



# APPENDIX 5

Redacted

November 5, 2010

# SAN DIEGO GAS & ELECTRIC COMPANY

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## CalPeak Power El Cajon Facility *Acquisition Due-Diligence Study*

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119587

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## CalPeak Power El Cajon Facility Acquisition Due-Diligence Study

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## INTRODUCTION

San Diego Gas and Electric (SDG&E) is considering the economic feasibility of purchasing the CalPeak, LLC El Cajon peaking power plant located in San Diego County, California. The El Cajon facility was permitted, through normal local agency processes, and constructed in 2002. It is one of three nearly identical plants owned and operated by CalPeak (the others are Border and Enterprise).

### Study Purpose

The purpose of this study is to provide SDG&E an assessment of the condition and economic O&M projection of the CalPeak El Cajon facility through assembly and review of available information and observations during a site visit.

### Evaluation Process

The evaluation process included development of an initial data request for both CalPeak and SDG&E, reviewing the submitted documents, visiting the El Cajon facility, including the CalPeak Mission Gorge Dispatch Center and SDG&E Palomar Energy Center, which represent the current and potential future dispatch center for the facility under SDG&E, and finally development of the economic model and this summary report. Discussions with CalPeak during the site visit generated additional data requests.

CalPeak was very supportive of the data requests and provided timely comprehensive information covering the following general areas: organization, administration, financial, regulatory compliance, operations and maintenance.

## EXECUTIVE SUMMARY

The facility has been operated very sparingly over the past 8-years since being commissioned with aggregate operation averaging 3000-hours and 750-starts. The facility has a proven track record of successful remote dispatched and unmanned operation. The facility has an air emissions permit with reasonable pollutant limits, no direct startup or shutdown restrictions, and annual emissions limits allowing year-around operation.

The facility includes a single-unit simple-cycle peaking power plant with balance of plant auxiliaries. The facility is based upon the Pratt & Whitney Power Systems (PWPS) FT8-2 Swift Pac gas fuel only dry low NO<sub>x</sub> (DLN) combustion turbine technology, consisting of two turbines (or engines) connected to one common generator with common exhaust and emissions control systems. The facility has inlet air fogging for performance improvement, gas compression to boost the natural gas supply pressure, and required water treatment systems. The electrical systems includes a simple 69kV interconnect, 13.8kV generator, and auxiliary power distribution system, with no standby diesel generator or blackstart capability. The control equipment includes standard systems developed by PWPS for both unit and balance of plant control functions.

The facility performance has not changed significantly since commissioning. The facility nominal net output is 49.5 MW and net heat rate is 10,400 MMBTU/kWh HHV. The facility will generate up to 57 MW on a cold winter day and can be derated to as low as 42 MW on a hot summer day.

The overall physical condition of the El Cajon peaking power asset was conducive to facilities that operate with a historically limited dispatch profile. There were no tangible indicators of significant

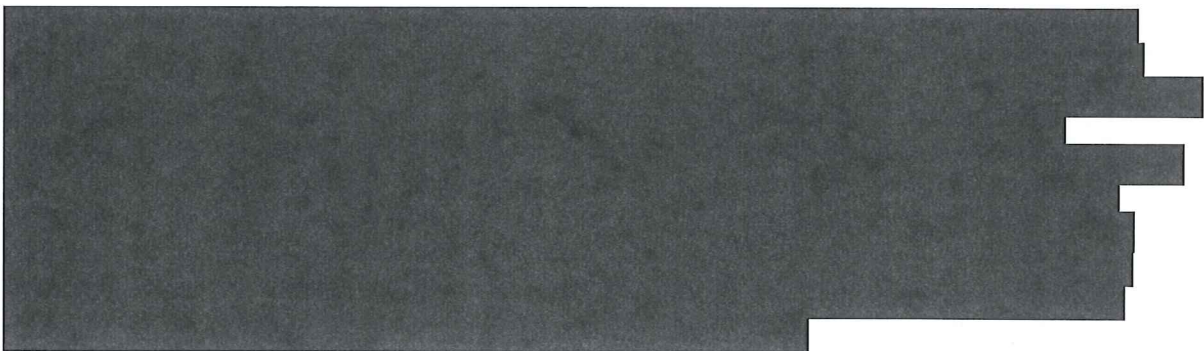
wear and tear of the mechanical equipment. There was however evidence of subpar external corrosion control (painting) due to the presence of rust on many of the structures.

The gas turbines and generator appeared in excellent condition and the package showed no obvious signs of fluid leakage, which is a common symptom of the PWPS FT8 technology with higher operating hours. The ancillary equipment throughout the plant was found to be in good condition; however, subpar corrosion control was observed on various pumps and motors. The electrical and controls equipment was also found to be in good condition. Wire and cable runs were clean, well organized, and terminated soundly. The condition of the facility appears to support the expected increased SDG&E run profile while maintaining above average availability and reliability factors.

CalPeak provided monthly Operation Reports for 2008 and 2009, which provide a comprehensive accounting of the regulatory, operations and maintenance activities over the past 2-years. The operation summary section of the report indicates that having one of the two engines fail to light during startup is not an uncommon occurrence, but usually results in a successful restart. The reports also indicated that continuous single engine operation is a viable alternative to achieve lower power output dispatch. It should be noted however, that the FT8 DLN technology appears to be limited to 90% minimum emission compliant load, which equates roughly to 44 MW or 22 MW net output for operations with both or single engine(s), respectively. In other words, the engine(s) cannot be operated continuously below 90% of rated load without potential out-of-compliance emissions. Significant turndown can only be accomplished by transitioning to single engine operation.

The El Cajon facility experienced a forced outage in the early 2008 timeframe due to a migrating turbine blade on Engine B. This engine was eventually replaced with the off-site repaired Engine A from the Enterprise facility, which had incurred major foreign object damage (FOD) during this same timeframe. In addition, the entire CalPeak fleet was subject to a PWPS power turbine (PT) bolting notice resulting in forced inspections and both temporary and final on-site repairs.

