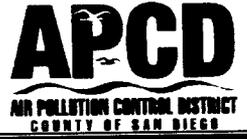


Internal Use Only
APP Record ID APCD 2015-APP-003970
SITE Record ID APCD2001-SITE-04276

**GENERAL PERMIT OR
REGISTRATION
APPLICATION FORM**



Submittal of this application does not grant permission to construct or to operate equipment except as specified in Rule 24(c) or (d)

REASON FOR SUBMITTAL OF APPLICATION:

- | | | |
|--|---|--|
| <input type="checkbox"/> New Installation | <input type="checkbox"/> Existing Unpermitted Equipment or Rule 11 Change | <input checked="" type="checkbox"/> Modification of Existing Permitted Equipment |
| <input type="checkbox"/> Amendment to Existing Authority to Construct or Application | <input type="checkbox"/> Change of Equipment Location | <input type="checkbox"/> Change of Equipment Ownership (please provide proof of ownership) |
| <input type="checkbox"/> Change of Permit Conditions | <input type="checkbox"/> Change Permit to Operate Status to Inactive | <input type="checkbox"/> Banking Emissions |
| <input type="checkbox"/> Registration of Portable Equipment | <input type="checkbox"/> Other (Specify) _____ | |

List affected APP/PTO Record ID(s): 000623 000625

APPLICANT INFORMATION

Name of Business (DBA) SDGE PALOMAR ENERGY CENTER
 Does this organization own or operate any other APCD permitted equipment at this or any other adjacent locations? Yes No
 If yes, list assigned Site Record IDs listed on your Permits APCD 2001-SITE-04276
 Name of Legal Owner (if different from DBA) _____

Equipment Owner		Authority to Construct Mailing Address	
Name: <u>SDGE</u>	Name: <u>SAME</u>	Mailing Address:	
Mailing Address: <u>2300 HARVESON PL</u>	Mailing Address:	City:	State:
City: <u>ESCONDIDO</u>	State: <u>CA</u>	City:	State:
Zip: <u>92029</u>	Phone: <u>760-432-2547</u>	Zip:	Phone:
E-Mail Address: <u>JBOWMAN2@SEMPRAUTILITIES.COM</u>	E-Mail Address:		

Permit To Operate Mailing Address		Invoice Mailing Address	
Name: <u>SAME</u>	Name: <u>SAME</u>	Mailing Address:	
Mailing Address:	Mailing Address:	City:	State:
City:	State:	City:	State:
Zip:	Phone:	Zip:	Phone:
E-Mail Address:	E-Mail Address:		

EQUIPMENT/PROCESS INFORMATION: Type of Equipment: Stationary Portable, *if portable please enter below the equipment storage address.* If portable, will operation exceed 12 consecutive months at the same location Yes No

Equipment Location Address SAME City _____ State: _____
 Parcel No. 2324105300 Zip _____ Phone (____) _____ E-mail: _____
 Site Contact JASON BOWMAN Phone (760)432-2547
 General Description of Equipment/Process NATURAL GAS COMBUSTION TURBINE
 Application Submitted by Owner Operator Contractor Consultant Affiliation _____

EXPEDITED APPLICATION PROCESSING: I hereby request Expedited Application Processing and understand that:

a) Expedited processing will incur additional fees and permits will not be issued until the additional fees are paid in full (see Rule 40(d)(8)(iv) for details) b) Expedited processing is contingent on the availability of qualified staff c) Once engineering review has begun this request cannot be cancelled d) Expedited processing does not guarantee action by any specific date nor does it guarantee permit approval.

I hereby certify that all information provided on this application is true and correct.
 SIGNATURE [Signature] Date 3/13/2015
 Print Name JASON BOWMAN Company SDGE
 Phone (760)432-2547 E-mail Address JBOWMAN2@SEMPRAUTILITIES.COM

Internal Use Only

Date <u>3/16/15</u>	Staff Initials: <u>CG</u>	Amt Rec'd \$ <u>1472</u>	Fee Schedule <u>20F (MAL)</u>
RNP: _____	EMF: _____	NBF: <u>95</u> TA: <u>(688.50)</u>	GEN APP_Form_Rev Date: Feb. 2015
<u>2013A</u> <u>20F(MAL) = (688.50)</u> Remaining funds on <u>APP-003971</u> <u>12NFB/15</u>			

