DOCKETED	
Docket Number:	82-AFC-01C
Project Title:	Compliance - Application for Certification for PG&E Geysers Unit 20
TN #:	242578
Document Title:	2020 Revised Annual Compliance Report - Grant
Description:	N/A
Filer:	Sharon Peterson
Organization:	Geysers Power Company, LLC
Submitter Role:	Applicant
Submission Date:	4/5/2022 4:43:46 PM
Docketed Date:	4/5/2022

CALPINE

GEYSERS POWER COMPANY, LLC

10350 SOCRATES MINE ROAD

MIDDLETOWN, CA 95461

GPC-22-067

April 5, 2022

Eric Veerkamp, Compliance Project Manager
Energy Facilities Siting and Environmental Protection Division
California Energy Commission
1516 Ninth Street, MS-15
Sacramento, California 95814-5512

Subject: 82-AFC-01C REVISED 2020 Annual Compliance Report – Unit 20 (Grant) Power Plant

Dear Mr. Veerkamp:

In fulfillment of the Compliance Plan's annual reporting requirement, Geysers Power Company, LLC hereby submits the following revised 2020 Annual Compliance Report (ACR) for Unit 20 (Grant). This ACR supersedes the previous 2020 ACR that was docketed on 12/20/2021 (TN# 240995).

If you have any comments or questions, please contact me at (707) 431-6858.

Sincerely,

Sharon Peterson
Air Compliance Manager, Geysers
Calpine Corporation

Geysers Grant Plant (Unit 20)
82-AFC-01C
2020 Annual Compliance Report to the California Energy Commission
January 2020-December 2020 Reporting Period

EXECUTIVE SUMMARY

Section 25532 of the Public Resources Code provides that the California Energy Commission (CEC) shall establish a monitoring system to assure that any facility certified by the CEC is constructed and operated in compliance with air, water quality, public health, safety, and other applicable regulations, guidelines, and conditions adopted or established by the CEC.

On March 18, 1982, PG&E filed an Application for Certification (AFC) for Geysers Power Plant Unit 20. In order for the AFC to be granted the CEC issued the "Final Commission Decision Document for Geysers Power Plant Unit 20". In November, 1999, the CEC license was transferred from PG&E to Geysers Power Company LLC (GPC or Project Owner). The license requires GPC to be responsible for administering and monitoring various Conditions for Certification as contained in the Final Commission Decision, in accordance with the Compliance Plan for Unit 20, including submitting an Annual Report that summarizes compliance tasks conducted during the previous year.

Two amendments to the Final Decision have been approved by the CEC, resulting in the inclusion of additional on-going compliance tasks for reporting in the Annual Compliance Report.

First, on December 10, 2018 the CEC Final Decision was amended to revise the Air Quality Conditions of Certification and approved the installation of the wet down system permanent diesel engine at Grant, Socrates and Quicksilver (TN#: 226129). The new Air Quality and Worker Safety Conditions of Certification requires on-going reporting of certain monitoring and other activities at Grant.
Second, on November 16, 2020, additional Compliance Conditions of Certification were adopted for Unit 19 (TN#: 235699): GEN-1, COM-1 through 11, and FIRE PROTECTION-1 through 5. Condition COM-5 requires submission of Periodic and Annual Compliance Reports and details specific reporting requirements that should be included in each Annual Compliance Report (ACR). The following sections of this ACR corresponds with the reporting requirements set forth in Condition COM-5. The conditions with annual reporting requirements that are included as part of this ACR are summarized below:

Technical Area	Conditions with Annual Reporting Requirements
Air Quality	AQ-C9, AQ-E2, AQ-E3, AQ-F11 AQ-SC2, AQ-SC3
Biological Resources	BR 5-1, BR 5-3, BR 5-4, BR 5-6, BR 5-10
Compliance	COM-5
Cultural Resources	CR 4-2
Fire Protection	Fire Protection-3
Public Health	PH 2-1
Water Quality, Hydrology and Water Resources	WQ 6-17

Geysers Grant Plant (Unit 20)

82-AFC-01C

2020 Annual Compliance Report to the California Energy Commission

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In accordance with Condition Compliance-5 of the License, Geysers Grant Plant (Grant) reports as follows:

Updated Compliance Matrix

A copy of the updated compliance matrix showing the status of all conditions of certification (with the exception of fully satisfied conditions) is included as an attachment under COMPLIANCE-5.

1. Summary of current project operating status and explanation of any significant changes to facility operating status during the year

Grant is currently operational and was operational during the 2020 reporting period with the exception of the following outage periods:

Event	Summary	Start	Actual End
Planned Outage, Transmission supplier	Unit removed from service for scheduled 230 kV line outage	6/23/2020 4:00	6/24/2020 10:20
Forced Outage	Unit relayed on High #3 Bearing Vibration	11/14/2020 1:55	11/14/2020 8:30
Forced Outage, Transmission supplier	Unit removed from service in preparation for Transmission System Operator PSPS event	10/25/2020 6:10	10/28/2020 12:40
Forced Outage, Transmission supplier	Unit Gen Breaker tripped during 230 kV system disturbance	10/2/2020 11:15	10/6/2020 21:25
Forced Outage, Transmission supplier	PG&E 230 kV line relay operation	9/27/2020 22:50	10/1/2020 11:25
Planned Outage, Transmission supplier	Unit was removed from service for scheduled P.G&E 230 kV line outage	9/24/2020 4:00	9/24/2020 20:20
Forced Outage	Unit removed from service to perform a turbine balance shot	7/22/2020 20:00	7/23/2020 15:45
Forced Derate	Unit relayed on high vibration	7/7/2020 16:25	7/22/2020 15:25

2. Required Annual Compliance Report Documents

The following information is required by specific conditions to be submitted annually in the ACR. Attachments are provided, as applicable:

Geysers Grant Plant (Unit 20)

82-AFC-01C

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Condition of Certification	Submittal Title
AQ-C9 / AQ-E2 / AQ-SC2	**Attachment AQ-E2a**: Annual Criteria Pollutant Report for 2020 **Attachment AQ-E2b**: Engine operating data summary for 2020
AQ-E3	**Compliance Statement**: The Geysers greenhouse gas emissions report for 2020 was submitted to CARB via the Cal-eGRRT reporting tool.
AQ-F11	**Attachment AQ-F11:** Annual Compliance Certification for 2020
AQ-SC3 / COM-5	**Attachment COM-5**: Compliance Matrix This Annual Compliance Report is being submitted to the CEC in accordance with AQ-SC3 and COM-5. An updated Compliance Matrix is attached in accordance with COM-5.
BIOLOGICAL RESOURCES 5-1	**Compliance Statement:** Each of the below items (1-7), regarding reduction of the potential for erosion, were completed during initial construction. 1. Terracing cut and fill slopes, 2. Lining ditches with gunite was completed during initial construction, 3. Constructing and maintaining of sediment ponds as designated in the AFC was completed. 4. Constructing a berm as described in the AFC, 5. Applying cereal grain straw or rice straw as designated in the AFC, 6. Revegetating all exposed slopes as described in Section 5.4 of the AFC and in the Unit 20 biological Resource Mitigation and Monitoring Plan, 7. Revegetating approximately 1.7 miles of existing unpaved roads as described in the Monitoring and Mitigation Plan, **Attachment BIOLOGICAL RESOURCES 5-1a:** (for item 3 above): April 2021 Guzzler and Sediment Pond inspection pictures. **Attachment BIOLOGICAL RESOURCES 5-1b:** (for items 8 & 9 below): Geysers Panicum Monitoring Report 8. Protecting the Little Geysers Natural Area as defined in the AFC Appendix J, and 9. Implementing an erosion control program to reduce erosion at the Little Geysers (described in the PG&E and Union Oil proposal to CEC submitted September 1982).
BIOLOGICAL RESOURCES 5-3	**Attachment BIOLOGICAL RESOURCES 5-1b**: Geysers Panicum Monitoring Report for 2020. The report recommends monitoring of Geysers Panicum every 4 years.
BIOLOGICAL RESOURCES 5-4	**Compliance Statement:** GPC is in compliance. There was no new development of makeup wells at Unit 20 that impacted the streptanthus brachiatus and S. morrisonii populations. Temporary fencing was not required in 2020.

Geysers Grant Plant (Unit 20)
82-AFC-01C
2020 Annual Compliance Report to the California Energy Commission
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Biological Resources 5-6	**Compliance Statement:** Each of the below items (a, b, d, e), as specified in the Monitoring and Mitigation Plan were completed: a. Prescribed burns (to be initiated the first fall season following power plant certification) or participation in the California Department of Forestry Chaparral Management Plan, b. Development of three springs, c. Development of a wildlife guzzler with annual maintenance and inspection during dry periods to ensure a year-round water supply, d. Revegetation with wildlife food and cover plants, and e. Construction of two raptor perch sites. **Attachment BIOLOGICAL RESOURCES 5-1a** (for item c above): April 2021 Guzzler and Sediment Pond inspection pictures.
Biological Resources 5-10	**Statement of Progress:** There were no construction activities at Unit 20 during the reporting period that required monitoring by a biologist.
Cultural Resources 4-2	**Compliance Statement:** In 2020, the existing fence around archaeological site CA-SON-793 was maintained and is intact. **Attachment BIOLOGICAL RESOURCES 5-1a :** Guzzler and Sediment Pond Inspection Pictures
PH 2-1	**Attachment PH 2-1:** Table of Quarterly Radon-222 Concentration Analysis in Non-Condensable Gases for 2020
FIRE PROTECTION - 3	Inspection, Testing, and Maintenance (ITM) reports are submitted to the CEC under confidential designation and are not provided as part of this ACR.
WQ 6-17	**Attachment WQ 6-17**: 2020 Geysers Power Plant Units Recycled Water Use Report. A copy of the report is attached.

3. Cumulative List of All Known Post-Certification Changes Approved by the CEC or CPM

- Resolved alleged violations of license and LORS relating to fire systems. Added new COCs: GEN-1, COM-1 through COM-11, Fire Protection-1 through Fire Protection-5. Docketed 11/16/20 per TN#235698.

4. Submittal deadlines not met

There are no past due compliance submittals.

5. Filings Submitted to or Permits Issued by Other Governmental Agencies

- Quarterly Compliance Reports for Sonoma County Title V compliance to NSCAPCD

- Title V Operating Permit 2020 Annual Compliance Certification for the Power Plants submitted to NSCAPCD
- Title V Responsible Official Certifications for Power Plant Operating Permit Applications and Annual Compliance Reporting Submitted to NSCAPCD
- 2020 PSD H2S Abatement System Performance Results: Geysers Power Company LLC's Sonoma, Lake View, Grant, Quicksilver and Calistoga Power Plants submitted to CEC & NSCAPCD
- Sonoma County AB2588 Air Toxics "Hot Spots" Emission Inventory Report for the Inventory Year 2020 (electronic data submission) submitted to NSCAPCD
- Guzzler and Sediment Pond inspection pictures submitted to CEC
- 2020 Geysers Power Plant Units Recycled Water Use Report submitted to SWRCB
- Criteria Pollutant Year 2020 Emission Inventory for GPC Plants submitted to NSCAPCD
- Monthly submission of completed hazardous waste manifests to DTSC
- Annual Hazardous Waste Report submitted to DTSC
- Sulfur Hexafluoride (SF6) Geothermal Resource Tracer Testing Exemption- Progress Report submitted to CARB
- 2020 Geysers Power Plant Units Recycled Water Use Report to the State WRCB-Division of Drinking Water

6. Projection of Scheduled Compliance Activities for Next Year

- Annual Asbestos Notification: 2021 Nonscheduled Maintenance Projects At Geysers Power Company LLC Facilities Located In Sonoma County submitted to NSCAPCD
- AQ-1: Perform monthly source test cooling tower H2S
- AQ-2: Perform annual performance test on turbine exhaust system
- Compliance-5: Evaluate Site Contingency Plan for unplanned facility closure
- Cultural Resources 4-4: Continued inspection, maintenance and repair of existing fencing around the archaeological site identified as CA-SON-793
- Fire Protection-1: Perform annual inspection, testing, and maintenance of the non-NFPA cooling tower wet down system
- Fire Protection-3: Perform inspections, testing, and maintenance of fire systems
- Public Health 2-1: Perform quarterly sampling and analysis of radon-222 concentrations in noncondensable gases entering the power plant in the incoming steam line, or vent off-gas line, or H2S abatement off-gas line
- Safety 12-14: Perform annual re-examination of the fire protection plan with California Department of Forestry
- Soils 6-3: Perform triannual panicum monitoring program

7. Additions to the Compliance Record

- Resolved alleged violations of license and LORS relating to fire systems. Added new COCs: GEN-1, COM-1 through COM-11, Fire Protection-1 through Fire Protection-5. Docketed 11/19/20 per TN#235698.