An assessment of the CalPeak O&M organization found that the El Cajon facility has satisfactory programs and processes in place in the areas of administration, operations and maintenance, environmental, health and safety, and regulatory compliance. SDG&E would have to audit and transition these programs to meet their organizational needs if the asset was acquired.



The CalPeak 2010 budget summary provided with the data request submittal represented the budget for all five (5) plants currently in the CalPeak fleet. This CalPeak budget was adjusted by 1/5 to represent only the El Cajon facility associated with this study:

- The adjusted El Cajon 2010 O&M budget is [REDACTED] MM.



- The CalPeak budget also includes utilities and major maintenance costs (assumed to be intended for ongoing PT bolting repairs), which have not been included in the future O&M budget analysis,
- Bringing the El Cajon 2010 O&M budget down to \$ [REDACTED] MM.

In addition, the following budget areas were identified as possible opportunities for improvement under SDG&E acquisition of the asset:

- Labor: [REDACTED]
- Consumables: [REDACTED]
- G&A: [REDACTED]
- Telecommunications: [REDACTED]
- Outside Services: [REDACTED]
- Routine Maintenance & Repair: [REDACTED]

As part of this due-diligence study, Power Industry Consultants (PIC) performed an independent 15-year O&M analysis starting 1 January 2012 for one operating scenario, each held constant over the analysis period:

- Scenario A: 700-hours with 250-starts

The result of the study indicated the following (see **Attachment A**):

- Scenario A: First Year O&M (routine maintenance only) budget estimate is \$0.540 MM.

The primary factor contributing to reduction in the annual O&M estimated budget is the reduction in staffing associated with supporting the management, dispatching and maintenance of the CalPeak El Cajon facility with existing SDG&E personnel at the Palomar Energy Center. The above SDG&E budget analysis includes three (3) new Operations and Maintenance Technicians (OMT). The O&M analysis is also based upon the observation that under the 700-hour annual operating scenario, the aggregate engine operating hours at the end of the 15-year analysis period will not have reached the PWPS scheduled major overhaul runtime of 25,000-hours.

## FACILITY DESCRIPTION

The following provides a description of the facility being considered for acquisition by SDG&E.

The facility is based upon the PWPS FT8-2 aero-derivative gas turbine arranged as two gas turbines, or engines, connected to one generator, and exhausting into one emission control module and stack. The El Cajon facility utilizes the PWPS "Swift Pac" physical arrangement with inlet air fogging.

## General

The site is unmanned and dispatched from the Mission Gorge Dispatch Center with operations and maintenance technicians (OMT's) visiting the plant each day. The plant can be started at the site if communications is lost with the Dispatch Center. The plant is currently operated with a contract startup fee of \$750 and two-hour minimum runtime, which appears to be a contract restraint and not a technology restraint. The facility is rarely visited by an OMT after dispatch, providing an indication of the high reliability of the equipment and remote communications.

The equipment and arrangement of the El Cajon plant is somewhat unique to the CalPeak facilities with differences including PWPS packaging (Swift Pac), inlet air cooling (fogging), fuel gas compressor HP (600 versus 300), and site arrangement, which has a very tight physical arrangement with tall perimeter sound attenuation walls and GSU transformer located in an area of elevated grade.

One advantage of a PWPS FT8 plant is standardization of not only the power generation equipment, but most of the auxiliary equipment as well. The facility is equipped with fuel gas compressors to boost the natural gas supply pressure as required. The El Cajon compressors are normally required for operation. The facility is equipped with emissions control equipment, including both CO and NOx reduction catalyst, with 19% aqueous ammonia used as the NOx catalyst reagent, tempering air fans to cool the exhaust and continuous emissions monitoring system (CEMS) for regulatory monitoring. The aqueous ammonia storage and forwarding systems appear to have all the necessary containment mechanisms in place. The facility is also equipped with water treatment and storage systems including two approximately 47,000 gallon storage tanks and demineralization equipment (leased). The engines do not require water injection, so the only water use is for inlet air cooling. The El Cajon facility utilizes demineralized water for inlet air fogging (atomizing water in the inlet air ducting after the filter to lower the temperature and increase density). The facility electrical interconnection arrangement at 69 kV appears to be simple and standard, and the facility has PWPS standard auxiliary power and controls systems.

The Mission Gorge Dispatch Center was in top condition with a recently upgraded control room and operating system. The center handles the administration and dispatching of the entire CalPeak fleet, and also houses the common maintenance shop and spare parts warehouse. The architecture of the dispatch operating system should easily support separation of the El Cajon facility from the other CalPeak facilities, but the common spare parts inventory could present challenges. The preferred approach would be to relocate the dispatching for the El Cajon facility to an existing SDG&E facility, such as the Palomar Energy Center, to avoid acquiring the Mission Gorge facility, and also gain some staffing efficiency by using existing management, dispatch and maintenance personnel.

The facility has a Citech based remote video surveillance system monitored from the dispatch center with front gate access control. The facility is also equipped with a "lone man" system monitored from the dispatch center to provide a degree of safety for the OMT working alone at the facility.

## Performance

The following Table represents the MW output and heat rate of the El Cajon plant established during original performance testing, corrected to ISO ambient conditions.

Power Plant Performance (from initial testing – 59F, 60% RH, 14.626 PSIA)	Plant Output kW (net)	Heat Rate BTU/kWh (net – HHV)
El Cajon – Swift Pac	49,680	10,403

Performance tests have been conducted annual for the facility (see **Attachment B**). The plant performance data does not show any significant degradation, but assuming the plant is operated with somewhat higher runtime after SDG&E acquisition, the expectation is that performance degradation will begin to become evident in the near future based upon aggregate operating hours.