Internal Use Only
APP Record ID APCD 2015-APP-003971
SITE Record ID APCD 2001-SITE-04276

**GENERAL PERMIT OR
REGISTRATION
APPLICATION FORM**



Submittal of this application does not grant permission to construct or to operate equipment except as specified in Rule 24(c) or (d)

REASON FOR SUBMITTAL OF APPLICATION:

- | | | |
|--|---|--|
| <input type="checkbox"/> New Installation | <input type="checkbox"/> Existing Unpermitted Equipment or Rule 11 Change | <input checked="" type="checkbox"/> Modification of Existing Permitted Equipment |
| <input type="checkbox"/> Amendment to Existing Authority to Construct or Application | <input type="checkbox"/> Change of Equipment Location | <input type="checkbox"/> Change of Equipment Ownership (please provide proof of ownership) |
| <input type="checkbox"/> Change of Permit Conditions | <input type="checkbox"/> Change Permit to Operate Status to Inactive | <input type="checkbox"/> Banking Emissions |
| <input type="checkbox"/> Registration of Portable Equipment | <input type="checkbox"/> Other (Specify) _____ | |

List affected APP/PTO Record ID(s): 000623 000625

APPLICANT INFORMATION

Name of Business (DBA) SDGE PALDMAR ENERGY CENTER
 Does this organization own or operate any other APCD permitted equipment at this or any other adjacent locations? Yes No
 If yes, list assigned Site Record IDs listed on your Permits APCD 2001-SITE-04276
 Name of Legal Owner (if different from DBA) _____

Equipment Owner		Authority to Construct Mailing Address	
Name: <u>SDGE</u>	Name: <u>SAME</u>		
Mailing Address: <u>2300 HARVESON PL</u>	Mailing Address:		
City: <u>ESCONDIDO</u> State: <u>CA</u>	City:	State:	
Zip: <u>92029</u> Phone: <u>760-432-2547</u>	Zip:	Phone:	
E-Mail Address: <u>J.BOWMAN2@SEMPRAUTILITIES.COM</u>	E-Mail Address:		

Permit To Operate Mailing Address		Invoice Mailing Address	
Name: <u>SAME</u>	Name: <u>SAME</u>		
Mailing Address:	Mailing Address:		
City:	City:	State:	
Zip:	Zip:	Phone:	
E-Mail Address:	E-Mail Address:		

EQUIPMENT/PROCESS INFORMATION: Type of Equipment: Stationary Portable, if portable please enter below the equipment storage address. If portable, will operation exceed 12 consecutive months at the same location Yes No

Equipment Location Address SAME City _____ State: _____
 Parcel No. 2324105300 Zip _____ Phone (____) _____ E-mail: _____
 Site Contact JASON BOWMAN Phone (760) 432-2547

General Description of Equipment/Process NATURAL GAS COMBUSTION TURBINE
 Application Submitted by Owner Operator Contractor Consultant Affiliation _____

EXPEDITED APPLICATION PROCESSING: I hereby request Expedited Application Processing and understand that:

a) Expedited processing will incur additional fees and permits will not be issued until the additional fees are paid in full (see Rule 40(d)(8)(iv) for details) b) Expedited processing is contingent on the availability of qualified staff c) Once engineering review has begun this request cannot be cancelled d) Expedited processing does not guarantee action by any specific date nor does it guarantee permit approval.

I hereby certify that all information provided on this application is true and correct.

SIGNATURE [Signature] Date 3/13/2015
 Print Name JASON BOWMAN Company SDGE
 Phone (760) 432-2547 E-mail Address J.BOWMAN2@SEMPRAUTILITIES.COM

Internal Use Only

Date <u>3/16/15</u>	Staff Initials: <u>CG</u>	Amt Rec'd \$ <u>1472</u>	Fee Schedule <u>20F (MAL)</u>
RNP: <u>8013A</u>	EMF: <u>20F (MAL) = (688.50)</u>	NBF: _____	TA: <u>(688.50)</u>
<p align="center">Remaining funds on APP-003970 RNP 8/15</p>			

TO: JOHN ANNICCHIARICO
FROM: CARL LA PETER
SUBJECT: PALOMAR ENERGY CENTER ADVANCED GAS PATH UPGRADE
DATE: MARCH 13, 2015
CC: JASON DOBBS, BRIAN MARTIN

Palomar Energy Center (PEC) proposes to upgrade the hot gas path of the existing natural gas Combustion Turbines (CT). This Advanced Gas Path (AGP) modification will improve turbine heat rate, resulting in a more efficient power generating facility and a small power increase. Currently, PEC anticipates performing the improvement project during the next annual maintenance requiring replacement of these components (2018).