- On-going logging of monitoring and calibration of H2S monitoring devices, continuous strip chart record and appropriate sampling line, and other additions pursuant to AQ-1.
- On-going analyses of results of source tests and other tests requested by the NSCAPCD or CEC pursuant to the AQ conditions of certification.

8. Evaluation of the Site Contingency Plan

An evaluation of the Site Contingency Plan for unplanned facility closure was conducted and minor modifications were made to the plan to update the listed agency contact information for listed to be referenced in case of a facility closure.

9. Listing of complaints, notices of violations, official warnings, and citations

No complaints, notices of violations, official warnings or citations were received in the 2020 reporting period.

CONDITION OF CERTIFICATION
AQ-C9/AQ-E2/AQ-SC2

Attachment AQ-E2a: Annual Criteria Pollutant Report for 2020

Geysers Grant Plant (Unit 20) 82-AFC-01C
2020 Annual Compliance Report to the California Energy Commission
January 2020-December 2020

CALPINE
GEYSERS POWER COMPANY, LLC

10350 SOCRATES MINE ROAD
MIDDLETOWN, CA 95461
707.431.6000

GPC-21-016

February 9, 2021

Alex Saschin
Air Quality Engineer
Northern Sonoma County Air Pollution Control District
150 Matheson Street
Healdsburg, CA 95448

Subject: Criteria Pollutants Inventory Report Year 2020, For NSCAPCD Plants

Dear Mr. Saschin:

Enclosed is the year 2020 Criteria Pollutants Inventory Report for Geysers Power Plant generating units located in the Northern Sonoma County Air Pollution Control District. This inventory is submitted pursuant to the Title V Operating Permits for Units 5–12, 14, 17, 18, 20, and Sonoma, Condition II.A.V.2.

Included in the table of pollutants is the information required annually for the Aidlin Power Plant Permits to Operate #88-35 and #88-36 Condition E.3. Not included in the table, but required by the Aidlin permit, is the average annual supplied steam ammonia concentration, which is 525 ppm (w).

Please call me at (707) 431-6858, if you have any questions on this subject.

Sincerely,

Sharon Peterson
EHS Air Compliance Manager, Geysers

Enclosure[1] (CEC Licensed Units: 3, 17, 18, and 20)

cc: Eric VeerKamp, Compliance Project Manager
California Energy Commission (CEC)
1516 Ninth Street, MS-15
Sacramento, CA 95814-5512

[1] Data are copied to the CEC compliance project manager as a separate enclosure containing only the information required for CEC licensed facilities pursuant to: Unit 17 CEC Docket 79-AFC-1C, Unit 18 CEC Docket 79-AFC-3C, Unit 20 CEC Docket 82-AFC-1C, and Unit 3 CEC Docket 80-AFC-1C

Geysers Power Company LLC
Annual Emissions Report For Inventory Year 2020 Including Criteria Pollutants

Unit No.	Gross Generation (MWHrs)	Gross Steam Rate (Klbs / MWHr)	Unit Operating Hour (hrs)	Avg. Circ.Water Flowrate (Gal/Min)	[1] TSDS (ppm_w)	Cooling Tower Drift Rate	Cooling Tower PM: PM10 & PM2.5 (tons)	[2] TOG (Methane) Emissions (tons)	[4] NH_3 Emissions (tons)	[5] Avg. H_2S Conc. (ppm_w)	H_2S (tons)	[6] CO_{2e} (tons)	Stretford Cooler PM (tons)	Total PM: PM10 & PM2.5 (tons)
17	554,760	16.6	8223.90	97,000	1933	0.00002	7.8	1064.4	188	304	1.4	53299	1.5	9.3
18	455,210	15.4	7998.73	84,000	513	0.00001	0.9	105.4	143	62	20.1	5698	2.1	3.1
20	309,021	15.6	7720.72	84,000	1040	0.00001	2.4	40.6	99	43	14.9	2316	6.2	8.6
3 (Sonoma)	496,598	15.4	8115.77	99,104	778	0.00001	1.7	227.3	156	99	1.8	10657		1.7

[1] Annual average of monthly samples of cooling tower water total suspended and dissolved solids, (TSDS)

[2] Total organic gasses in supplied steam measured as methane.

[4] Ammonia emissions expressed as NH_3 determined from mass balance and steam and water analyses,

[5] H_2S concentration in the supplied steam from the average of weekly samples.

[6] CO_{2e} is regulated not as a criteria pollutant

CONDITION OF CERTIFICATION
AQ-C9/AQ-E2/AQ-SC2

Attachment AQ-E2b: Engine Operating Data Summary for 2020

Geysers Grant Plant (Unit 20) 82-AFC-01C
2020 Annual Compliance Report to the California Energy Commission
January 2020-December 2020

Cooling Tower Wet-down Diesel Engine-Driven Pump Operating Data

CEC Licensed Facilities in Sonoma County

January 1, 2020 - December 31, 2020

Facility	*Ultra Low Sulfur Diesel Fuel Use (Gallons)* [1]	*Engine Use (Total Hours)*	*Engine Use by Category*	*Engine Use by Category (Hours)*
Grant (Unit 20) License: 82-AFC-01C Condition: AQ-E2 Commissioned in 2020	211.6	17.2	Testing/Maintenance	17.2
			Emergency Use	0.0

[1]Fuel use estimated using manufacturer's fuel consumption rating x total hours of engine operation

CONDITION OF CERTIFICATION
AQ-F11

Attachment: Annual Compliance Certification for 2020

Geysers Grant Plant (Unit 20) 82-AFC-01C
2020 Annual Compliance Report to the California Energy Commission
January 2020-December 2020

CALPINE

GEYSERS POWER COMPANY, LLC

10350 SOCRATES MINE ROAD
MIDDLETOWN, CA 95461

GPC-21-013

August 31, 2021

Alex Saschin
Air Quality Engineer
Northern Sonoma County
Air Pollution Control District
150 Matheson Street
Healdsburg, CA 95448

Subject: Title V Operating Permit Annual Compliance Certifications 2020

Dear Mr. Saschin:

Attached are the Annual Compliance Certifications required pursuant to Condition V.C.17 of the Title V Operating Permits.

The Certification Period for each Title V Permit is January 1, 2020 through December 31, 2020. The certification periods are all on a calendar year basis regardless of the permit issue date.

The certification signature by the duly authorized responsible official is included on the title page of each annual compliance report.

If you require any additional information on this subject, please call me at (707) 431-6858.

Sincerely,

Sharon Peterson
Air Compliance Manager, Geysers

Enclosures

cc[1]: Eric VeerKamp, Compliance Project Manager
California Energy Commission (CEC)
1516 Ninth Street, MS-15
Sacramento, CA 95814-5512

[1] Enclosed reports required for CEC licensed facilities pursuant to: Unit 17 CEC Docket 79-AFC-1C, Unit 18 CEC Docket 79-AFC-3C, Unit 20 CEC Docket 82-AFC-1C, and Unit 3 CEC Docket 80-AFC-1C are provided to the CEC compliance project manager.

ATTACHMENT

Geysers Power Company LLC,

Unit 20 Title V Operating Permit, Annual Compliance Certification Report

For The Period January 1, 2020 through December 31, 2020

I certify that all information submitted herein is true, accurate and complete. Based on belief formed after reasonable inquiry, the Geysers Power Company LLC, Unit 20 Geothermal Power Plant is in compliance with the applicable federal, state, and local requirement(s) as identified in the attached Geysers Power Company LLC, Unit 20 Title V Operating Permit Annual Compliance Certification Report.

Michael A Puccioni

Signature of Responsible Official

Michael Puccioni – General Manager

8/31/21

Date

Geysers Power Company LLC, Unit 20 Title V Operating Permit
ANNUAL COMPLIANCE CERTIFICATION REPORT
01/01/20 through 12/31/20

CONTENTS

I. EQUIPMENT LIST

A. PERMITTED SOURCE LIST Each of the following sources has been issued a Permit to Operate pursuant to the requirements of NSCAPCD Regulation 1, Chapter II Permits.

The equipment and capacities listed in Tables I.A and I.B are based on information provided by the permit holder. Routine maintenance, repair, or replacement with identical or equivalent equipment that does not result in an increase, or potential increase, in emissions of any air pollutant subject to District control does not require a permit modification. Replacement equipment that is within 5% of the listed capacity shall be considered equivalent for the purposes of this permit.

Pumps listed with a capacity range may be replaced with pumps within the listed range without notification to the District. Any replacement of pumps outside the listed range shall receive District approval prior to replacement;

Power Plant			
S-#	**Grant Description**	**Capacity**	***Notes***
1	Steam Turbine	1,968,900 lb Steam/hr; maximum plant gross steam flow	***No Changes***
2	Generator	119 MW gross nameplate capacity	***No Changes***
3	Surface Condenser with Steam Operated 2 and 3 Stage Gas Ejector System	1,750,000,000 BTU/Hr Design Heat Load	***No Changes***
4	Cooling Tower, Cross Flow Mechanical Draft Type with 0.002% rated drift eliminators with 11x200 hp fans	168,000 gpm maximum 200 hp each	***No Changes***
5	Gland Seal Leak Off System		***No Changes***
6	Emergency Standby Wet-Down Pump Diesel Drive Engine	204 HP	***New***

B. ABATEMENT DEVICE LIST

Hydrogen Sulfide Control System consisting of:			
A-#	**Description**	**Nominal Capacity**	***Notes***
1	**Stretford Air Pollution Control System consisting of:**	600 lb/hr H_2S	***No Changes***
A	Two Venturi Scrubbers	1,120 gpm each	***No Changes***
B	H_2S Absorber, 5'6" D x 38' H.	560 gpm	***No Changes***
C	Two Oxidizer Tanks 19'D x20'H, with 4 oxidizer blowers, 100 HP each	790 scfm air per blower	***No Changes***
D	Reaction Tank 19"D x 20' H	42,000 gallon capacity	***No Changes***
E	Balance Tank, 24' D x 18' H	60,000 gallon capacity	***No Changes***
F	Froth Tank 12' D x 12 H	15,000 gallon capacity	***No Changes***
G	Caustic Tank 12' D x 12' H	9,300 gallon capacity	***No Changes***
H	Condensate Tank 4' D x 5' H	450 gallon capacity	***No Changes***
I	Heat Exchangers consisting of:		
a	Stretford Heater	3.0 MM BTU/hr	***No Changes***
b	Stretford Cooling Tower, 0.005% drift	5.3 MM BTU/hr	***No Changes***
c	Auxiliary Stretford Heater	1.75 MM BTU/hr	***No Changes***
J	Main Pumps Consisting of:		
a	3 Stretford Circulating Pumps	1560 gpm each	***No Changes***
b	2 Stretford Cooler Circulating Pumps	1100 gpm each	***No Changes***
c	Caustic Additive Pump	15-100 gpm	***No Changes***
K	Stretford Treated Gas Analyzer and Alarm System		
L	One Sulfur Vacuum Filter Belt		
2	**Circulating Water H_2S Abatement Solution Injection (For H_2S Control) System Consisting of:**		
A	Abatement Solution Storage Tanks	5,400 gallons minimum	***No Changes***
B	One Abatement Solution Feed Pump and One Spare Pump	0-100 gph range	***No Changes***
C	Mass Flow Meter and Flow Alarm		
3	**Mercury Removal System Consisting of:**		
A	Vapor Liquid Separator Assembly		***No Changes***
B	Mercury Adsorption Vessel		***No Changes***

II. PERMIT CONDITIONS

Permit conditions are designated federally (**F**), state (**S**), and/or locally (**L**) enforceable.