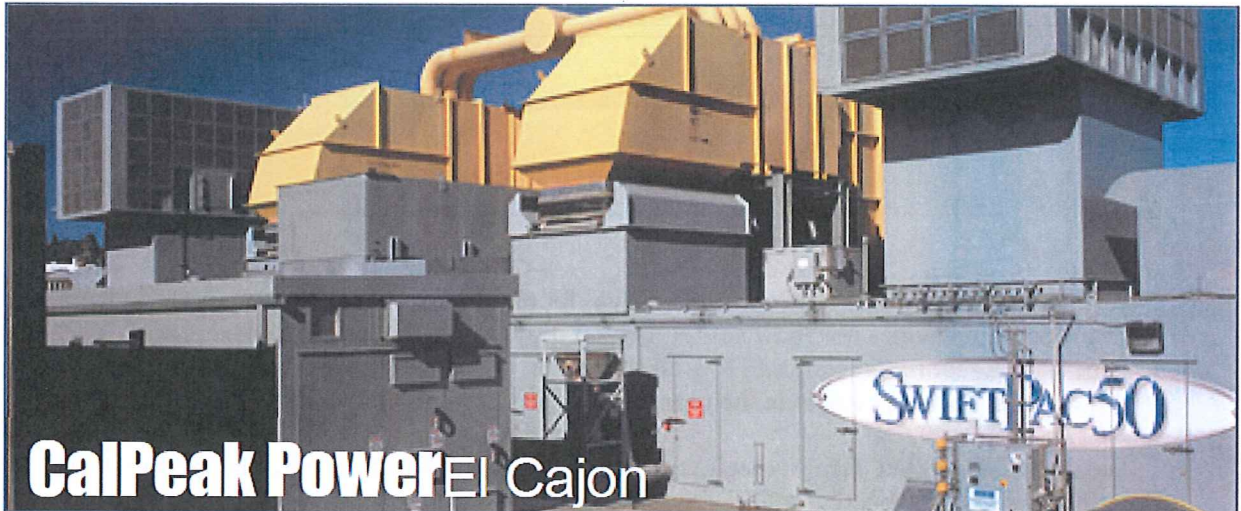
The Annual Operating Report (see **Attachment C**) provides a summary of the performance parameters over the operating life of the facility.

The facility has an air emissions operating permit through SDAPCD. The permit is based upon relatively reasonable limits of 3.5 ppm NOx, 50 ppm CO and 10 ppm ammonia slip, with no startup and shutdown emissions limits. The facility has been represented to be capable of operations at less than 2.0 ppm NOx.



## El Cajon Plant

The El Cajon facility is located on property owned by and leased from SDG&E.



### Project Details

**PROJECT (legal) NAME** | CalPeak Power - El Cajon, LLC

**LOCATION** | El Cajon, CA

**OWNER(s)** | Starwood Energy (80%), Tyr Capital (20%)

**CUSTOMER** | California Department of Water Resources

**ASSET MANAGER** | Tyr Energy, LLC

**OPERATOR** | NAES

**EQUIPMENT TYPE** | Pratt & Whitney FT8 Twin Pac

**OUTPUT (mw)** | 49

**COMMERCIAL OPERATION DATE** | 2001

**FUEL** | Natural Gas

**NERC REGION** | WECC

**ISO/RTO** | CAISO

RISK GRADING			
Plant Layout:	Good	Management Programs:	Good
Fire Water Supply:	Nearly Adequate	Maintenance & Inspections:	Good
Fixed Protection:	Adequate	Housekeeping:	Good
Manual Fire Fighting:	Good	Emergency Programs:	Good
Outside Exposures:	Moderate	Security/Vulnerability:	Good
<b>OVERALL PLANT RATING: Good</b>			

**UNIT DATA**

blank = Not Applicable

TURBINES / GENERATORS - General Specs, Fixed Protection			
GENERAL	Unit 1	Unit 2	
Service Status	Peaking	Peaking	
Spacing	25 ft	25 ft	
TURBINE			
Type	Aeroderivative	Aeroderivative	
Manufacturer	Pratt & Whitney	Pratt & Whitney	
Model #	FT8	FT8	
Serial #	P728619	P728620	
# Stages	22	22	
Rating (MW)	25	25	
Year	2001	2001	
Fuel (GT's)	Natural Gas	Natural Gas	
Adequate Controls/trips	Yes	Yes	
GENERATOR			
Manufacturer	Brush		
Model #	BDAX7-290		
Serial #	904797		
Year	2001		
Rated voltage	13,800		
Rating (MW)	71,176 kVA		
Rotor Cooling	Air		
Stator Cooling	Air		
LUBE / SEAL OIL			
System/Type	Mineral	Mineral	
Piping	Flanged/ welded	Flanged/ welded	
Containment	Yes	Yes	
Reservoir Location	Skid	Skid	
H <sub>2</sub> Detrain Provided	N/A	N/A	
H <sub>2</sub> Stg Arrangement Adeq	N/A	N/A	
FIXED PROTECTION	Following indicates installed protection. See "Fire Protection" section for adequacy details		
Ceiling	N/A	N/A	
Under Deck	N/A	N/A	
Lube Oil Tank	None, separate module	None, separate module	
Lube Oil Pumps/piping	None, separate module	None, separate module	
H <sub>2</sub> Storage/Seal Oil System	N/A	N/A	
Turbine Bearings	CO <sub>2</sub>	CO <sub>2</sub>	
Generator Bearings	CO <sub>2</sub>	CO <sub>2</sub>	
Exciter	CO <sub>2</sub>	CO <sub>2</sub>	
Hydraulic Oil Unit	None, separate module	None, separate module	
Governor Housing	None, separate module	None, separate module	
Skirt	N/A	N/A	
Turbine Enclosure (GT's)	CO <sub>2</sub>	CO <sub>2</sub>	
Generator Enclosure (GT's)	CO <sub>2</sub>	CO <sub>2</sub>	