The AGP modification requires that certain components in the hot gas path be replaced. These components are required to be regularly replaced in accordance with manufacturer recommendations / industry standards and are detailed below.

1. Low Pressure Drop Combustor
2. Stage 1 Nozzles (material change, configuration change))
3. Stage 1 Shrouds (material change, configuration change)
4. Stage 1 Buckets (material change, airfoil change)
5. Stage 2 Nozzles (material change, sealing scheme change)
6. Stage 2 Shrouds (material change, honeycomb change to double width)
7. Stage 2 Buckets (double tip seal, fully covered throat area – tip shroud))
8. Stage 3 nozzles (material change, new airfoil design)
9. Stage 3 Shrouds (material change, double width honeycomb arrangement)
10. Stage 3 Buckets (double tip seal, more throat area coverage – tip shroud)

Additionally, the AGP components are functionally identical to the currently installed components except that:

1. They are made from different alloys, which can tolerate higher temperatures. The firing temperature will be increased to make best use of the new materials.
2. Improved gas path aerodynamics. The airfoils were redesigned, and sealing improved.



Jason Bowman
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March 20, 2015

John Annicchiarico
Air Pollution Control District
County of San Diego
10124 Old Grove Road
San Diego, CA 92131

SUBJECT: SDG&E Palomar Energy Center Advanced Gas Path Upgrade

Dear Mr. Annicchiarico:

As discussed on 3/13/2015 here is additional information on the changes to the plant operating profile. As detailed below, a significant change in air emissions as result of the AGP upgrade is not expected. Plant specific technical information, provided by GE, indicates that the combustion turbines will experience a 5.4% increase in output, while seeing a 2.6% improvement in heat rate, a 0.1% reduction in exhaust flow, and 10°F increase in turbine exhaust temperature. The increased exhaust energy subsequently improves the capability of the steam turbine (Attachment 1).

General engineering data presented by GE shows that combustion turbines can expect to maintain nearly identical NO_x emission rates following the upgrade (Attachment 2). Plant specific technical data confirms this expectation. Since the combustor remains a 9 ppm combustor and the SCR will continue to maintain emissions at or below the 2.0 ppm limit, the reduction in exhaust flow is the most important factor when considering emissions impact. Fundamentally, hourly mass emission rates must change with exhaust flow for a given concentration. Thus NO_x and CO hourly emission rates must decrease proportionate to exhaust flow when maintained within permitted limits (concentration corrected to 15% O₂). The slight reduction in flow is caused by slightly increased backpressure in the CTG.

If we ignore this fundamental principle and incorrectly assume that emission change solely as a function of fuel flow the project would still not approach the AQIA thresholds required for further evaluation. Using the increase in power and reduction in heat rate, a 2.6% increase in fuel flow is expected at base load. Note that at power levels below base load the CTG will use less fuel than it currently does for a given power output. Using data obtained from the most recent source test, we can calculate a NO_x increase of approximately 20 lb/day using the overly conservative fuel flow methodology. During the test, the facility operated at just over 12 lb/hr NO_x at 1.5 ppm corrected to 15% O₂ with duct burners in operation. Adjusting this figure for 2 ppm @ 15% O₂ and applying



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our conservative correction factor of 2.6 % over a 24 hour period, NO_x increases by approximately 20 lb/day. But, again, this notion is incorrect because exhaust flow actually decreases (Attachment 3). The hourly and daily increase using this overly conservative methodology is far below the AQIA thresholds (Attachment 4).

CO emissions are substantially lower than NO_x emissions, typically less than 2 lb/hr. VOC emissions are typically non detectable, and PM10 emissions are typically 1 lb/hr or less per turbine. The AQIA thresholds for these pollutants are 550 lb/day, 137 lb/day, and 100 lb/day. Accordingly, AQIA threshold attainment is unrealistic; therefore a detailed discussion is not warranted (Attachment 4).