1. POWER PLANT AND ABATEMENT SYSTEMS		***Compliance***	***NOTES/MEANS/METHODS***
I. Emission Limits			
Emission Limits for H_2S			
1. The Unit 20 power plant and associated abatement systems shall comply with Regulation 1 Rule 455 (b)-Geothermal Emission Standards. Total emissions of H_2S shall not exceed 4.7 kilograms averaged over any one-hour period. Total H_2S emissions shall be the cumulative emissions to the atmosphere from the power plant and associated abatement equipment. *ref. Rule 455(b),* ***PTO 82-45B Cond. 16.A.***	**S L**	***Yes***	***Source Tests are conducted monthly, as required in condition III.1 to verify compliance. Results of the NSCAPCD Method 102 source tests, as well as excursions and exceedances, are reported to the District in the quarterly compliance reports.***
2. The operator of this source shall not discharge or cause the discharge into the atmosphere of more than a total of 10.4 pounds/hour of H_2S from Geysers Unit 20. ***Ref. PSD SFB 81-03 Cond. IX.D.***	**F S L**	***Yes***	***Source Tests are conducted monthly, as required in condition III.1 to verify compliance. Results of the NSCAPCD Method 102 source tests, as well as excursions and exceedances, are reported to the District in the quarterly compliance reports.***
3. The exit concentration in the process piping leading from the Stretford System shall not exceed 10 ppmv H_2S (dry) averaged over any consecutive 60-minute period unless operating under a District approved Alternative Compliance Plan (ACP). ***ref. PTO 82-45B Cond. 16.B.***	**S L**	***Yes***	***Continuous monitoring is in service and maintained to verify compliance. An automatic alarm notifies the operator prior to exceeding the limit. Excursions and exceedances are documented in follow-up reports and in the quarterly compliance reports. No deviations to this condition occurred during this reporting period.***
4. The exit concentration from the Stretford unit shall not exceed 125 ppmv or 0.5 lb/hr. ***ref. PSD 81-03, 82-AFC-1 Cond. 3.b***	**F S L**	***Yes***	***Continuous monitoring is in service and maintained to verify compliance. An automatic alarm notifies the operator prior to exceeding the limit. Excursions and exceedances are documented in follow-up reports and in the quarterly compliance reports. No deviations to this condition occurred during this reporting period.***
5. Annual emissions from the cooling tower shall not exceed, on a calendar year basis, 20.6 tons per year of hydrogen sulfide (H2S). ***ref. Rule 240 (d)***	**S L**	***Yes***	***Source tests are performed monthly as required by Condition III.1 to determine the H2S emission rate. The monthly emission rates are averaged and multiplied by the annual hours of operation to calculate the annual emissions. Total 2020 H2S emissions were 14.9 tons.***

6. The power plant and associated abatement systems shall comply with Regulation 1 Rule 455 (a)-Geothermal Emission Standards; no person shall discharge into the atmosphere from any geothermal operation sulfur compounds, calculated as sulfur dioxide, in excess of 1,000 ppmv. ***ref. Rule 455(a)***	**S L**	***Yes***	***Plant systems that contain sulfur oxides are designed to limit emissions to concentrations less than the limit. Continuous monitoring of process piping gas concentration prior to release in the cooling tower is in service and maintained to verify compliance. No deviations to this condition occurred during the reporting period.***
Emission Limits for Particulate Matter			
7. The power plant and associated abatement systems shall comply with Regulation 1 Rule 420 (d) Non-Combustion Sources- Particulate Matter; no person shall discharge particulate matter into the atmosphere from a non-combustion source in excess of 0.2 grains per cubic foot of exhaust gas or in total quantities in excess of the amount shown in Table I. (40 lb/hr) whichever is the more restrictive condition. ***ref. Rule 420(d)***	**F S L**	***Yes***	***Calculation of the PM discharge rate is based upon monthly total solids analyses and the cooling water flow rate. PM emission calculation is per Permit specified condition III.5. Calculations indicate that the plant was in compliance with this limit during the reporting period***
8. Annual emissions from the cooling tower shall not exceed, on a calendar year basis, 17.0 tons per year particulate matter less than 10 microns in diameter (PM-10) and 12.0 tons per year particulate matter less than 2.5 microns in diameter (PM-2.5). ***ref. Rule 240(d).***	**S L**	***Yes***	***Particulate emission rate determined as required by III.5. The results of that determination are used to determine the annual emission. Total 2020 PM10 and PM 2.5 emissions calculations were 8.6 tons.***
Emission Limits Specific to the Emergency Standby Wet-Down Pump Diesel Drive Engine			
1. Visible particulate emissions shall not exceed an opacity as to obscure an observer's view to a degree equal to or greater than Ringelmann 2.0 or 40 per cent opacity for a period or periods exceeding 3 minutes in any one hour. ***ref. ATC/Temporary PTO 17-10***.	**F S L**	***Yes***	***Operators and maintenance personnel record startup and operating exhaust observations in J-5 log entries to identify exhaust opacity trouble for further evaluation and repair in the work order system.***
2. Particulate emissions shall not exceed an emission rate of 0.15 g/bhp-hr. ***ref. ATC/Temporary PTO 17-10.***	**F S L**	***Yes***	***Engine meets EPA Tier 3 emission standards and is rated below the permitted limits.***
3. Combined non-methane hydrocarbons and nitrogen oxide emissions shall not exceed and emission rate of 3.0 g/bhp-hr. ***ref. ATC/Temporary PTO 17-10.***	**F S L**	***Yes***	***Engine meets EPA Tier 3 emission standards and is rated below the permitted limits.***

4. Carbon monoxide emissions shall not exceed an emission rate of 2.6 g/bhp-hr. ***ref. ATC/Temporary PTO 17-10.***	**F S L**		***Engine meets EPA Tier 3 emission standards and is rated below the permitted limits.***
II. Operational Limits and Requirements			
1. The permit holder shall not operate the plant unless untreated vent gasses are vented to the Stretford Air Pollution Control System. The condensate H_2S abatement chemical feed system and the Stretford abatement system shall be kept in good working order and operated as necessary in order to limit H_2S and particulate emissions on a continuous basis from the power plant as specified in condition I.1, I.2, I.3, I.4, and I.5. ***ref. Rule 240.d, PTO 82-45A Cond. 18, PSD SFB 81-03, 82-AFC-1 AQ-B8 ~~Cond. 15~~.***	**F S L**	***Yes***	***The H_2S abatement systems are operated and maintained in accordance with operating practices and a maintenance program described in the Title V application.***
2. The secondary abatement solution storage tank shall have a minimum of 1000 gallons of abatement solution at all times when the plant is in operation. All continuously operated abatement solution feed pumps shall have a standby spare available, a readily accessible flowmeter readable in appropriate units and equipped with alarms signaling no or low flow. Flowmeter accuracy shall be plus or minus 10% of flow. **ref. PTO 82-45A Cond. 18**	**S L**	***Yes***	***A program is in place to verify tank levels and to order and deliver chemicals prior to reaching the minimum level. Flowmeters and alarms are tested quarterly per permit condition II.4. A review of chemical tank sounding records indicates compliance with this condition.***
3. Except for justifiable reasons during performance testing or under operation of an ACP, for which the permit holder has received prior District written approval, the circulating water shall be kept to the following specification: Circulating water iron chelate (abatement solution) concentration shall be maintained at or above the ppmw concentration recommended in the power plant operating guidelines as necessary to abate H_2S emissions from the power plant to the emission limit specified in Condition I.1. ***ref. PTO 82-45A Cond. 19***	**S L**	***Yes***	***Operating practices are in place to maintain the circulating iron concentration when required. A review of the operator's compliance check-off sheets and logs indicates that the requirement is consistently met when iron chelate is used.***
4. All the abatement systems shall be properly winterized and maintained to ensure proper and reliable functioning. All primary pressure gauges and flow meters associated with abatement equipment shall be readily identified, maintained in good operating condition and calibrated on a quarterly basis. Alarm systems associated with abatement equipment shall be tested on a quarterly basis. Calibration and maintenance shall be performed according to manufacturer's recommendations or per the permit holder's maintenance schedule as needed to maintain the equipment in good working order. ***ref. PTO 82-45B Cond. 14.***	**S L**	***Yes***	***Maintenance practices are in place to ensure compliance with this condition. Flowmeters and alarms were tested as required during this reporting period.***
5. All areas in the immediate vicinity and under the permit holder's responsibility shall be properly treated to control fugitive dust. ***ref. PTO 82-45B Cond. 17.***	**S L**	***Yes***	***Fugitive dust is controlled with general clean-up and housekeeping.***

6. Fugitive Leaks			
a. Non-condensable gas leaks: Valves, flanges, seals on pumps and compressors, piping and duct systems shall be inspected, maintained and repaired to prevent the emission of steam and non-condensable gases to the atmosphere. Valves, flanges and seals shall be tightened, adjusted, or have gasket material added using the best modern practices for the purpose of stopping or reducing leakage to the atmosphere. Non-condensable gas leaks shall not (i) exceed (as measured within 1 cm of suck leak) 1000 ppm (vol) H2S nor 10,000 ppm (vol) methane nor (ii) exceed emission limits of Rule 455. Such leaks shall be repaired within 24 hours, unless the leak is from essential equipment. If the leak is from essential equipment, the leak must be minimized within 24 hours using best modern practices and eliminated at the next prolonged outage of the process unit unless an extension is approved by the APCO. Essential Equipment I defined as equipment which cannot be taken out of service without shutting down the process unit which it serves. Leak Minimization is defined as the tightening, adjusting, or addition of packing material which surrounds the leak, or the replacement of the valve or flange for the purpose of stopping or reducing leakage to the atmosphere, using best modern practices.	**F** **S** **L**	***Yes***	***A review of maintenance records indicated that the plant is in compliance. A review of daily compliance checklists indicated that the operators inspect the system for fugitive leaks.*** ***Plant operations and maintenance follow the procedure outlined in this permit condition to identify fugitive emissions.*** ***Maintenance records are available to inspectors to verify that fugitive emissions are minimized and controlled in a timely manner.*** ***Fugitive leak inspections are performed more frequently than once per quarter. The operator conducts daily rounds to inspect the plant which include identifying any leaks and entering the information into the plant log and submitting a work order requesting repair.***
b. Steam and Condensate leaks: Valves, flanges seals on pumps and compressors, piping and duct systems shall be inspected, maintained and repaired to prevent the emission of steam and condensate to the atmosphere. Valves, flanges and seals shall be tightened, adjusted or have gasket material added using the best modern practices for the purpose of stopping or reducing leakage to the atmosphere. Valves, flanges drip legs, threaded fittings and seals on pipelines shall be maintained to prevent or reduce the emission of steam and condensate to the atmosphere as noted below: Liquid leak rate in pressurized steam and condensate lines shall not exceed 20 ml in 3 minute. Liquid leak rates in excess of 20 ml in 3 minutes shall be repaired within 15 calendar days, excepting those leaks from essential equipment. If the leak is from essential equipment, the leak must be minimized within 15 days using best modern practices and eliminated at the next prolonged outage of the process unit unless an extension is approved by the APCO. Essential Equipment is defined as equipment which cannot be taken out of service without shutting down the process unit which it serves. Leak Minimization is defined as the tightening, adjusting, or addition of packing material which surrounds the leak, or the replacement of the valve or flange for the purpose of stopping or reducing leakage to the atmosphere, using best	**S** **L**	***Yes***	***A review of maintenance records indicated that the plant is in compliance. A review of daily compliance checklists indicated that the operators inspect the system for fugitive leaks.*** ***Plant operations and maintenance follow the procedure outlined in this permit condition to identify fugitive emissions.*** ***Maintenance records are available to inspectors to verify that fugitive emissions are minimized and controlled in a timely manner.*** ***Fugitive leak inspections are performed more frequently than once per quarter. The operator conducts daily rounds to inspect the plant which include identifying any leaks and entering the information into the plant log and submitting a work order requesting repair.***

modern practices The permit holder shall check the power plant for fugitive leaks at least once per quarter. ***ref. PTO 82-45B Cond. 17.***			
7. *Alternative Compliance Plan*			
a. The permit holder may propose an Alternative Compliance Plan (ACP) which allows for operating flexibility of the power plant while maintaining compliance with all applicable emission limits of Conditions I.2, I.4, I.6, and I.7. The ACP shall list operating parameters such as power output (MW) and abatement solution concentration levels which shall be met in order to meet all applicable emission limits listed above. The ACP shall be submitted to the APCO for approval. The APCO shall approve, disapprove or modify the plan within 30 days of receipt of the ACP. An APCO approved ACP shall consist of all parametric operating guidelines which shall be used to determine compliance with Conditions I.2, I.4, I.6, and I.7. The ACP shall list the specific operating conditions the ACP will supersede.	**F S L**	***Yes***	***No ACPs are currently in place as allowed under this condition.***
b The permit holder may propose an Alternative Compliance Plan (ACP) which allows for operating flexibility of the power plant while maintaining compliance with all applicable emission limits of Conditions I.1 and I.3. The ACP shall list operating parameters such as power output (MW) and abatement solution concentration levels which shall be met in order to meet all applicable emission limits listed above. The ACP shall be submitted to the APCO for approval. The APCO shall approve, disapprove or modify the plan within 30 days of receipt of the ACP. An APCO approved ACP shall consist of all parametric operating guidelines which shall be used to determine compliance with Conditions I.1 and 1.3. The ACP shall list the specific operating conditions the ACP will supersede.	**S L**	***Yes***	***No ACPs are currently in place as allowed under this condition.***
Facilities Operation			
8. All equipment, facilities, and systems installed or used to achieve compliance with the terms and conditions of the Permit shall at all times be maintained in good working order. The equipment shall be operated in a manner necessary to meet all emission limits of the permit. ***Ref. Rule 240(d), PSD SFB 81-03 Cond. III.***	**F S L**	***Yes***	***The Plant operator conducts daily rounds to inspect the plant. Equipment or systems in need of repair are identified and the information is entered into the plant log and a work order is submitted requesting repair. Weekly compliance checks indicate compliance with this condition.***
9. The cooling tower shall be maintained in good operating condition. The permit holder shall conduct an integrity inspection of the cooling tower during each scheduled plant overhaul and carry out any repairs necessary to correct all	**S L**	***Yes***	***Routine plant inspections by operators include the cooling tower to identify areas in need of repair. Plant maintenance makes repairs during plant overhauls. A***

deficiencies encountered. ***ref. Rule 240(d)***			***review of plant overhaul work planning indicated that cooling tower repair work is included.***
10. The permit holder shall operate and maintain the following air pollution control equipment at the Unit 20 plant: a. The non-condensable gas stream exiting from the surface condenser shall be ducted to an operating Stretford process unit. b. Condensate exiting from the surface condenser shall be treated as necessary to reduce the levels of dissolved hydrogen sulfide. The permit holder shall use a secondary abatement system authorized by the NSCAPCD to accomplish this reduction. c. The permit holder shall have installed drift controls on the power plant cooling tower to limit drift losses to 0.002 percent or better of the circulating water mass, thus minimizing emissions of particulate matter**. ref. PSD SFB 81-03 Cond. IX.B**.	**F** **S** **L**	***Yes***	***a. By design the non-condensable gasses are ducted to the Stretford system.*** ***b. A secondary abatement system, including condensate re-route is in place, and is permitted by the NSCAPCD.*** ***c. Based upon manufactures specifications, the cooling tower drift eliminators meet the requirement of this condition.***