TURBINES / GENERATORS - B&M Special Hazards		
TURBINE	Unit 1	Unit 2
Last Full Dismantle	In process, due to blade failure	Not yet performed
Dismantle Frequency	25,000 hrs	25,000 hrs
Last Boroscope	12/2007	12/2007
Boroscope Frequency	Annual	Annual
Hours since last overhaul	N/A	N/A
Last Valve Inspection	N/A	N/A
Valve Insp Frequency	N/A	N/A
Water Induction		
Compliance w/ ASME	N/A	N/A
ASME Rec. Testing Completed?	N/A	N/A
Vibration Monitoring		
Fixed / Portable	Fixed	Fixed
Frequency (portable)	Continuous	Continuous
Alarms/Interlocks	Shutdown	Shutdown
Seamed HI Energy Piping?		
Last Inspection	N/A	N/A
Frequency	N/A	N/A
GENERATOR		
Last Dismantle-Rotor Removed	Not yet performed	
Last Dismantle-Rotor Not Removed	N/A	
Op Hrs. Since Last Rewind	N/A	
Dismantle Frequency	N/A	
Retaining Rings		
Material	1818	
Last Inspection/Frequency	To be performed 2008	
Type Inspection	Visual	
Stator		
Last Inspection/Frequency	Not yet performed	
Flux Probe	N/A	
PDA/Frequency	N/A	
Last Rewind	N/A	
Electrical Testing/Frequency		
IR Testing	Annual	
Relay Testing	Every 3 years	
Breaker Testing	Not yet performed	
Batteries		
Type	Gel	
Last Load Test/Frequency		
MISC.		
DA Tank- Last NDE / Frequency	Not yet performed	
Water Chemistry Testing/controls	Conductivity & pH	
Water Fogging/Inspections	N/A	

**ANCILLARY EQUIPMENT & SYSTEMS**

<b>TRANSFORMERS (&gt;10 MVA)</b>			
Service	GSU	Station	Auxiliary (gas compressor)
Manufacturer/Year	Delta/2001	Cutler Hammer/2001	Cutler Hammer/2001
Serial No	F68240401		
MVA	36	1	1
Service Voltage	13.8-69 kV	13.8-480	13.8-4160
No. Phase	3	3	3
Form (Shell or Core)			
Oil Type / Capacity	Mineral/5340 gal	Mineral/237 gal	Mineral/192 gal
Adequate drainage/contain.	Yes	Yes	Yes
Separation (transformers)	N/A	N/A	N/A
Separation (buildings/structures)	25' to secondary module	8' to secondary module	8' to secondary module
Barriers	Fire wall	None	None
Fixed Protection	None	None	None
Spares	No	No	No
Est. Lead time	33 weeks	4 weeks	4 weeks
Date Last Rewind	N/A		
Testing Freq: DGA	Annual	Annual	Annual
Screen	Yes	Yes	Yes
Electrical	Yes	Yes	Yes

<b>CONTROL ROOMS</b>		
	Primary Control Module	Secondary Control Module
Location	Outdoor	Outdoor
Size	10' by 40'	11' by 36'
Detection	Smoke	Smoke
Protection	FM-200	FE-227
Penetrations	N/A	N/A
Minimum Staffing	Unmanned	Unmanned
Control System	DCS	DCS



General Observations of the El Cajon Power Plant:

- Site located on SDG&E property in what was once a parking lot. Area appears to be industrial park as well.
- Site access/space is very limited for major maintenance, heavy equip., etc.
- Security appears adequate, locked gate, fencing and cameras at each corner of site (monitored from Dispatch Center).
- Unit is Swift Pac vs. Twin Pac (newer packaging, designed for quick installation).
- Unit utilizes CO catalyst and aqueous ammonia for NOx and CO control.
- Site uses Aqueous Ammonia, proper containment measures appear to be in place, however holding tank is in very close proximity to major industrial area (need to investigate current countermeasures, if any, are in place).
- Site has two 47K US GAL tanks located on site for demineralized water storage with portable demineralized water treatment trailers (rented).
- Unit uses demineralized water for inlet fogging...only unit in CalPeak fleet to do so.
- Exposed motors throughout plant are very rusty in appearance, consider insulation testing, or obtain copy of last readings.
- Entire plant is in need of preservation and painting of structures, piping, valve maintenance, etc.
- Package door was broken at hinges and was held closed with board...package has CO2 firefighting system and should never have any sealed structures ajar.
- All systems, layout, etc. are consistent with typical PWPS FT8 Swift Pac design.
- Overall plant condition is good.
- All relay testing, calibrations, etc appear current based on stickers.
- All applicable service bulletins appear to have been addressed on this unit.
- The Gas Generator (GG) section for GTB was pulled and repaired in 2008 (migrated blade), and was placed in Enterprise GTA upon return. The Enterprise Gas Generator (GG) section for GTA was pulled and repaired in 2008 (blade failure), and was placed in El Cajon GTB.
- The Power Turbine (PT) section for GTA and GTB was pulled and repaired in the fall of 2008 (Exit Guide Vane - EGV & Outer Air Seal – OAS Bolting, per PWPS recommended modifications).
- A full dismantle (25,000 hour scheduled overhaul) has not be performed on either GTA or GTB.
- EMC did a visual inspection of the generator retaining rings in 2009. These retaining rings are the nonmagnetic 18Mn18Cr (18%Magnesium 18% Chromium).

Additional location maps and satellite images of the El Cajon facility are located in **Appendix A.**

## Mission Gorge Dispatch Center



### General Observations of the Mission Gorge Dispatch Center:

1. Located in industrial/office complex.
2. Control room is adequate, controls & hardware have been updated, but it is unclear whether this center will be part of future acquisition.
3. All CalPeak facilities are remotely dispatched/controlled from this center (including 2 northern sites), can also be controlled locally at sites.
4. Technicians have assigned trucks and travel daily to each site for readings, rounds, PM's etc.
5. Warehouse and maintenance shop are located in this building (share same space).
6. Currently the CMMS system is Mainsaver, appears adequate.
7. Maintenance shop appears to have adequate tooling and space; no local sites have a maintenance shop.
8. All major disassembly tooling (two-sets) is owned by CalPeak and is located in this facility.

9. All spare parts are located at this site in warehouse, appear to be mainly consumables, small replacement parts, etc...no capital spares noted (it was stated that \$1.5M in spares were on-site).
10. A plan must be developed for spares, disassembly tooling, etc. prior to purchase, as current inventory is for all five sites.
11. Current staffing appears adequate to excessive.