Using the same source test data, we can evaluate the effects on emission rate when we consider both the increase in fuel flow and the reduction in exhaust flow. As stated above, we can see that for a given concentration, a reduction in flow will have a corresponding reduction in mass emission rate. This is true with and without duct burners in operation. Favorable deviations are exhibited due to the reduction in mass flow (Attachment 3).

Sincerely,

Jason Bowman

Attachments:

1. Technical Data
2. Emissions Comparison
3. Plant Calculations
4. Significance Determination Thresholds

cc: Dobbs, Jason: SDG&E – Electric Generation
LaPeter, Carl: SDG&E – Electric Generation
Lyons, Steve: SDG&E – Electric Generation
Martin, Brian: SDG&E – Electric Generation
File



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Attachment 1 – Technical Data

Configuration	7FA.04
Compressor	Flared
Combustor	DLN 2.6
S1N	AGP
HGP	AGP
IGV	86
GT MW	5.40%
GT HR	-2.60%
CC MW	4.00%
CC HR	-1.30%
Texh	10.30
Exhaust Flow	-0.10%
ST MW	1.50%
Wf	2.80%
HPST Flow	1.20%
IPST Flow	1.40%
LPST Flow	1.20%
Exhaust Energy	1.10%

Source: Eric Wurster, GE, 06/13/2012

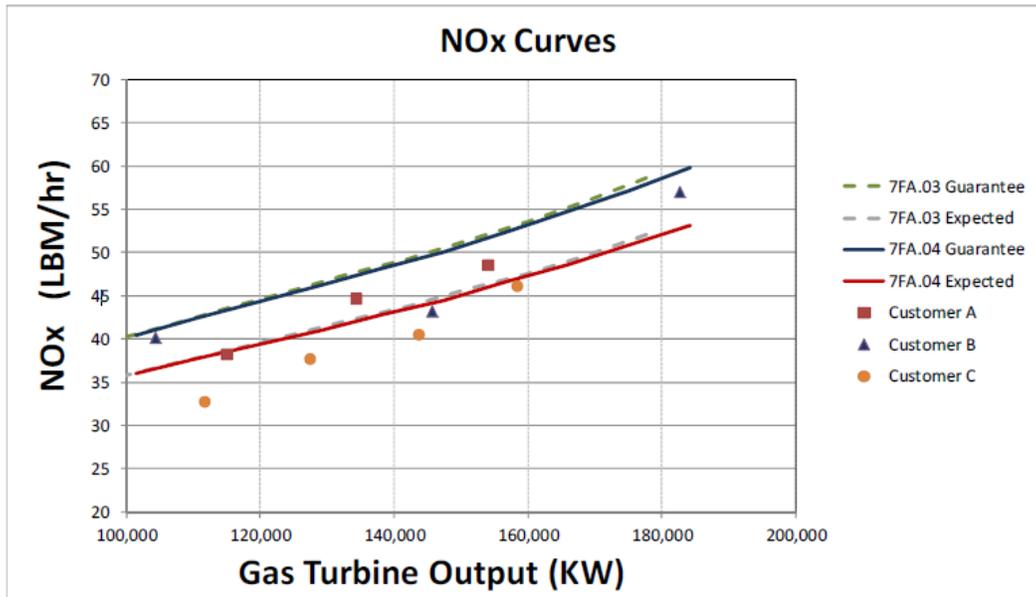


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Attachment 2 – Emissions Comparison

Emissions Comparison .03 & .04



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Attachment 3 – Plant Calculations