11. The permit holder shall, in any 12-month period, limit unscheduled outages for Unit 20 to no more than a total of 12. The following shall not be used in computing the total outages. a. scheduled outages (defined as outages with 24-hour advance notice between the steam supplier and permit holder, except in the case of Unit 20 outages resulting from an abundance of hydropower in which case a scheduled outage shall be defined as one-hour notice). b. steam supplier induced outages (such as pressure surge, strainer plugging, etc.). c. outages of less than 2 hours in duration. d. outages which do not cause steam stacking. A violation of the above performance standards is considered a violation of this condition. The permit holder shall have on file with the District an approved operating protocol describing the methods that will be used to meet the 12 outages in 12 consecutive months' performance standard. The protocol must include a description of the operational procedures between the steam supplier and permit holder, permit holder's operational procedures, and equipment to meet the above standard. The terms and requirements of the protocol may be modified by the	**F** **S** **L**	***Yes***	***All occurrences meeting the condition criteria are reported to the District in the Quarterly Compliance Reports. A protocol is in place to meet the requirements of this condition. Steam lines interconnecting the power plants allow steam to be shifted to other operating plants if an outage occurs. No outages have resulted in steam stacking since interconnection of the steam lines was completed.*** ***No stacking events occurred during this reporting period.***

Control Officer for good cause upon written request from the permit holder. The permit holder shall allow the District to inspect all operating logs to verify the total outage hours. These requirements are in addition to the applicable requirements of rule 540. In the event the permit holder is not able to meet the standards specified above, the following shall be required: The permit holder shall prepare and submit a revised "plan" to the Control Officer, within 30 days of the end of the month in which the outage limit was exceeded, to achieve the outage standards set forth in this permit condition. At a minimum, the measures to be considered in the "plan" shall include: improved coordination of the power plant and steam field operations, improved alarming and control systems, increased duration of manned operation of the power plant, improved preventative maintenance and design modifications, retrofit of a 100% of steam flow turbine bypass, and retrofit of a 50% of steam flow turbine bypass. In evaluating measures to be taken to prevent future exceedances of the outage standard, outages of less than 2 hours shall be counted. This plan" shall also be submitted to EPA for approval if the outage standard is exceeded. Within 30 days of receipt of the "plan" the Control Officer shall determine whether the "plan" is satisfactory and, if so, shall approve the "plan". Upon approval, the revised "plan" shall supersede the old plan and become a part of the terms and conditions of this permit. ***ref. PSD SFB 81-03 Cond. IX.C., PT0-82-45A Cond.18.***			
Emergency Standby Wet-Down Pump Diesel Drive Engine			
12. Total operating hours used for testing and maintenance of S-6, emergency standby wet-down pump diesel drive engine, shall not exceed 50 hours in any consecutive 12-month period. The total hours of operation do not include use during emergencies. ***ATC/Temporary PTO 17-10***.	**F** **S** **L**	***Yes***	***Operators log and track the recorded hours to ensure testing and maintenance diesel engine run time does not exceed 50 hours in any consecutive 12- month period.***
13. S-6, emergency standby wet-down pump diesel drive engine, shall only be used because of a failure or loss of all or part of normal electrical power service, except for testing and maintenance as defined in CA HSC 93115.4 (30). ***ATC/Temporary PTO 17-10.***	**S** **L**	***Yes***	***The generator purpose is to provide emergency electrical power for critical equipment and lighting for safety during failure or loss of all or part of normal electrical power service.***
14. S-6, emergency standby wet-down pump diesel drive engine, shall be equipped with a non-resettable hour counting meter to indicate the number of hours the engine is operated. ***ATC/Temporary PTO 17-10***.	**S** **L**	***Yes***	***The generator is equipped with a working non-resettable hour counting meter.***
15. S-6, emergency standby wet-down pump diesel drive engine, shall be operated exclusively on California Air Resources Board (CARB) Diesel Fuel.	**S**	***Yes***	***The Geysers purchasing department contracts with fuel vendors who only supply Ultra-low Sulfur Diesel***

ATC/Temporary PTO 17-10.	**L**		***Fuel.***
16. S-6, emergency standby wet-down pump diesel drive engine, shall be operated according to manufacturer specifications. ***ATC/Temporary PTO 17-10***.	**S** **L**	***Yes***	***Maintenance is a contracted service with the supplier of the generator performed at intervals per the manufacturer's recommendation.***
III. Monitoring, Testing and Analysis			
Performance Tests			
1. The permit holder shall, on a monthly basis, conduct a source test of the cooling tower to determine the H_2S emission rate to verify compliance with condition I.1. A mass balance determination of total H2S to the cooling tower based on measured operating conditions may be used to document that the worst case possible H2S emission are less that the emission limit of the plant or District Method 102 shall be utilized to determine the H2S emission rate. The permit holder may propose an Alternative Compliance Plan (ACP) which allows for operating flexibility of the power plant, including periods when accessing the cooling tower is not possible, while maintaining compliance with all applicable emission limits of Condition I.1. The ACP shall list operating parameters such as power output (MW), target pH, abatement solution concentration levels, and burner/scrubber exit concentrations which shall be met in order to meet all applicable emission limits listed above. The ACP shall be submitted to the APCO for approval. The APCO shall approve, disapprove or modify the plan within 30 days of receipt of the ACP. An APCO approved ACP shall consist of all parametric operating guidelines which shall be used to determine compliance with Condition I.1. The ACP shall list the specific operating conditions the ACP will supersede. ***ref. PTO 82-45A Cond. 22.***	**S** **L**	***Yes***	***NSCAPCD Approved version of Method 102 (Modified Method 102) Source tests were performed each month, and reported to the District in the quarterly reports.*** ***All test results and determinations indicated compliance with this condition.***
2. The permit holder shall conduct or cause to be conducted performance tests on the turbine exhaust system to determine the H_2S emission rate to verify compliance with condition I.2. Performance tests shall be conducted in accordance with Northern Sonoma County APCD Method 102, unless otherwise specified by EPA. The permit holder shall furnish the Northern Sonoma County APCD, the California Air Resources Board and the EPA (Attn: Air-5) a written report of such tests. All performance tests shall be conducted at the maximum operating capacity of the plant. Performance tests shall be conducted at least on a yearly basis and at such times as shall be specified by EPA. ***ref. PSD SFB 81-03 Cond. IX.E***.	**F** **S** **L**	***Yes***	***An annual report including all Geysers plants with PSD permits is sent to the agencies listed in this condition. Reference letter GPC21-026 dated 2/18/2021.***
3. The permit holder shall provide platforms, electrical power and safe access to sampling ports to enable representatives of the District, ARB and EPA to collect samples from the main steam supply, treated and untreated condensate, circulating water upstream of the cooling tower, cooling tower stacks, untreated	**F** **S** **L**	***Yes***	***Sample taps used by plant personnel for chemical sampling and analysis are also available for use by CARB and District personnel. Safety Orientations and Job Safety Analysis are available for District and ARB***

and treated non-condensable gas stream to and from the Stretford abatement facility, any off gas bypass vents to the atmosphere and any Stretford tanks or evaporative coolers. ***ref. PTO 82-45B Cond. 11, PSD SFB 81-03 Cond. IX E.3..***			***representatives and highly encouraged for sampling activities.***
4. The permit holder, as requested by the Control Officer, shall conduct a District approved performance test for particulate matter (PM), H_2S, other species (i.e. benzene, mercury, arsenic, TRS, mercaptans, radon, other nitrogen compounds (amines) and compounds listed under NESHAPS and/or AB2588 from the power plant evaporative cooling tower and/or the Stretford evaporative cooling tower. Upon written request of the Control Officer, the permit holder shall submit to the District at least 45 days prior to testing a detailed performance test plan. The District shall approve, disapprove or modify the plan within 45 days of receipt of the plan. The permit holder shall incorporate the District's comments or modifications to the plan which are required to assure compliance with the District's regulations. The Control Officer shall be notified 15 days prior to the test date in order to arrange for an observer to be present for the test. The test results shall be provided to the District within 45 days of the test date unless a different submittal schedule is approved in advance by the Control Officer. ***ref. PTO 82-45A Cond 9 &10.***	**S L**	***Yes***	***Tests for listed species are performed at the request of the District utilizing District approved methods and an approved test plan. No test requests by the District are currently active.***
5. Compliance with the particulate mass emission limitation shall be estimated using calculations based on the evaporative cooling tower manufacturers design drift eliminator drift rate, 0.001 percent for the main cooling tower and 0.005% for the Stretford cooling tower, multiplied by the circulating water rate or Stretford solution circulating rate and, total dissolved solids (TDS) and total suspended solids (TSS). A circulating water sample shall be collected and analyzed for TDS and TSS on a monthly basis. ***ref. PTO 82-45A Cond. 21***	**S L**	***Yes***	***Monthly analysis by plant chemical staff and calculations done in accordance with the condition. Calculation of the particulate emissions is based upon monthly samples and analysis of the cooling tower water TSS and TDS. These calculations indicate that the unit was in compliance with this condition during the reporting period.***
6. Main steam supply H_2S concentrations shall be determined minimally on a weekly basis and any additional times as required by the operating protocol or ACP**.** ***Ref. PTO 82-45A Cond.19.***	**S L**	***Yes***	***A protocol on file with the District describes the method used to determine H_2S concentration. A review of the records indicates that the requirements of this condition are being met.***
7. The permit holder shall perform an abatement solution concentration test of the cooling tower circulating water once per operating shift when abatement solution is necessary in order to achieve compliance with Condition I.1. The testing equipment shall be kept calibrated per the manufacturer's specifications. ***ref. PTO 82-45A Cond.19.***	**S L**	***Yes***	***Operators perform tests required by this condition as a part of their daily routine. Iron concentration tests are validated by the plant chemistry staff using the "Hach" Ferreover colorimetric method. A review of the operating logs during this reporting period indicates compliance with this condition when circulating water abatement was in service.***