Additional location maps and satellite images of the Mission Gorge Dispatch Center are located in **Appendix B**.

### **Available Spare Parts**

Spare parts for entire CalPeak fleet are kept in the Mission Gorge Dispatch Center and warehouse. The parts are primarily consumables that include thermocouples, extra computer cards, gaskets etc. CalPeak provided a complete spare parts listing (**see Appendix J**). SDG&E has requested a recommended spare parts list from PWPS, and will negotiate with CalPeak to purchase a portion of the available spare parts as needed to support the El Cajon facility.



## FACILITY CONDITION

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

**El Cajon Facility Key Photographs:**



Gas Turbine Package

Note: rusting and need of paint on intake enclosure housing





Stack, HRSG and CEMS Shelter

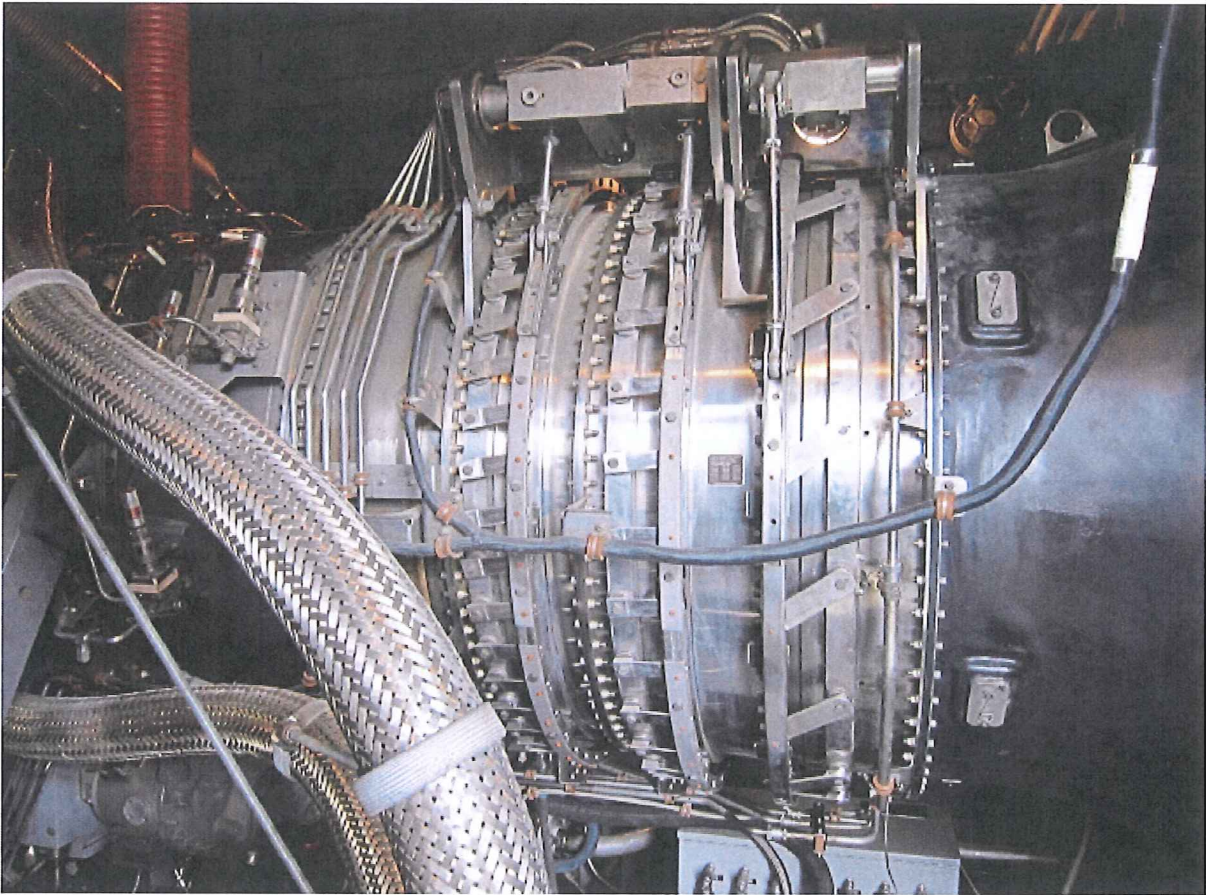


Gas Compression Equipment





Electrical Package  
MCC and Control Center



Gas Turbine



## Significant Historical Events

CalPeak provided monthly operations reports for 2008 and 2009 as part of the due-diligence data submittal (see **Appendix C**). These reports provided the most focused information on the recent operations and maintenance activities at the facility. Those interested may want to review these documents.

The major historical events identified included:

- Enterprise Engine A Blade Failure (see **Appendix H**) – November 2007 (this is identified due to the repaired engine swap between the Enterprise and El Cajon facilities)
- El Cajon Engine B Migrating Turbine Blade – Spring Outage 2008
- Fleet Wide Power Turbine Bolting Repair

The Enterprise Engine A failure resulted in long-term off-site repair with PWPS lease engine installation during the repair period. The root cause was investigated by both CalPeak and PWPS, with cause ultimately linked to foreign object damage starting at the 8<sup>th</sup> stage compressor blades, possibly associated with debris found in the bleed valve. The root cause analysis appears to be inconclusive.

The El Cajon engine issues were discovered during the 2008 spring outage through borescope inspections. This event required a short-term off-site repair of the affected engine.

Due to operational decisions, the repaired Enterprise and El Cajon engines were swapped between the facilities.

The fleet wide power turbine bolting repair resulted from a PWPS notification, and resulted in immediate inspections and both initial and final on-site repairs. These repairs have been accomplished at the El Cajon facility.

EMC performed a fleet wide visual inspection of the generator retaining rings in 2009. These retaining rings are the nonmagnetic 18Mn18Cr type (18% Magnesium 18% Chromium).

## Expected Modifications or Upgrades

No significant required modifications or upgrades were identified during the due-diligence effort. However, modifications will be required to the dispatch facilities to separate the dispatch of the El Cajon facility from the other CalPeak facilities.