	Base	Adj for 2 ppm	Initial W/ DB	New W/DB	Delta W/DB	Initial W/out DB	New W/out DB	Delta W/out DB
MW	167.33	167.33	167.33	176.36582	5.40%	165	173.91	5.40%
HHV (BTU/Scf)	1030	1030	1030	1030	0.00%	1030	1030	0.00%
DSCFH	43,088,055	43,088,055	43,088,055	43,048,917	-0.09%	39,138,059	39,098,921	-0.10%
HR (BTU/KWh)	10300	10300	10300	10032	-2.60%	10300	10032	-2.60%
CTG FF (scfm)	16698.89	16698.89	16698.89	17133.06	2.60%	16698.89	17133.06	2.60%
DB FF (scfm)	1685.33	1685.33	1685.33	1685.33	0.00%	0	0	
HI (MMBtu/hr)	1893.58	1893.57	1893.57	1938.29	2.36%	1719.99	1764.71	2.60%
Fd	8710	8710	8710	8710	0.00%	8710	8710	0.00%
O2	12.90	12.90	12.90	12.70	-1.52%	12.90	12.68	-1.68%
ppm	1.48	2	2	2	0.00%	2	2	0.00%
lb/MMBtu	0.0066	0.0089	0.0089	0.0087	-2.40%	0.0089	0.0087	-2.63%
lb/hr	12.53	16.93	16.93	16.92	-0.09%	15.38	15.37	-0.10%



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Attachment 4 – Significance Determination Thresholds

<i>Table A-2</i> SAN DIEGO AIR POLLUTION CONTROL DISTRICT POLLUTANT THRESHOLDS FOR STATIONARY SOURCES			
POLLUTANT	<i>EMISSION RATE</i>		
	<i>Lb/hr</i>	<i>lb/day</i>	<i>tons/yr</i>
Carbon Monoxide (CO)	100	550	100
Oxides of Nitrogen (NOx)	25	250	40
Particulate Matter (PM ₁₀)	--	100	15
Oxides of Sulfur (SOx) ^(b)	25	250	40
Lead and Lead Compounds ^(c)	--	3.2	0.6
Particulate Matter, 2.5 microns (PM _{2.5})	--	--	--
Volatile Organic Compounds (VOC) Reactive Organic Gases (ROG)	--	137 ^(e)	15

- d. Source: SDAPCD Rule 1501, 20.2(d)(2)
- e. San Diego Air Basin has been in attainment of SOx standard due to sulfur-free natural gas for electricity generation and lack of heavy industrial/manufacturing uses in the region.



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May 11, 2015

Nick Horres
Air Pollution Control District
County of San Diego
10124 Old Grove Road
San Diego, CA 92131

SUBJECT: SDG&E Palomar Energy Center Advanced Gas Path Upgrade, APCD2015-APP-003970 and 003971

Dear Mr. Horres:

Thank you for reviewing the application and supplemental information previously provided. As requested on April 14, 2015, here is additional information on the Advanced Gas Path (AGP) upgrade supporting (1) the reduction in exhaust volume, and thus emissions, despite an increase in heat input, and (2) why the proposed upgrade does not constitute “reconstruction” or “modification.”

As discussed in more detail in Attachment (2), the volume of exhaust gas from combustion is only a fraction of total exhaust gas flow. The primary purpose of the proposed upgrade is to increase efficiency. This increase will more than offset the increase in heat input. As Palomar has not requested to change the existing permit limits, the resulting reduction in total exhaust flow leaves no option but a reduction in mass emissions for any given pollutant concentration (e.g. 2 ppm NO_x corrected to 15% O₂).

After reexamining the applicable Rules, SDG&E believes that this project does not meet the definition of either “reconstruction” or “modification.” 40 CFR 60.15 defines “reconstruction” as *the replacement of components of an existing facility to such an extent that the fixed capital cost of the new components exceeds 50 percent of the fixed capital cost that would be required to construct a comparable entirely new facility.* The capital cost of the components to perform the AGP upgrade is approximately \$10M per turbine. The capital cost, per turbine, is approximately \$40M. Since the capital cost of new components is only 25% of a new turbine there is no need to do a detailed cost analysis, or to determine total capital cost for the “facility.” 40 CFR 60.2 defines “modification” as *any physical change in, or change in the method of operation of, an existing facility which increases the amount of any air pollutant (to which a standard applies) emitted into the atmosphere by that facility or which results in the emission of any air pollutant (to which a standard applies) into the atmosphere not previously emitted.* The only operational change is increased efficiency. Thus, there will be no new air pollutants. As discussed above, and



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in Attachment 2, there is no increase in emissions; therefore the project does not meet the definition of “modification.”

As always, if you have any additional questions please do not hesitate to contact me via phone or email.