8. Instruments used for the measurement of H2S or Total Organic Gases to satisfy District permit conditions or regulations shall receive District approval prior to use. Test plans shall be submitted for District approval of instruments used for the measurement of H2S or Total Organic Gases to satisfy District permit conditions or regulations. *ref. Rule 240(d)*	**S L**	***Yes***	***The NSCAPCD has approved the following instruments that are used to measure H2S: ASI Model; 102, Jerome Instruments Model 631, "Dräger" brand sampling and analysis tubes. Organic gases are analyzed utilizing an "Aglient" Model 3000C G.C.***
9. All sampling protocols, chemical feed charts, targets and operational guidelines for using said charts and targets, necessary to abate H_2S emissions from the power plant to the emission limits specified in Conditions I.1 and I.2 must be developed using good engineering judgment and supporting data. The APCO may review such sampling protocols, chemical feed charts, targets and guidelines upon request. If the APCO determines that any of the protocols, feed charts, targets, or guidelines are not sufficient to maintain compliance with Conditions I.1 and I.2, the APCO shall require the permit holder to develop revised protocols, feed charts, targets and guidelines. *ref. Rule 240(d)*	**S L**	***Yes***	***Protocols related to this condition were submitted and approved by the District in the initial Title V application.*** ***Plant unit engineers specify targets and guidelines based on good engineering judgment and recent chemical analyses. Targets and operating requirements are available electronically via the plant intranet and they are posted on an erasable board in the operating control room.***
Continuous Compliance Monitoring (CCM)			
10. The permit holder shall operate a continuous compliance monitor capable of measuring the concentrations of H_2S in the exhaust stream from the Stretford absorber in order to verify compliance with conditions I.1 and I.3. The monitoring system must alarm the operator when H_2S in the treated gas is in excess of 10 ppmv (dry basis). The permit holder shall respond to the alarm with appropriate mitigative measures. Mitigative measures taken shall be logged in the power plant abatement log book. In the event H_2S concentrations are in excess of 10 ppmv and the range of the CCM is exceeded, the permit holder shall test for H_2S using an approved alternative method (ex Draeger tester, wet chemical tests) once every hour during the excess. The monitor shall have a full range of at least 50 ppmv. The monitor shall meet the following operational specifications: an accuracy of plus or minus 10% of full scale, provide measurements at least every 3 minutes, provide a continuous strip chart record or a District approved alternative, and provide monthly data capture of at least 90%. The District must be notified when the concentration of H_2S exceeds the hourly average limit of 10 ppmv. A one-point calibration shall be performed at least once per week. A three-point calibration shall be performed at least once per quarter. The Control Officer may allow modifications to the above specifications under an ACP upon written request with justification by the permit holder as long as emissions from the power plant do not exceed the "total" H_2S emission limitations of condition I.1. Written notification from the Control Officer must be received by	**S L**	***Yes***	***A monitor meeting the requirements of this condition is in place and operational. Plant records indicate that the continuous monitor consistently meets the requirements of this condition. Verification of these requirements is sent to the NSCAPCD in the quarterly reports. There were no deviations from this condition during the reporting period. Plant records indicate that calibrations are performed as required.***

the permit holder prior to any change in monitoring specifications. ***Ref. PTO 82-45A Cond. 19.***			
Ambient Air Monitoring			
11. The permit holder shall maintain and operate one H_2S/meteorological monitoring station, PM-10 high volume station at a location approved in advance by the Control Officer for the life of the facility. The permit holder shall install and operate additional monitoring stations, such as a PM 2.5 monitoring station, if required by the Control Officer, California Air Resources Board or EPA. Participation by the permit holder in a joint air monitoring program, such as the Geysers Air Quality Monitoring Program (GAMP), shall be deemed to satisfy all ambient air quality monitoring requirements of this permit provided the term of monitoring is equivalent. The Control Officer can alter, suspend, or cancel this requirement provided no ambient air quality standard applicable to this facility is threatened or that sufficient other monitoring is available by the District, Lake County AQMD or other third party. ***ref. PTO 82-45A Cond. 22, PSD SFB 81-03, 82-AFC-1 ~~Cond. 13~~ AQ-C11.***	**F S L**	***Yes***	***Geysers Power Company LLC participates in GAMP.***
Emergency Standby Wet-Down Pump Diesel Drive Engine			
12. At any time as specified by the Control Officer, the operator of this source shall conduct a District approved source test to determine NOx and particulate emissions from the emergency standby wet-down pump diesel drive engine. The test results shall be provided to the District within 30 days of the test.	**S L**	***Yes***	***Tests for NOx and particulate emissions are performed at the request of the District utilizing District approved methods. No test requests by the District are currently active.***
IV. Record keeping			
1. All records and logs shall be retained for a period of at least 5 years from the date the record or log was made and shall be submitted to the NSCAPCD upon request.	**F S L**	***Yes***	***Records and Logs are retained for a minimum of 5 years and are submitted upon NSCAPCD request.***
2. The permit holder shall maintain a weekly abatement solution inventory log available for on-site inspection. *ref. Rule 240(d)*	**S L**	***Yes***	***Operators conduct on-site inspections. Weekly chemical inventory files are kept and available for inspection.***
3. The permit holder shall maintain a strip chart or other District approved data recording device of H2S readings measured by the CCM. All measurements, records, and data shall be maintained by the permit holder for at least five (5) years. The permit holder shall report all exceedances of Condition I.3 in the	**S L**	***Yes***	***The District has approved Digital strip chart recorders to archive data in electronic format for later retrieval and review of CCM measurements. These data are available in the plant file system.***

quarterly report as required in V.1. The report shall include a description of all measures taken to bring the Stretford system back into compliance with Condition I.3. The permit holder shall include in the report a copy of the output from the H_2S CCM or alternative District approved data during the upset condition. *ref. Rule 240(d)*			***All exceedances of Condition I.3 are reported in the quarterly reports. There were no reportable exceedances during this reporting period.***
4. The permit holder shall maintain copies of the source test results as required in condition III.1 for a minimum of 5 years. ***ref. PTO 82-45A cond. 22.***	**S L**	***Yes***	***Source test data is available in the plant chemistry laboratory files on site, and in the plant archives.***
5. Fugitive Leak Records			
a. Any non-condensable gas leak in excess of the limitations of condition II.12 which has been detected by the permit holder and is awaiting repair shall be identified in a manner which is readily verifiable by a District inspector. Any leak in the above listed pieces of equipment exceeding the limitation s of II.7 and not identified by the permit holder and which is found by the District shall constitute a violation of this Permit. The permit holder shall maintain a current listing of such leaks awaiting repair and shall make this list available to the District upon request. ***Ref. PTO 82-45A cond. 20.***	**F S L**	***Yes***	***Operators conduct on-site inspections Daily plant inspections by operators identify leaks described by this condition. Plant maintenance records are available upon request to verify leak identification and repair.***
b. Any valve, flange, drip leg threaded fitting or seal on a pipeline or condensate collection system with a leak in excess of the limitations of condition II.12 which has been detected by the permit holder and is awaiting repair shall be identified in a manner which is readily verifiable by a District inspector. Any leak in the above listed pieces of equipment exceeding the limitations of II.7 and not identified by the permit holder and which is found by the District shall constitute a violation of this Permit. The permit holder shall maintain a current listing of such leaks awaiting repair and shall make this list available to the District upon request. ***ref. PTO 82-45A cond. 20.***	**S L**	***Yes***	***Operators conduct on-site inspections Daily plant inspections by operators identify leaks described by this condition. Plant maintenance records are available upon request to verify leak identification and repair.***
6. The permit holder shall maintain records detailing: a. any periods of significant abatement equipment malfunction, reasons for malfunctions and corrective action. b. the dates and hours in which the emission rates were in excess of the emission limitations specified in permit conditions I.3, and I.4. c fugitive steam and non-condensable gas emission source inspections. Leak rates, repairs and maintenance. d. total dissolved solids and total suspended solids in the circulating water. *Ref. Rule 240(d)*	**F S L**	***Yes***	***a. Operator logs and incident reports.*** ***b. Operator logs and incident reports.*** ***c. Recurring maintenance records.*** ***d. Plant Chemistry Lab data records.***
7. The permit holder shall maintain records detailing:	**S**	***Yes***	***a. Plant logs and data acquisition system (J-5 and EDNA).***

a. hours of operation. b. types, concentrations and amounts of chemicals used for Stretford absorbing solution and used for condensate treatment including target levels for abatement solution concentration in the circulating water. c. a summary of any irregularities that occurred with a continuous compliance monitor. d. the dates and hours in which the emission rates were in excess of the emission limitations specified in permit conditions I.1, I.2. e. periods of scheduled and unscheduled outages and the cause of the outages. f. time and date of all pump and flowmeter calibrations required by this permit. g. time and date of all alarm system tests. h. leaking equipment awaiting repair; time and date of detection and final repair. i. total H2S, PM-10 and PM 2.5 annual emissions to date. *ref. Rule 240(d)*	**L**		***b. Operator logs, EDNA, and purchasing records.*** ***c. Technicians log of maintenance of continuous monitors, EDNA, incident reports.*** ***d. Incident reports, logs, and EDNA.*** ***e. Operator logs and EDNA.*** ***f. Plant operating logs and maintenance records.*** ***g. Plant operating logs and maintenance records.*** ***h. Plant maintenance records (Maximo).*** ***i. Plant Chemistry Lab data records.***
Emergency Standby Wet-Down Pump Diesel Drive Engine			
8. In order to demonstrate compliance with the above permit conditions, records shall be maintained in a District approved log, shall be kept on site, and made available for District inspection for a period of 5 years from the date on which a record is made. The records shall include the following information summarized on a monthly basis: a. Total engine operating hours. b. Emergency use hours of operation. c. Maintenance and testing hours of operation. d. Hours of operation to comply with the requirements of NFPA 25. e. Type and amount of fuel purchased.	**F** **S** **L**	***Yes***	***a-e. Engine operating information is recorded in the J-5 operations log and summarized on a monthly basis.***
V. Reporting			
1. A quarterly report shall be submitted to the District which contains the following information: a. CCM availability for the given quarter. b. any periods of significant abatement equipment malfunction, reasons for malfunctions and corrective action taken. c. Time and date of any monitor indicating an hourly average exceed of 10 ppmv of H_2S. d. Source test results. e. Steam stacking events The quarterly report shall be submitted to the District within 30 days of the end of each quarter. The reports are due by May 1, August 1, November 1 and February	**S** **L**	***Yes***	***Quarterly Reports were submitted as required or on a date agreed upon with NSCAPCD.*** ***Ref. Geysers Power Company LLC letters:*** ***GPC-20-037, 1st Quarter 4/30/20*** ***GPC-20-075, 2nd Quarter 7/29/20*** ***GPC-20-086, 3rd Quarter 10/28/20*** ***GPC-21-002, 4th Quarter - 1/26/21***

1 for each corresponding quarter. *ref. Rule 240(d)*			
2. An annual report shall be submitted to the District which contains the following information: a. average mainsteam H_2S and ammonia concentrations. b. average total dissolved and suspended solids and average flowrate of the cooling tower water. c. annual ammonia emissions. d. gross megawatt hours generated. e. steaming rate, gross average (gross steam flow; lb/ gross MW). f. update to any changes in operating protocols used to determine plant chemical feed charts and targets; calibration and maintenance programs. g. total organic gasses emitted as methane. h. hours of plant operation. i. annual CO2e emissions. j. Annual H2S, PM-10 and PM-2.5 emissions The annual report shall be submitted to the District within 45 days of the end of each calendar year. r*ef. Rule 240(d)*	**S** **L**	***Yes***	***Geysers Power Company LLC submitted the required 2020 annual Criteria Pollutants Inventory Report to the NSCAPCD, on 2/9/2021 ref GPC letter GPC-21-016.***
3. The permit holder shall submit reports to the California Air Resources Board (CARB) in accordance with provisions of CCR Title 17, Division 3, Chapter 1, Subchapter 10, Article 2, Regulation for Mandatory Reporting of Greenhouse Gas Emissions.	**S** **L**	***Yes***	***The 2020 report was submitted Cal e-GGRT to CARB, Facility ARB ID:101527 on 4/8/2021 verification by the independent third party has been completed.***
Steam Stacking			
The permit holder shall, on a quarterly basis, provide a written report to the District with the outage events, cause of each outage and the balance of events for the year. The Control Officer may change the frequency of reporting. The permit holder shall inform the District when total outages have reached 12 in any consecutive 12 month period. The District shall be notified within 5 days of the 12th outage.	**F** **S** **L**	***Yes***	***The required outage information is included in the quarterly compliance reports. No stacking events occurred during this reporting period.***
B. PLANT WIDE PERMIT CONDITIONS			
The plant shall comply with the following District regulations. The text of the referenced regulations can be found in Appendix A of this Title V Operating Permit. 1. Regulation 1 Rule 400-General Limitations 2. Regulation 1 Rule 410-Visible Emissions 3. Regulation 1 Rule 430-Fugitive Dust Emissions 4. Regulation 1 Rule 492 (40 CFR part 61 Subpart M)-Asbestos 5. Regulation 1 Rule 540-Equipment Breakdown 6. Regulation 2- Open Burning 7. If in the event this stationary source, as defined in 40 CFR part 68.3, becomes	**F** **S** **L**	***Yes***	***1-3 Reviewed Quarterly compliance reports and District Inspections.*** ***4. Reviewed Asbestos Notification letters. Notifications were submitted as required during the reporting period. GPC20-058, dated 12/15/2020.*** ***5. Reviewed Quarterly compliance records "Incidents Requiring Corrective Action".*** ***6. No open burning is performed at this location.***