## OPERATIONS & MAINTENANCE

SDG&E requested development of an O&M cost estimate based upon material condition observations, historical O&M budget review, and expected SDG&E dispatch plan. The O&M analysis was requested to cover a period of 15-years starting January 2012. The analysis was to include budgetary schedule for significant maintenance capital expenditures, but after reviewing the historical accumulated operating hours, and the expected future operating hours, it became obvious that major maintenance expenditures scheduled on operating hours, such as gas turbine overhauls, catalyst replacement, etc., should not be encountered. In addition, the identified power turbine bolting repair was already accomplished.

The following summarizes the review of the historical operations profile, historical O&M budget, expected future dispatch profile, and finally the expected O&M budget, which are based upon the listed analysis assumptions.

### Historical Operations Review

The following Table provides historical run time for the El Cajon plant over the past 12-months.

	Number of Starts	Run Hours
Mar-10	█	█
Feb-10	█	█
Jan-10	█	█
Dec-09	█	█
Nov-09	█	█
Oct-09	█	█
Sep-09	█	█
Aug-09	█	█
Jul-09	█	█
Jun-09	█	█
May-09	█	█
Apr-09	█	█
Totals	█	█

The Annual Operating Report Summary (**see Attachment C**) presents the plant operating parameters between 2002 and 2009, which is essentially the entire operating life of the plant. The following lists observations:

- The plant has been operated relatively similarly during the past 8-years.
- The average capacity factor of the plant over the past 8-years has been 3.5%.
- The plant has accumulated approximately 3000 operating hours and 750 starts.
- The average net output of the plant was approximately 40 MW.
- The average net heat rate of the plant over the past 8-years was approximately 11,000 MM BTU/kwh HHV.
- The plant average parasitic load was approximately 1,150 kW.

### Future Operations and Staffing Assumptions

SDG&E provided the following input regarding the expected future operating profile of the plant. The expected operating profile was based upon the historical operations of the SDG&E MEF peaking facility (**see Attachment D**). SDG&E requested that the look-ahead O&M budgets be developed for one annual operating scenario as shown below, which increases the historic operating profile of the plant:

- Scenario A: 700-hours with 250-starts per plant



The above scenario was expected to hold constant over the 15-year O&M analysis period.

As can be seen above, the historical accumulated 3000-hours, plus worst-case 700-hours annual operation over 15-years, equates to an expected accumulated hours of only 13,500-hours. The first scheduled major overhaul for the FT8 technology is at 25,000 hours. However, the SCR catalysts may be getting close to end-of-life at this level of accumulated operating hours.

The current staffing at the CalPeak facilities is based on third party plant operations, with all management and hourly personnel being employed by the third party provider.

The proposed facility organization is based upon the operations, maintenance and administration of the El Cajon facility being conducted from the SDG&E Palomar facility utilizing various existing support and managerial staff.

Based upon discussions with SDG&E personnel during the site visit, the future O&M budget analysis is based upon a proposed organization of sharing both the current management personnel (plant, operations, maintenance, and administration) and current control room personnel (supervisor and operator) at the SDG&E Palomar facility, and adding only three (3) new personnel as shift based operation and maintenance technicians (OMT's) to perform the inspections and routine maintenance at the El Cajon facility.

The recommended organization would employ only operations personnel at the site on a permanent basis. The permanent site personnel would be a multi-skilled workforce with the ability to perform plant operations as well as routine maintenance and I&E functions at the facilities on a day to day basis. Any significant maintenance would be performed by supplementing with existing skilled SDG&E personnel from other facilities or by outside contractors, which is the current approach.

## Historical O&M Budgets Review

The historical O&M budget for the plant appears to be in line with industry standards for this technology and run profile. The O&M budget appears consistent year to year based upon the provided historical data. Only pure O&M fixed and variable costs are considered in this study, while other costs such as energy management, asset management, leases, property tax, insurance, and fuel have been ignored.

The CalPeak 2010 budget summary provided with the data request submittal represents the budget for all five plants currently in the CalPeak fleet. This CalPeak budget was adjusted by 1/5 to represent only the El Cajon facility associated with this study:

- The adjusted El Cajon 2010 O&M budget is \$ [REDACTED] MM.
- The CalPeak budget also includes utilities and major maintenance costs (assumed to be intended for ongoing PT bolting repairs) of approximately \$ [REDACTED], which have not been included in future O&M budget analysis,
- Bringing the El Cajon 2010 O&M budget down to \$ [REDACTED] MM.

In addition, the following budget areas were identified as possible opportunities for improvement under SDG&E acquisition of the asset:

- Labor: [REDACTED]



- Consumables: [REDACTED]
- G&A: [REDACTED]
- Telecommunications: [REDACTED]
- Outside Services: [REDACTED]
- Routine Maintenance & Repair: [REDACTED]

### Future O&M Budget Analysis

As part of this due diligence study, Power Industry Consultants (PIC) performed an independent 15-year O&M analysis starting 1 January 2012 for one operating scenario, held constant over the analysis period:

- Scenario A: 700-hours with 250-starts

The result of the study indicated the following (see **Attachment A**):

- Scenario A: First Year O&M (routine maintenance only) budget estimate is \$0.540 MM.

The primary factor contributing to reduction in the annual O&M estimated budget is the reduction in staffing associated with supporting the management, dispatching and maintenance of the El Cajon facility with existing SDG&E personnel at the Palomar Energy Center. The above SDG&E budget analysis includes three (e) new Operations and Maintenance Technicians (OMT). The O&M analysis is also based upon the observation that under the 700-hour annual operating scenario, the aggregate engine operating hours at the end of the 15-year analysis period will not have reached the PWPS scheduled major overhaul runtime of 25,000-hours.

