	**63.36**	**5.52**	**39.61**	**44.62**	**11.74**	**0.86**

Table E.3-9e Summary of Maximum Daily Uncontrolled (MDU) Emissions for the Project

Source	lb/day					
	NOx	VOC	CO	PM10	PM2.5	SOx
Auxiliary Boilers	10.30	4.64	34.84	9.28	9.28	10.48
Emergency Fire Pump Engines	3.77	0.20	3.44	0.20	0.20	0.01
Emergency Generators	58.70	3.09	33.47	1.93	1.93	0.06
Cooling Towers	---	---	---	0.97	0.97	--
HTF Vents	---	150.00	---	---	--	---
HTF Fugitives	---	8.76	--	--	--	--
Onsite Maintenance Vehicles	0.87	0.09	0.56	313.04	66.39	0.01
Total[1]	**73.64**	**166.77**	**72.31**	**325.41**	**78.76**	**10.56**

Table E.3-9f Summary of Maximum Daily Controlled (MDC) Emissions for the Project

Source	lb/day					
	NOx	VOC	CO	PM10	PM2.5	SOx
Auxiliary Boilers	10.30	4.64	34.84	9.28	9.28	10.48
Emergency Fire Pump Engines	3.77	0.20	3.44	0.20	0.20	0.01
Emergency Generators	58.70	3.09	33.47	1.93	1.93	0.06
Cooling Towers	---	---	---	0.97	0.97	--
HTF Vents	---	3.00	---	---	--	---
HTF Fugitives	---	8.76	---	---	--	---
Onsite Maintenance Vehicles	0.87	0.09	0.56	313.04	66.39	0.01
Total[1]	**73.64**	**19.77**	**72.31**	**325.41**	**78.76**	**10.56**

Summary of Project Criteria Pollutant Emissions

Table E.3-9g Summary of Annual Average (AA) Emissions for the Project

Source	lb/yr					
	NOx	VOC	CO	PM10	PM2.5	SOx
Auxiliary Boilers	1288.91	580.13	4358.65	1160.25	1160.25	566.75
Emergency Fire Pump Engines	188.33	9.91	171.81	9.91	9.91	0.33
Emergency Generators	2934.87	154.47	1673.39	96.54	96.54	3.05
Cooling Towers	—	—	—	223.58	223.58	–
HTF Vents	—	600.00	—	—	–	—
HTF Fugitives	—	3196.36	–	–	–	–
Onsite Maintenance Vehicles	211.9	22.7	146.8	63,716	13,513	2.4
Total[1]	**4,624.1**	**4,563.6**	**6,350.6**	**65,205.8**	**15,003.5**	**572.6**

Table E.3-9h Summary of 30-Day Average Emissions for the Project

Source	lb/day					
	NOx	VOC	CO	PM10	PM2.5	SOx
Auxiliary Boilers	10.30	4.64	34.84	9.28	9.28	10.48
Emergency Fire Pump Engines	3.77	0.20	3.44	0.20	0.20	0.01
Emergency Generators	58.70	3.09	33.47	1.93	1.93	0.06
Cooling Towers	—	—	—	0.97	0.97	–
HTF Vents	—	3.00	—	—	–	—
HTF Fugitives	—	8.76	–	–	–	–
Onsite Maintenance Vehicles	0.87	0.09	0.56	313.04	66.39	0.01
Total[1]	**73.64**	**19.77**	**72.31**	**325.41**	**78.76**	**10.56**

Table E.3-9i Summary of Project Criteria Pollutant Emissions

Emissions	NOx	VOC	CO	PM10	PM2.5	SOx
AHU (lb/hr)	0.53	3.88	0.72	7.44	1.71	0.07
AHC (lb/hr)	0.53	0.52	0.72	7.44	1.71	0.07
MHU (lb/hr)	63.36	79.02	39.61	44.62	11.74	0.86
MHC (lb/hr)	63.36	5.52	39.61	44.62	11.74	0.86
MDU (lb/day)	73.64	166.77	72.31	325.41	78.76	10.56
MDC (lb/day)	73.64	19.77	72.31	325.41	78.76	10.56
AA (lb/yr)	4,624	4,564	6,351	65,206	15,004	573
30-DA (lb/day)	73.64	19.77	72.31	325.41	78.76	10.56

Table E.3-9j Mass Daily Operation Significance Determination

Source	lb/day					
	NOx	VOC	CO	PM10	PM2.5	SOx
Auxiliary Boilers	10.30	4.64	34.84	9.28	9.28	10.48
Emergency Fire Pump Engines	3.77	0.20	3.44	0.20	0.20	0.01
Emergency Generators	58.70	3.09	33.47	1.93	1.93	0.06
Cooling Towers	—	—	—	0.97	0.97	–
HTF Vents	—	3.00	—	—	–	—
HTF Fugitives	—	8.76	—	—	–	—
Onsite Maintenance Vehicles	0.87	0.09	0.56	313.04	66.39	0.01
Offsite Delivery Vehicles[1]	39.16	2.89	11.02	2.95	2.11	0.04
Total[2]	**112.80**	**22.67**	**83.32**	**328.35**	**80.86**	**10.60**
SCAQMD CEQA Significance Thresholds	55	55	550	150	55	150
Significant (Yes/No)	**Yes**	**No**	**No**	**Yes**	**Yes**	**No**

Note:

[1] Offsite vehicle emissions were only used to determine CEQA significance and are not presented in the other Project summary tables.

[2] PSPP utilizes two power plant units and onsite maintenance vehicles

Solar Millennium LLC
1625 Shattuck Ave., Ste 270
Berkeley, CA 94709
(510) 524-4517

CITIBANK, N.A.
90-7118/3211

2075

1/29/2010

PAY TO THE ORDER OF South Coast Air Quality Management Dist. $ **6,833.84

Six Thousand Eight Hundred Thirty-Three and 84/100********** DOLLARS

South Coast Air Quality Management Dist.

MEMO Palen SCAQMD fees

⑈002075⑈ ⑆321171184⑆ 20245209⑈

2075

South Coast Air Quality Management Dist.		1/29/2010	
	Palen SCAQMD fees		6,833.84

CitiBank -1209	Palen SCAQMD fees	6,833.84

Palen DR Construction Emissions (Revised)
See Attached CD

Air Quality

Palen Solar Power Project

Docket No. 09-AFC-7

Alice Harron
Senior Director of Project Development
1625 Shattuck Avenue, Suite 270
Berkeley, CA 94709-1161