subject to part 68, this stationary source shall submit a risk management plan (RMP) by the date specified in part 68.10. As specified in Parts 68, 70 and 71, this stationary source shall certify compliance with the requirements of part 68 as part of the annual compliance certification required by 40 CFR part 70 or 71. 8. 40 CFR Part 82- Chlorinated Fluorocarbons 9. If in the event this stationary source, as defined in 40 CFR part 63, becomes subject to part 63, this stationary source shall notify the District within 90 days of becoming subject to the regulation. The stationary source shall identify all applicable requirements of part 63 and submit a plan for complying with all applicable requirements.			***7. The Plant is exempt from the Risk Management Plan because quantities of flammable hydrocarbons are less than 67,000 lbs. Ref.: EPA notice dated March 13, 2000.*** ***8. All work performed on appliances containing chlorinated fluorocarbons is performed by HVAC Technicians certified through EPA approved training programs in accordance with the Clean Air Act Section 608 and 40 CFR part 82, Subpart F.*** ***9. Maintenance is a contracted service with the supplier of the generator performed at intervals per the manufacturer's recommendation.***
C. ADMINISTRATIVE REQUIREMENTS			
Payment of Fees			
1. This Permit shall remain valid during the 5-year term as long as the annual renewal fees are paid in accordance with Regulation 1 Rule 300 and Rule 360 of the District. Failure to pay these fees will result in forfeiture of this permit. Operation without a permit subjects the source to potential enforcement action by the District and the EPA pursuant to section 502(a) of the Clean Air Act. *ref. Reg 5.670*	**F S L**	***Yes***	***Geysers Power Company LLC submitted the required Permit Fees: Payment of Annual Renewal Fees Fiscal Year 2020-2021, GPC-20-032, dated 8/24/20. Federal Program Fees fiscal year 2020/2021: GPC-21-042, dated 5/27/21.***
Right to Entry and Inspection			
2. The Control Officer, the Chairman of the California Air Resources Board, The Regional Administrator of the EPA and/or their authorized representatives, upon the presentation of credentials, shall be permitted: A. to enter upon the premises where the source is located or areas in which any records are required to be kept under the terms and conditions of this Permit; and B. at reasonable times to have access to and copy any records required to be kept under the terms and conditions of this Permit; and C. to inspect any equipment, operation, or method required in this Permit; and D. to sample emissions from the source. *ref. Reg 5.610(e)*	**F S L**	***Yes***	***Agency representatives are admitted to the project upon presentation of credentials. After receiving a safety advisory no restrictions are placed on access to plant premises, sample locations and records.***
Compliance with Permit Conditions			
3. This Title V Operating Permit expires on August 8, 2021. The permit holder shall submit a complete application for renewal of this Title V Operating Permit no later than 6 months prior to expiration and no earlier than one year prior to expiration. If a complete application for renewal has not been submitted in accordance with these deadlines, the facility may not operate after August 7, 2021. R*ef Reg 5.660*	**F S L**	***Yes***	***Application was submitted 6 months prior to expiration; ref. GPC-21-020 dated February 4, 2021. The current permit renewal was issued on August 8, 2021.***

4. The permit holder shall comply with all conditions of this permit. Any non-compliance with the terms and conditions of this permit will constitute a violation of the law and may be grounds for enforcement action, including monetary civil penalties, permit termination, revocation and reissuance, or modification; or denial of a permit renewal application. r*ef. Reg 5.610(f)(3)*	**F S L**	***Yes***	***No NOVs were issued to Unit 20 during this reporting period.***
5. In the event any enforcement action is brought as a result of a violation of any term or condition of this permit, the fact that it would have been necessary for the permit holder to halt or reduce the permitted activity in order to maintain compliance with such term or condition shall not be a defense to such enforcement action. r*ef. Reg 5.610(f)(4)*	**F S L**	***Yes***	
6. The filing of a request by the facility for a permit modification, revocation and reissuance, or termination, or of a notification of planned changes or anticipated non-compliance does not stay the applicability of any permit condition. r*ef. Reg 5.610 f)(5)*	**F S L**	***Yes***	
7. This permit does not convey any property rights of any sort, nor any exclusive privilege. *ref. Reg 5.610(f)(2)*	**F S L**	***Yes***	
8. The permit holder shall supply within 30 days any information that the District requests in writing to determine whether cause exists, per Regulation 5.570, for modifying, revoking and reissuing, or terminating the permit or to determine compliance with the permit. *ref. Reg 1 Rule 200, Reg 5.430*	**F S L**	***Yes***	***There are no active information requests.***
Reporting			
9. All deviations from permit requirements, including those attributable to upset conditions (as defined in the permit) must be reported to the District at least once every six months. For emissions of a hazardous air pollutant (HAP) or a toxic air pollutant (as identified in an applicable regulation) that continue for more than an hour in excess of the permit requirements, the report must be made within 24 hours of the occurrence. For emissions of any regulated air pollutant, excluding those HAP emission requirements listed above, that continue for more than two hours in excess of permit requirements, the report must be made within 48 hours. All reports of deviation from permit requirements shall include the probable cause of the deviation and any preventative or corrective action taken. A progress report shall be made on a compliance schedule at least semi-annually and shall include the date when compliance will be achieved, an explanation of why compliance was not, or will not be, achieved by the scheduled date, and a log of any preventative or corrective action taken. The reports shall be certified by the	**F S L**	***Yes***	**There were no deviations to report during this period** ***No excess emissions occurred.***

responsible official as true, accurate and complete. *ref. Reg 5.625*			
Severability			
10. In the event that any provision of this permit is held invalid all remaining portions of the permit shall remain in full force and effect. *ref. Reg 5.610(g)*	**F S L**	***Yes***	
Transfer of Ownership			
11. In the event of any changes in control or ownership of facilities to be modified and/or operated, this Permit is transferable and shall be binding on all subsequent owners and operators. The permit holder shall notify the succeeding owner and operator of the existence of this Permit and its conditions by letter, a copy of which shall be forwarded to the Control Officer. *ref. Rule 240(j)*	**F S L**	***Yes***	***No ownership changes occurred during this reporting period.***
Records			
12. Notwithstanding the specific wording in any requirement, all records for federally enforceable requirements shall be maintained for at least five years from the date of entry and shall include: date place and time of sampling, operating conditions at the time of sampling, date, place and method of analysis and the results of the analysis. *ref. Reg 5.615*	**F S L**	***Yes***	***Site inspection. Plant policy requires files to be maintained to meet the requirements of this condition.***
Emergency Provisions			
13. The permit holder may seek relief from enforcement action in the event of a breakdown, as defined by Regulation 1 Rule 540 of the District's Rules and Regulations, by following the procedures contained in Regulation 1, Rule 540 (b). The District will thereafter determine whether breakdown relief will be granted in accordance with Regulation 1, Rule 540 (b)(3). *ref. Reg 5.640*	**F S L**	***Yes***	
14. The permit holder may seek relief from enforcement action for a violation of any of the terms and conditions of this permit caused by conditions beyond permit holders reasonable control by applying to the District's Hearing Board for a variance pursuant to Health and Safety Code Section 42350. The Hearing Board will determine after notice and hearing whether variance relief should be granted in accordance with the procedures and standards set forth in Health and Safety Code Section 42350 et seq. Any variance granted by the Hearing Board from any term or condition of this permit which lasts longer than 90 days will be subject to EPA approval. *ref. Reg 1 Rule 600*	**F S L**	***Yes***	***No variances are currently requested or in force.***
15. Notwithstanding the foregoing, the granting by the District of breakdown relief or the issuance by the Hearing Board of a variance will not provide relief from federal	**F S**	***Yes***	

	enforcement unless the Title V Operating Permit has been modified pursuant to Regulation 5 or other EPA approved process. *ref. Reg 1 Rule 600*	**L**		
	Malfunction			
16.	The Regional Administrator shall be notified by telephone within 48 hours following any failure of air pollution control equipment, process equipment, or of a process to operate in a normal manner which results in an increase in emissions above allowable emissions limit stated in Condition I.2. In addition, the Regional Administrator shall be notified in writing within fifteen (15) days of any such failure. This notification shall include a description of the malfunctioning equipment or abnormal operation, the date of the initial failure, the period of time over which emissions were increased due to the failure, the cause of the failure, the estimated resultant emissions in excess of those allowed under Condition I.2, and the methods utilized to restore normal operations. Compliance with this malfunction notification provision shall not excuse or otherwise constitute a defense to any violation of this permit or of any law or regulations, which such malfunction, may cause. ***ref. PSD SFB 81-03 Cond. IV***.	**F S L**	***Yes***	***NSCAPCD is notified for any such failures.***

	Permit Posting			
17.	Operation under this permit must be conducted in compliance with all data specifications included in the application which attest to the operator's ability to comply with District rules and regulations. This permit must be posted in such a manner as to be clearly visible and accessible at a location near the source. In the event that the permit cannot be so placed, the permit shall be maintained readily available at all times on the operating premises. *ref. Rule 240(i)*	**S L**	***Yes***	***Operators conduct on-site inspections. This permit is located in the Unit 20 control room and is available electronically to Operators in the control room.***
	Compliance Certification			
18.	Compliance certifications shall be submitted annually by the responsible official of this facility to the Northern Sonoma County Air Pollution Control District and to the EPA. Each compliance certification shall be accompanied by a written statement from the responsible official which certifies the truth, accuracy, and completeness of the report. r*ef. Reg 5.650*	**F S L**	***Yes***	***This submittal includes the required Compliance Certification for this Permit. The cover page contains a written statement by the responsible official certifying truth, accuracy and completeness.***
19.	This Permit does not authorize the emission of air contaminants in excess of those allowed by the Health & Safety Code of the State of California or the Rules and Regulations of the Northern Sonoma County Air Pollution Control District. This Permit cannot be considered as permission to violate existing laws,	**F S L**	***Yes***	

ordinances, regulations or statutes of other governmental agencies. *ref. Rule 240(d)*			
Permit Modification			
20. The permit holder shall comply with all applicable requirements in NSCAPCD Regulation 1 Chapter II- Permits and New Source Review. *ref. Regulation 1 Rule 200*	**F S L**	***Yes***	***No permit modifications were initiated in 2020.***

CONDITION OF CERTIFICATION
AQ-SC3 / COMPLIANCE-5

Attachment COM-5: Compliance Matrix

Geysers Grant Plant (Unit 20) 82-AFC-01C
2020 Annual Compliance Report to the California Energy Commission
January 2020-December 2020

Technical Area	No.	Facility Status	Condition of Certification	Compliance Verification	Status	2020 Annual Compliance Report
AQ	A1	Operations/ Ongoing	The project and associated abatement systems shall comply with Regulation 1 Rule 455(b) –Geothermal Emission Standards. Total emissions of hydrogen sulfide (H2S) shall not exceed 4.7 kilograms averaged over any one-hour period. Total H2S emissions shall be the cumulative emissions to the atmosphere from the power plant and associated abatement equipment. [Ref. Rule 455(b), PTO 82-45B Cond. 16.A]	The project owner shall verify compliance by conducting a monthly source test on the cooling tower as indicated in AQ-C1, weekly determinations of the H2S content in the main steam supply as required in AQ-C6, or as required in an approved Alternative Compliance Plan.	Ongoing	Source Tests are conducted monthly, as required in AQ-C1. to verify compliance with this condition. Results of the NSCAPCD Method 102 source tests, as well as excursions and exceedances, are reported to the District in the quarterly compliance reports.
AQ	A2	Operations/ Ongoing	The project owner shall not discharge or cause the discharge into the atmosphere of more than a total of 10.4 pounds per hour of H2S from the project. [ref. PSD SFB 81-03 Cond. IX.D.]	The project owner shall verify compliance by conducting an annual performance test on the turbine exhaust system to determine the H2S emission rate as required in AQ-C2.	Ongoing	Source Tests are conducted monthly, as required in condition AC-C2 to verify compliance. Results of the NSCAPCD Method 102 source tests, as well as excursions and exceedances, are reported to the District in the quarterly compliance reports.
AQ	A3	Operations/ Ongoing	The exit concentration in the process piping leading from the Stretford system shall not exceed 10 ppmv H2S averaged over any consecutive 60-minute period unless operating under a District-approved Alternative Compliance Plan (ACP). [ref. PTO 82-45B Cond. 16.B.]	The project owner shall verify compliance by operating a continuous compliance monitor as required in AQ-C10.	Ongoing	Continuous monitoring is in service and maintained to verify compliance. An automatic alarm notifies the operator prior to exceeding the limit. Excursions and exceedances are documented in follow-up reports and in the quarterly compliance reports. No deviations to this condition occurred during the reporting period.
AQ	A4	Operations/ Ongoing	The exit concentration of H2S from the Stretford unit shall not exceed 125 ppmv or 0.5 lb/hr [ref. PSD 81-03, 82-AFC-1 Cond. 3.b]	The project owner shall verify compliance by operating a continuous compliance monitor as required in AQ-C10.	Ongoing	Continuous monitoring is in service and maintained to verify compliance. An automatic alarm notifies the operator prior to exceeding the limit. Excursions and exceedances are documented in follow-up reports and in the quarterly compliance reports. No deviations to this condition occurred during this reporting period.
AQ	A5	Operations/ Ongoing	Annual emissions from the cooling tower shall not exceed, on a calendar year basis, 20.6 tons per year of hydrogen sulfide (H2S).	The project owner shall maintain records of total H2S as indicated in AQ-D7 and submit reports as indicated in AQ-E2. Records shall be based on required source testing in Condition AQ-C1, and an annual summation from January to December.	Ongoing	GPC is in compliance. Source tests are performed monthly as required by AQ-A5 to determine the H2S emission rate. The monthly emission rates are averaged and multiplied by the annual hours of operation to calculate the annual emissions. Total 2020 H2S emissions were 14.9 tons.
AQ	A6	Operations/ Ongoing	The project owner shall comply with Regulation 1 Rule 455 (a)-Geothermal Emission Standards; no person shall discharge into the atmosphere from any geothermal operation sulfur compounds, calculated as sulfur dioxide, in excess of 1,000 ppmv. [ref. Rule 455(a)]	The project owner shall verify compliance by adhering to all monitoring and testing requirements.	Ongoing	GPC is in compliance.
AQ	A7	Operations/ Ongoing	The project owner shall operate the power plant and associated abatement systems in compliance with Regulation 1 Rule 420 (d) Non-Combustion Sources-Particulate Matter; no person shall discharge particulate matter into the atmosphere from a non-combustion source in excess of 0.2 grains per cubic foot of exhaust gas or in total quantities in excess of the amount shown in Table I. (40 lb/hr) whichever is the more restrictive condition. [ref. Rule 420(d)]	The project owner shall perform a source test to determine compliance as requested by the NSCAPCD or CPM. The project owner shall make the site and records available for inspection by representatives of the District, ARB, U.S. EPA, and Energy Commission upon request.	Ongoing	Calculation of the PM discharge rate is based upon monthly total solids analyses and the cooling water flow rate. PM emission calculation is per Permit specified condition III.4. Calculations indicate that the plant was in compliance with this limit during the reporting period