This first year O&M budget estimate along with the extended 15-year estimates including escalations were developed using a PIC standard spreadsheet based upon the following assumptions:

- The model was produced assuming 1x0, FT8 Twin Pac, gas fuel only, DLN, PWPS Technology, assuming one annual operating hour scenario (700).
- The model is based upon a staffing plan including three (3) personnel (plus 48% burden).
- The model goes out 15 years (as the facility ages the maintenance cost will increase).
- This budgetary estimate does not include costs associated with fuel, utilities, water, duties, freight and insurance (other than workmen's compensation, auto liability, and employer's liability).
- Maintenance costs include an annual turbine inspection (borescope) and annual plant routine maintenance, using an annual allowance of \$37,500.
- Major schedule turbine maintenance at 25,000 operating hours is not a factor under the expected operating scenario.

A summary of the PIC spreadsheet user inputs include:

- Plant Technology: P&W FT-8 DLN Swift Pac

- Number of Plants: 1
- Plant Age: 10 Years
- Plant Hours: 3500
- Plant Heat Rate: 10,500
- Term of Service: 15 years
- Start of Service: Jan 2012
- Plant Nominal Output: 52 MW
- Plant Availability: 95%
- Material Escalation Rate: 2.5%
- Labor Escalation Rate: 4.0%
- Plant Fuel: Natural Gas Only
- Plant Operating Profile: Peaking

## DISPATCH INTEGRATION

### CalPeak Mission Gorge Communication Infrastructure

The dispatch center has recently been renovated and updated. Plant operating PLCs are the SLC 5/05 models with 10BaseT network interface and with the CEMS operating an L35E PLC with 10BaseT interface. SCADA systems connect to the Citect Servers at the dispatch center across a 384kbps 6DS0 channel. El Cajon, Border and Enterprise all share the PWPS router being physical segmented from the remaining stations at the dispatch center. CiTect and PWPS server applications provide the application interface to the dispatch center. Citect and PWPS power generation systems are monitored at the dispatch center where a 2-tiered flat panel monitor station allows operation visibility and control of both systems.





The dispatch center servers, monitors, software and equipment are the largest new capital expense recently undertaken by CalPeak and present the highest capital value for the communication and SCADA system.

The costs associated with communications are primarily operating expenses to service providers (SP) and external contractors. Communications equipment at the El Cajon facility is past end-of-life (EOL) and provides limited connectivity and performance inefficiency to SCADA. The status of the copper and fiber optic assets at the plant is uncertain as no test logs or data have been provided.

Documentation consists of a single Power Point Slide dated June 26, 2001 and cabling has not been labeled past the SP demarcation at the plant site and dispatch center. Router equipment has been labeled as to its function and connection to PWPS VPN and CAL ISO DPG through a fractional DS1. Redundant operation channels are available through separate POTS lines connected to modems. Given lack of documentation provided, the status of network security is assumed poor given external contractor management and absent internal network management.

A capital investment in plant communications equipment would be recommended at El Cajon facility to include routers and existing media converters. An operating expense savings could be realized at El Cajon where network connectivity could be provided by a fiber optic, copper or wireless T1 backbone to adjacent plant communications demarcation. CAL ISO is utilizing 1DS0 to the plant while operations use 6DS0 allowing sufficient channels over a T1 as presently operated to provide telephone and modem connections into existing SDG&E telecom infrastructure.

### **SDG&E Palomar Energy Center Communication Infrastructure**

The Palomar telecom equipment room demarcation wall utilizes older 66 block style pair terminations and appears at first glance to be near pair capacity with service cables not in an expandable conduit. It would require more time and information to determine what capacity remains but assuming two 4-wire T-1 circuits for El Cajon would be terminated by Pacific Bell (SP) at the demarcation point along with any NTU circuit cards, the assumption is that sufficient area remains to add these service connections from the SP.

Maximum circuit assumptions based on current CalPeak configuration of:

- 1-T1 for SDG&E Operations and Control
- 1-T1 for CA ISO

### **Network Communication Integration**

Assuming SDG&E would continue with leased T1 facilities, Telco SP RLH and Pacific Bell would provide circuit re-assignment and configuration between the El Cajon facility and Palomar Energy Center telecommunication room. Remote plant 2600 routers would be replaced with newer routers with WAN MLP connectivity capability. New plant routers would be assigned an appropriate network address and subnet and integrated with SDG&E existing IP LAN at the control centers telecom room.

Currently, the routers at the CalPeak Dispatch Center are separated logically and physically for the plants and CAISO has separate routers on site for metering.

Alternatives over continuing with leased lines

- Share existing facility connections between El Cajon and Palomar Energy center

## Dispatch Center Physical Integration

No layouts have been provided of the Palomar Control Center room. Discussions during the visit indicated removing a wall from an underutilized engineering room and adding new plant monitors and systems adjacent to current control operations. Rooms are located on elevated flooring and 6" cable routes, and cables could be added from the telecom room (TR) to the engineering and current control room facility. The difficulty is separate fire suppression systems between the two rooms and the need to change the engineering room system to be compliant with control room needs.

A suggestion would be to expand the center of the current control arc by the minimum dispatch furniture available to accommodate a two (2) monitor station. The widening of the furniture arc would extend the horizontal width of the current panel arrangement and allow the arc end-points to accommodate to smaller extensions and encompass the cabinet storage system behind the control monitoring station. The equipment being added from the Starwood Control center is 2 monitors with associated PC equipment beneath the work station.



Current Arrangement Sketch



It is anticipated given the existing spacing and clearances perceived around the control center and storage cabinet that widening the arc in the center could allow accommodation of new systems while maintaining walking and work clearances between surrounding walls and furniture. The raised floor system allows for cables and infrastructure to be move conveniently.

## AGREEMENTS, PERMITS AND LICENSES

The following provides a list of the regulatory agreements, permits and licenses that were provided with the due diligence information submittal.

### **CAISO Agreements**

*Meter Service Agreements*

*Participating Generator Agreements*

### **Interconnection Agreements**

*Electric Facilities Agreements*



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*Generator Interconnection Agreements*

*Gas Interconnection Agreements*

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### ***Environmental Permits***

*Title IV Acid Rain Permits & Title V Operating Permits*

*Air Quality Permit to Operate and Authority to Construct*

*Air Pressure Tank Permits*

*FAA No Hazard Determination*

*EPA Identification Numbers*

## **Power Purchase**

The power purchase agreement (PPA) for the facility is currently with the California Department of Water Resources (CDWR). The agreement was located on the Internet (**see Appendix D**).