Sincerely,

Jason Bowman

Attachments:

1. Application Status – Incomplete dated April 14, 2015
2. Palomar AGP Emissions Letter

cc: Dobbs, Jason: SDG&E – Electric Generation
LaPeter, Carl: SDG&E – Electric Generation
Lyons, Steve: SDG&E – Electric Generation
Martin, Brian: SDG&E – Electric Generation



Air Pollution Control Board

Greg Cox	District 1
Dianne Jacob	District 2
Dave Roberts	District 3
Ron Roberts	District 4
Bill Horn	District 5

April 14, 2015

SAN DIEGO GAS AND ELECTRIC
ATTN: JASON BOWMAN
2300 HARVESON PL.
ESCONDIDO, CA 92029

EQUIPMENT ADDRESS: **2300 HARVESON PL., ESCONDIDO, CA 92029**

APPLICATION STATUS - INCOMPLETE

The applications for modified Permits to Operate for two combined cycle gas turbine engines (PTO numbers APCD2010-PTO-000623 and APCD2010-PTO-000625) were received at the District on March 16, 2015. They have been assigned Application Nos. APCD2015-APP-003970 and APCD2015-APP-003971.

The applications are incomplete and cannot be processed until the information requested below is provided. Please provide this information within (30) days. If your application is not completed within six (6) months, it will be subject to cancellation and forfeiture of fees.

1. Please provide additional information supporting that an increase in maximum heat input combined with no change to concentration based limits will not result in an emission increase. Specifically address how if the fuel F factor (amount of exhaust generated per unit of heat input) does not change from 8710 dscf/MMBtu, but maximum heat input increases from 1893.58 MMBtu/hr to 1938.29 MMBtu/hr, would the exhaust volume at standard conditions not also increase?
2. Please provide additional information to support whether or not the proposed change would constitute either a "reconstruction" or "modification" as defined by 40 CFR 60.2 and 40 CFR 60 subpart KKKK. Specific information may include cost data and/or emission information.

Please be advised that operation of this equipment in a manner contradictory to District rules and regulations and the currently issued Permits to Operate is a misdemeanor, which may be subject to fines or penalties as authorized by the California Health and Safety Code.

I can be reached by phone at (858)586-2728, or by email at Nick.Horres@sdcounty.ca.gov. Please feel free to contact me if you have questions about information you need to submit, or if you have any other questions about your application.


Nick Horres
Air Pollution Control Engineer



To: Jason Bowman
SDG&E Environmental Services

Date: May 1, 2015

Subject: Advanced Hot Gas Path (AGP) Upgrade Emissions

In reference to the AGP upgrades at Palomar Energy Center, the volume of combusted fuel represents only a percentage of total exhaust gas flow. At full power operations fuel flow slightly increases, but the total exhaust gas flow decreases due to a reduction in the turbine inlet guide vane (IGV) position by 1 degree. A net reduction of flow through the turbine, while maintaining the same NO_x concentration value, result in a lower mass emission (lb/hr) for any given pollutant concentration.

While the gas turbine heat input and gas turbine output both increase as a result of the uprate, the gas turbine efficiency also increases. As part of the design improvements, less airflow is used for cooling and other non-power generation flow paths, therefore less air is passed through the turbine. The gas turbine NO_x emissions on a concentration basis will remain unchanged as a result of this uprate, the gas turbine will be controlled to the same 9 ppm ref 15%O₂ emission level, and the stack NO_x emissions will be controlled to 2 ppm ref 15%O₂ through the use of an SCR. Since the concentration is remaining unchanged, and the exhaust flow is decreasing the associated NO_x mass flow rate (lb/hr) emissions will decrease.

Mark Robson
Account Manager
Power Generation Services
GE International Inc.

From: [Bowman, Jason R](#)
To: [Horres, Nicholas](#)
Subject: Palomar AGP Application
Date: Tuesday, December 01, 2015 5:38:12 PM

Hello Nick,

I have discussed the available options with generation staff, and SDG&E has decided the plant-wide applicability limit seems to be the most favorable path going forward.

Hope your Thanksgiving went well.

As always, let me know if I can be of further assistance.

Best,

Jason Bowman

SDG&E Environmental Services

JBowman2@semprautilities.com

(O) 760-432-2547

(C) 858-602-9124

Semper Proeꝑere