Technical Area	No.	Facility Status	Condition of Certification	Compliance Verification	Status	2020 Annual Compliance Report
AQ	A8	Operations/ Ongoing	Annual emissions from the cooling tower shall not exceed, on a calendar year basis, 17.0 tons per year particulate matter less than 10 microns in diameter (PM10) and 12.0 tons per year particulate matter less than 2.5 microns in diameter (PM-2.5).	The project owner shall verify compliance through monitoring as indicated in AQ-C5. The project owner shall maintain records according to AQ-D6 and AQ-D7 and submit reports as indicated in AQ-E2. Records shall be based on required sampling and an annual summation from January through the end of December.	Ongoing	GPC is in compliance. Particulate emission rate determined as required by AQ-C5. The results of that determination are used to determine the annual emission. Total 2020 PM10 and PM 2.5 emissions calculations were 8.6 tons.
AQ	AE1	Operations/ Ongoing	Visible particulate emissions shall not exceed an opacity as to obscure an observer's view to a degree equal to or greater than Ringelmann 2.0 or 40 percent opacity for a period or periods exceeding 3 minutes in any one hour [ref. PTO 17- 10 Cond. B1]	The project owner shall perform a Visible Emissions Evaluation to determine compliance as requested by the NSCAPCD or CPM, the project owner shall make the site and records available for inspection by representatives of the District, ARB, U.S. EPA, and Energy Commission upon request.	Ongoing	No request has been made to perform testing
AQ	AE2	Operations/ Ongoing	Particulate emissions shall not exceed an emission rate of 0.15 g/bhp-hr. [ref. PTO 17-10 Cond. B2]	The project owner shall verify compliance according to Condition AQ-CE1. The project owner shall make the site and records available for inspection by representatives of the District, ARB, U.S. EPA, and Energy Commission upon request.	Ongoing	Engine meets EPA Tier 3 emission standards and is rated below the permitted limits.
AQ	AE3	Operations/ Ongoing	Combined non-methane hydrocarbons and nitrogen oxide emissions shall not exceed an emission rate of 3.0 g/bhp-hr. [ref. PTO 17-10 Cond. B3]	The project owner shall perform a source test to verify compliance with the emission rate upon request of the District or CPM. The project owner shall make the site and records available for inspection by representatives of the District, ARB, U.S. EPA, and Energy Commission upon request.	Ongoing	Engine meets EPA Tier 3 emission standards and is rated below the permitted limits.
AQ	AE4	Operations/ Ongoing	Carbon monoxide emissions shall not exceed an emission rate of 2.6 g/bhp-hr. [ref. PTO 17-10 Cond. B4]	The project owner shall perform a source test to verify compliance with the emission rate upon request of the District or CPM. The project owner shall make the site and records available for inspection by representatives of the District, ARB, U.S. EPA, and Energy Commission upon request.	Ongoing	Engine meets EPA Tier 3 emission standards and is rated below the permitted limits.
AQ	B1	Operations/ Ongoing	The project owner shall not operate the plant unless untreated vent gasses are vented to the Stretford Air Pollution Control System. The condensate H2S abatement chemical feed system and the Stretford abatement chemical feed system and the Stretford abatement system shall be kept in good working order and operated as necessary in order to limit H2S and particulate emissions on a continuous basis from the power plant as specified in conditions AQ-A1, AQ-A2, AQ-A3, AQ-A4, and AQ-A6. [ref. Rule 240.d, PTO 82- 45A Cond. 18, PSD SFB 81-03, 82-AFC-1 Cond. 15]	The project owner shall make the site and records available for inspection by representatives of the District, ARB, U.S. EPA, and Energy Commission upon request.	Ongoing	The H2S abatement systems are operated and maintained in accordance with operating practices and a maintenance program described in the Title V application.
AQ	B2	Operations/ Ongoing	The secondary abatement solution storage tank shall hold a minimum of 1,000 gallons of abatement solution at all times when the plant is in operation. All continuously operated abatement solution feed pumps shall have a standby spare available, a readily accessible flowmeter readable in appropriate units and equipped with alarms signaling no or low flow. Flowmeter accuracy shall be plus or minus 10% of flow. [ref. PTO 82-45A Cond. 18]	The project owner shall make the site and records available for inspection by representatives of the District, ARB, U.S. EPA, and Energy Commission upon request.	Ongoing	A program is in place to verify tank levels and to order and deliver chemicals prior to reaching the minimum level. Flowmeters and alarms are tested quarterly per permit Title V condition II.4. Records available upon request.
AQ	B3	Operations/ Ongoing	Except for justifiable reasons during performance testing or under operation of an ACP, for which the project owner has received prior District written approval, the circulating water shall be kept to the following specification: Circulating water iron chelate (abatement solution) concentration shall be maintained at or above the ppmw concentration recommended in the power plant operating guidelines as necessary to abate H2S emissions from the power plant to the emission limit specified in Condition AQ-A1. [ref. PTO 82-45A Cond. 19]	The project owner shall make the site and records available for inspection by representatives of the District, ARB, U.S. EPA, and Energy Commission upon request.	Ongoing	GPC is in compliance. Operating practices are in place to maintain the circulating iron concentration when required. Records are available on request.
AQ	B4	Operations/ Ongoing	All the abatement systems shall be properly winterized and maintained to ensure proper and reliable functioning. All primary pressure gauges and flow meters associated with abatement equipment shall be readily identified, maintained in good operating condition and calibrated on a quarterly basis. Alarm systems associated with abatement equipment shall be tested on a quarterly basis. Calibration and maintenance shall be performed according to manufacturer's recommendations or per the project owner's maintenance schedule as needed to maintain the equipment in good working order. [ref. PTO 82-45B Cond. 14]	The project owner shall make the site and records available for inspection by representatives of the District, ARB, U.S. EPA, and Energy Commission upon request.	Ongoing	Maintenance practices are in place to ensure compliance with this condition. Flowmeters and alarms were tested as required during this reporting period.

Technical Area	No.	Facility Status	Condition of Certification	Compliance Verification	Status	2020 Annual Compliance Report
AQ	B5	Operations/ Ongoing	All areas in the immediate vicinity and under the project owner's responsibility shall be properly treated to control fugitive dust. [ref. PTO 82-45B Cond. 17]	The project owner shall make the site and records available for inspection by representatives of the District, ARB, U.S. EPA, and Energy Commission upon request.	Ongoing	GPC complies with NSCAPCD Regulation 1 Rule 430. A fugitive dust control plan is in place
AQ	B6	Operations/ Ongoing	Fugitive Leaks A. Non-condensable gas leaks: Valves, flanges, seals on pumps and compressors, piping and duct systems shall be inspected, maintained and repaired to prevent the emission of non-condensable gases to the atmosphere. Valves, flanges and seals shall be tightened, adjusted, or have gasket material added using the best modern practices for the purpose of stopping or reducing leakage to the atmosphere. Non-condensable gas leaks shall not (i) exceed (as measured within 1 cm of such leak) 1,000 ppmv H2S nor 10,000 ppmv methane nor (ii) exceed emission limits of Rule 455. Such leaks shall be repaired within 24 hours, unless the leak is from essential equipment. If the leak is from essential equipment, the leak must be minimized within 24 hours using best modern practices and eliminated at the next prolonged outage of the process unit unless an extension is appro by the APCO. Essential Equipment is defined as equipment which cannot be taken out of service without shutting down the process unit which it serves. Leak Minimization is defined as the tightening, adjusting, or addition of packing material which surrounds the leak, or the replacement of the valve or flange for the purpose of stopping or reducing leakage to the atmosphere, using best modern practices. B. Steam and Condensate leaks: Valves, flanges, seals on pumps and compressors, piping and duct systems shall be inspected, maintained and repaired to prevent the emission of steam and condensate to the atmosphere. Valves, flanges and seals shall be tightened, adjusted, or have gasket material added using the best modern practices for the purpose of stopping or reducing leakage to the atmosphere. Valves, flanges, drip legs, threaded fittings and seals on pipelir shall be maintained to prevent or reduce the emission of steam and condensate to the atmosphere as noted below: Liquid leak rate in pressurized steam and condensate lines shall not exceed 20 ml in 3 minutes. Liquid leak rates in excess of 20 ml in 3 minutes shall be repaired within 15 calendar days, excepting those leaks from essential equipment. If the leak is from essential equipment, the leak must be minimized within 15 days using best modern practices and eliminated at the next prolonged outage of the process unit unless an extension is approved by the APCO. Essential Equipment is defined as equipment which cannot be taken out of service without shutting down the process unit which it serves. Leak Minimization is defined as the tightening, adjusting, or addition of packing material which surrounds the leak, or the replacement of the valve or flange for the purpose of stopping or reducing leakage to the atmosphere, using best modern practices The project owner shall check the power plant for fugitive leaks at least once per quarter. [ref. PTO 82-45B Cond. 17]	The project owner shall keep records according to Condition AQ-D5. The project owner shall make the site and records available for inspection by representatives of the District, ARB, U.S. EPA, and Energy Commission upon request.	Ongoing	A & B. Records of compliance in accordance to Condition AQ-D5 are available on request.
AQ	B7	Operations/ Ongoing	Alternative Compliance Plan A. The project owner may propose an Alternative Compliance Plan (ACP) which allows for operating flexibility of the power plant while maintaining compliance with all applicable emission limits of Conditions AQ-A2, AQ-A4, AQ-A6, and AQ-A7. The ACP shall list operating parameters such as power output (MW) and abatement solution concentration levels which shall be met in order to meet all applicable emission limits listed above. The ACP shall be submitted to the AP for approval. The APCO shall approve, disapprove or modify the plan within 30 days of receipt of the ACP. An APCO approved ACP shall consist of all parametric operating guidelines which shall be used to determine compliance with Conditions AQ-A2, AQ-A4, AQ-A6, and AQ-A7. The ACP shall list the specific operating conditions the ACP will supersede. B. The project owner may propose an Alternative Compliance Plan (ACP) which allows for operating flexibility of the power plant while maintaining compliance with all applicable emission limits of Conditions AQ-A1 and AQ-A3. The ACP shall list operating parameters such as power output (MW) and abatement solut concentration levels which shall be met in order to meet all applicable emission limits listed above. The ACP shall be submitted to the APCO for approval. The APCO shall approve, disapprove or modify the plan within 30 days of receipt of the ACP. An APCO approved ACP shall consist of all parametric operating guidelines which shall be used to determine compliance with Conditions AQ-A1 and AQ-A3. The ACP shall list the specific operating conditions the ACP will supersede.	The project owner shall submit any ACP to the CPM fo review at the time it is submitted to the District. The project owner shall submit the District's approval, disapproval or plan modification to the CPM in the quarterly report.	Ongoing	A& B. No ACP is currently in place as allowed under this condition.
AQ	B8	Operations/ Ongoing	All equipment, facilities, and systems installed or used to achieve compliance with the terms and conditions of this license shall at all times be maintained in good working order. The equipment shall be operated in a manner necessary to meet all emission limits of the permit. [Ref. Rule 240(d), PSD SFB 81-03 Cor III]	The project owner shall make the site and records available for inspection by representatives of the District, ARB, U.S. EPA, and Energy Commission upon request.	Ongoing	GPC verifies compliance by adhering to all testing, monitoring, and reporting requirements.
AQ	B9	Operations/ Ongoing	The cooling tower shall be maintained in good operating condition. The project owner shall conduct an integrity inspection of the cooling tower during each scheduled plant overhaul and carry out any repairs necessary to correct all deficiencies encountered. [ref. Rule 240(d)]	The project owner shall make the site and records available for inspection by representatives of the District, ARB, U.S. EPA, and Energy Commission upon request.	Ongoing	GPC is in compliance. Routine plant inspections by operators include the cooling tower to identify areas i need of repair. Plant maintenance makes repairs during plant overhauls. Records are available on request.
AQ	B10	Operations/ Ongoing	The project owner shall operate and maintain the following air pollution control equipment: a. The non-condensable gas stream exiting from the surface condenser shall be ducted to an operating Stretford process unit. b. Condensate exiting from the surface condenser shall be treated as necessary to reduce the levels of dissolved hydrogen sulfide. The project owner shall use a secondary abatement system authorized by the NSCAPCD to accomplish this reduction. c. The project owner shall have installed drift controls on the power plant cooling tower to limit drift losses to 0.002 percent or better of the circulating water mass, thus minimizing emissions of particulate matter. [ref. PSD SFB 81-03 Cond. IX.B.]	The project owner shall make the site and records available for inspection by representatives of the District, ARB, U.S. EPA, and Energy Commission upon request.	Ongoing	GPC is in compliance with items A~C. Records are available upon request.