## **Fuel Purchase**

Fuel supply is from SDG&E. An existing agreement is in place.

## **Air Emissions Permit**

The air emissions permits for the facility are granted by the San Diego Air Pollution Control District (APCD). The permits are relatively reasonable (**see Appendix E**).

The emissions permit has concentration and mass limits based upon one-hour average and 3-hour rolling average values, which may indirectly result in minimum runtime restrictions in order to assemble complete data sets. These averaged limits exclude startup and shutdown emissions.

The emissions permit also has total daily and annual mass limits, with the daily limit having the potential to restrict daily startups depending on the overall daily operating profile.

A review of the PWPS performance guarantee sheet and original air emissions analysis used as the basis for the air permit may provide better definition to potential operating restrictions.

Although not confirmed with review of PWPS performance guarantee sheet, it appears the FT8 DLN technology has a 90% minimum load limit for emissions compliance. This is notable since other manufacturer technology typically has 50-60% minimum load limit while maintaining emission compliance.

The air emissions monitoring system is maintained internally by the OMT. CalPeak provided a spreadsheet (**see Attachment E**) showing equipment breakdowns, and associated impacts include Notice of Violations (NOV).

## **Waste Water Discharge**

The facility is designed for zero waste water discharge, and does not have connections to the local sewer system. Water treatment facilities are leased and returned to supplier when the media is spent. Process waste water discharge, such as engine water wash discharge, is collected and stored for pickup and disposal at an appropriate off-site facility.

## Maintenance Agreements

There is currently an operation and maintenance agreement with North American Energy Services (NAES) that should be fully reviewed by SDG&E legal for termination and transferability should the facility be acquired (see Appendix F).

## SAFETY REVIEW

CalPeak included safety and training manuals with the submittal package. The scope of this study does not allow a thorough review of these documents. The documents indicate that plans and procedures are in place.

The El Cajon facility appears to have very restricted emergency egress and access, primarily due to the tall sound attenuation walls surrounding the facility. Secondary egress routes need to be confirmed. The gas compressors are arranged in a confined area completely enclosed on three sides.

The El Cajon facility has the typical hazards associated with peaking power plants such as large amounts of natural gas usage and compression, large amounts of 19% aqueous ammonia delivery, storage and forwarding systems, and significant equipment lubricating oils and transformer insulating oils.

A Risk Management Plan (RMP) has been developed for the large quantities of aqueous ammonia storage at the facility. The facility has the typical aqueous ammonia spill containment infrastructure. However, the storage and containment area is adjacent to the only observed egress route.

Spill Prevention and Hazardous Material plans were submitted for the El Cajon facility.

A temporary looking wooden guardrail was observed in the GSU transformer area of the El Cajon facility. Electrical raceway trenches protruding above grade at both the El Cajon facility are potential tripping hazardous during dark conditions.

## CONCLUSION

After visiting the facility and reviewing submitted information, the CalPeak El Cajon facility appears to be in good condition, and has been well managed. The facility operation and maintenance programs appear to be very good. However, the facility is in need of preservation maintenance, such as painting, etc. This would also improve the outward appearance of the facility.

The El Cajon facility has relatively low runtime hours. The facility appears to be optimally located within the SDG&E territory.

One item of note is that this unit is part of a very small group of PWPS FT-8 "dry low NO<sub>x</sub>" (DLN) units, which are not being further marketed. Although, it appears that PWPS has provided excellent support of the CalPeak fleet. There also appears to be a very restrictive emissions compliant minimum load of 90%, related to the DLN technology.

The El Cajon facility has some unique aspects as compared to the CalPeak fleet, including the PWPS Swift Pac arrangement, inlet air fogging versus evaporative cooling (along with the associated demineralized water treatment requirement), larger fuel gas compression requirement, and the generally tight and constrained physical arrangement of the facility, which may require some safety related mitigation.

From a regulatory perspective, the operating air permit is relatively reasonable, and allows year around operation. However, there are daily emissions limits that could potentially restrict the number of daily startups depending on the overall daily operating profile.

The El Cajon facility dispatch infrastructure should be easily separated from the CalPeak fleet systems, assuming that SDG&E will integrate dispatch capability into the Palomar Energy Center.

Other than disassembly tooling, with two complete sets available, splitting the available spare parts between the El Cajon facility and other CalPeak facilities will be problematic.

The El Cajon facility should be suitable to provide the expected peaking power operating profile over at least a 15-year period without being subject to scheduled major overhauls or other typical balance of plant major maintenance expenditures, such as catalyst replacement.

Should SDG&E decide to move forward with acquisition planning, the following additional due diligence activities should be considered:

- PWPS consultation
- Observations during facility operations
- Pre-Acquisition Comprehensive Engine Borescope
- Specific fuel gas service, compression and distribution system condition assessment
- Specific GSU transformer condition assessment
- Pre-acquisition complete functional tests and performance tests
- Detailed review of the PWPS performance guarantee sheets
- Detailed review of the air emissions analysis used as the basis for development of the air permit to further investigate potential operating profile restrictions.



## **ATTACHMENTS**

### **Attachment A – SDG&E 15-Year O&M Analysis**

## Attachment B – Performance Test Summary

**Attachment C – Annual Operating Report Summary**



## Attachment D – Miramar Operating History

## Attachment E – Emissions Issues Summary

## **LIST OF APPENDICES**

*Below is a list of appendices that will be submitted separately from this study.*

**Appendix A – El Cajon Facility Location**

**Appendix B – Mission Gorge Dispatch Center Location**

**Appendix C – 2008 & 2009 Monthly Operations Reports**

**Appendix D – Power Purchase Agreements**

**Appendix E – SDAPCD Permits**

**Appendix F – NAES Agreement**

**Appendix G – Complete Site Visit Pictures**

**Appendix H – Enterprise Engine A Failure**

**Appendix J – Spare Parts Inventory Summary**

**Appendix K – Preventive Maintenance Schedules**