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AQ	B11	Operations/ Ongoing	The project owner shall, in any 12-month period, limit unscheduled outages for the project to no more than a total of 12. The following shall not be used in computing the total outages. a. Scheduled outages (defined as outages with 24-hour advance notice between the steam supplier and project owner, except in the case of project outages resulting from an abundance of hydropower in which case a scheduled outage shall be defined as one-hour notice). b. Steam supplier induced outages (such as pressure surge, strainer plugging, etc.). c. Outages of less than 2 hours in duration. d. Outages which do not cause steam stacking. A violation of the above performance standards is considered a violation of this condition. The project owner shall have on file with the District an approved operating protocol describing the methods that will be used to meet the 12 outages in 12 consecutive months performance standard. The protocol must include a description of the operational procedures between the steam supplier and project owner, project owner's operational procedures, and equipment to meet the above standard. The terms and requirements of the protocol may be modified by the Air Pollution Control Officer for good cause upon written request from the project owner. The project owner shall allow the District and CPM to inspect all operating logs to verify the total outage hours. These requirements are in addition to the applicable requirements of rule 540. In the event the project owner is not able to meet the standards specified above, the following shall be required: The project owner shall prepare and submit a revised "plan" to the Air pollution Control Officer and CPM, within 30 days of the end of the month in which the outage limit was exceeded, to achieve the outage standards set forth in this permit condition. At a minimum, the measures to be considered in the "plan" shall include: improved coordination of the power plant and steam field operations, improved alarming and control systems, increased duration of manned operation of the power plant, improved preventative maintenance and design modifications, retrofit of a 100% of steam flow turbine bypass, and retrofit of a 50% of steam flow turbine bypass. In evaluating measures to be taken to prevent future exceedances of the outage standard, outages of less than 2 hours shall be counted. This "plan" shall also be submitted to EPA for approval if the outage standard is exceeded. Within 30 days of receipt of the "plan" the Air Pollution Control Officer shall determine whether the "plan" is satisfactory and, if so, shall approve the "plan". Upon approval, the revised "plan" shall supersede the old plan and become a part of the terms and conditions of this permit. [ref. PSD SFB 81-03 Cond. IX.C., PT0-82-45A Cond.18]	The project owner shall submit revised plans to the CPM for review. The project owner shall submit any plan approval, disapproval or plan modification to the CPM in the following quarterly report. The project owner shall make the site and records available for inspection by representatives of the District, ARB, U.S. EPA, and Energy Commission upon request.	Ongoing	All occurrences meeting the condition criteria are reported to the District in the Quarterly Compliance Reports. A protocol is in place to meet the requirements of this condition. Steam lines interconnecting the power plants allow steam to be shifted to other operating plants if an outage occurs. No outages have resulted in steam stacking since interconnection of the steam lines was completed. No stacking events occurred during this reporting period.
AQ	BE1	Operations/ Ongoing	S-1, emergency standby wet-down pump diesel drive engine, shall only be used because of a failure or loss of all or part of normal electrical power service, except for testing and maintenance as defined in CA HSC 93115.4 (30). [ref. PTO 17-10 Cond. B2]	The project owner shall maintain records according to Condition AQ-DE1. The project owner shall make the site and records available for inspection by representatives of the District, ARB, U.S. EPA, and Energy Commission upon request.	Ongoing	The generator is only used to provide emergency electrical power during failure or loss of all or part of normal electrical power service except for testing and maintenance
AQ	BE2	Operations/ Ongoing	S-1, emergency standby wet-down pump diesel drive engine, shall be equipped with a non-resettable hour counting meter to indicate the number of hours the engine is operated. [ref. PTO 17-10 Cond. C2]	The project owner shall make the site and records available for inspection by representatives of the District, ARB, U.S. EPA, and Energy Commission upon request.	Ongoing	The generator is equipped with a working nonresettable hour counting meter.
AQ	BE3	Operations/ Ongoing	S-1, emergency standby wet-down pump diesel drive engine, shall be operated exclusively on California Air Resources Board (CARB) Diesel Fuel. [ref. PTO 10 Cond. C3]	The project owner shall maintain records according to Condition AQ-DE1. The project owner shall make the site and records available for inspection by representatives of the District, ARB, U.S. EPA, and Energy Commission upon request.	Ongoing	The GPC purchasing department contracts with fuel vendors who only supply Ultra-low Sulfur Diesel
AQ	BE4	Operations/ Ongoing	S-1, emergency standby wet-down pump diesel drive engine, shall be operated according to manufacturer specifications [ref. PTO 17-10 Cond. C4]	The project owner shall make the site and records available for inspection by representatives of the District, ARB, U.S. EPA, and Energy Commission upon request.	Ongoing	Maintenance is a contracted service with the supplier of the generator performed at intervals per the manufacturer's recommendation
AQ	BE5	Operations/ Ongoing	Total operating hours used for testing and maintenance of S-1, emergency standby wet-down pump diesel drive engine, shall not exceed 50 hours in any consecutive 12-month period. The total hours of operation do not include use during emergencies. [ref. PTO 17-10 Cond. A1]	The project owner shall maintain records according to Condition AQ-DE1. The project owner shall make the site and records available for inspection by representatives of the District, ARB, U.S. EPA, and Energy Commission upon request.	Ongoing	GPC logs and tracks the recorded hours to ensure testing and maintenance diesel engine run time does not exceed 50 hours in any consecutive 12- month period.

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AQ	C1	Operations/ Ongoing	The project owner shall, on a monthly basis, conduct a source test of the cooling tower to determine the H2S emission rate to verify compliance with condition AQ-A1. A mass balance determination of total H2S to the cooling tower based on measured operating conditions may be used to document that the worst case possible H2S emissions are less than the emission limit of the plant or District Method 102 shall be utilized to determine the H2S emission rate. The project owner may propose an Alternative Compliance Plan (ACP) which allows for operating flexibility of the power plant, including periods when accessing the cool tower is not possible, while maintaining compliance with all applicable emission limits of Condition AQ-A1. The ACP shall list operating parameters such as power output (MW), target pH, abatement solution concentration levels, and burner/scrubber exit concentrations which shall be met in order to meet all applicable emission limits listed above. The ACP shall be submitted to the APCO for approval. The APCO shall approve, disapprove or modify the plan within 30 days of receipt of the ACP. An APCO-approved ACP shall consist of all parametric operating guidelines which shall be used to determine compliance with Condition AQ-A1. The ACP shall list the specific operating conditions the ACP will supersede. [ref. PTO 82-45A Cond. 22]	The project owner shall submit source test results according to Condition AQ-E1. The project owner shall submit any ACP to the CPM for review. The project owner shall submit the District's approval, disapproval, or plan modification to the CPM in the following quarterly report.	Ongoing	NSCAPCD Approved version of Method 102 (Modified Method 102) Source tests were performed each month, and reported to the District in the quarterly reports. All test results and determinations indicated compliance with this condition.
AQ	C10	Operations/ Ongoing	Continuous Compliance Monitoring (CCM) The project owner shall operate a continuous compliance monitor capable of measuring the concentrations of H2S in the exhaust stream from the Stretford absorber in order to verify compliance with Conditions AQ-A1 and AQ-A3. The monitoring system must alarm the operator when H2S in the treated gas is in excess of 10 ppmv. The project owner shall respond to the alarm with appropriate mitigation measures. Mitigation measures taken shall be logged in the power plant abatement log book. In the event H2S concentrations are in excess of 10 ppmv and the range of the CCM is exceeded, the project owner shall test for H2S using an approved alternative method (ex Draeger tester, wet chemical tests) once every hour during the excess. The monitor shall have a full range of at least 50 ppmv. The monitor shall meet the following operational specifications: an accuracy of plus or minus 10% of full scale, provide measurements at least every 3 minutes, provide a continuous strip chart record or a District-approved alternative, and provide monthly data capture of at least 90%. The District must be notified when the concentration of H2S exceeds the hourly average limit of 10 ppmv. A one-point calibration shall be performed at least once per week. A three-point calibration shall be performed at least once per quarter. The Air Pollution Control Officer may allow modifications to the above specifications under an ACP upon written request with justification by the project owner as long as emissions from the power plant do not exceed the "total" H2S emission limitations of Condition AQ-A1. Written notification from the Air Pollution Control Officer must be received by the project owner prior to any change in monitoring specifications. [ref. PTO 82-45B Cond. 19]	The project owner shall provide the District and CPM with a summary of the monitor's availability and any irregularities that occurred with the continuous monitor. The summary shall be provided to the CPM in the quarterly reports required by Condition AQ-E1.	Ongoing	The continuous compliance monitor meeting the requirements of this condition is in place and operational. Plant records indicate no deviations from this condition during the reporting period. Copies of quarterly reports are submitted to the CPM at the time of submittal to NSCAPCD.
AQ	C11	Operations/ Ongoing	Ambient Air Monitoring The project owner shall maintain and operate one H2S/meteorological monitoring station, PM10 high volume station at a location approved in advance by the Air Pollution Control Officer for the life of the facility. The project owner shall install and operate additional monitoring stations, such as a PM2.5 monitoring station, if required by the Air Pollution Control Officer, Energy Commission, California Air Resources Board, or U.S. EPA. Participation by the project owner in a joint air monitoring program, such as the Geysers Air Quality Monitoring Program (GAMP), shall be deemed to satisfy all ambient air quality monitoring requirements of this license provided the term of monitoring is equivalent. The Air Pollution Control Officer can alter, suspend, or cancel this requirement provided no ambient air quality standard applicable to this facility is threatened or that sufficient other monitoring is available by the District, Lake County AQM or other third party. [ref. PTO 82-45A Cond. 22, PSD SFB 81-03, 82-AFC-1 Cond. 13]	If the project owner does not participate in GAMP, the project owner shall submit to the NSCAPCD, ARB, and CPM, for their review and approval, a detailed ambient monitoring plan.	Ongoing	GPC participates in GAMP
AQ	C2	Operations/ Ongoing	The project owner shall conduct or cause to be conducted performance tests on the turbine exhaust system to determine the H2S emission rate to verify compliance with Condition AQ-A2. Performance tests shall be conducted in accordance with Northern Sonoma County APCD Method 102, unless otherwise specified by the U.S. EPA. The project owner shall furnish the Northern Sonoma County APCD, the ARB, and the U.S EPA, a written report of such tests. All performance tests shall be conducted at the maximum operating capacity of the plant. Performance tests shall be conducted at least on a yearly basis and at such times as shall be specified by the U.S. EPA. [ref. PSD SFB 81-03 Cond. 1X.E]	The project owner shall submit source test results according to Condition AQE1.	Ongoing	An annual report including all GPC plants with PSD permits is sent to the agencies listed in this condition. Reference letter GPC21-026 dated 2/18/2021.

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AQ	C3	Operations/ Ongoing	The project owner shall provide platforms, electrical power, and safe access to sampling ports to enable representatives of the District, ARB and EPA to collect samples from the main steam supply, treated and untreated condensate, circulating water upstream of the cooling tower, cooling tower stacks, untreated and treated non-condensable gas stream to and from the Stretford abatement facility, any off gas bypass vents to the atmosphere and any Stretford tanks or evaporative coolers. [ref. PTO 82-45B Cond.11, PSD SFB-81-03 Cond. 1X E.3]	The project owner shall make the site and records available for inspection by representatives of the District, ARB, U.S. EPA, and Energy Commission upon request.	Ongoing	Sample taps used by plant personnel for chemical sampling and analysis are also available for use by CARB and District personnel. Safety Orientations and Job Safety Analysis are available for District and ARB representatives and highly encouraged for sampling activities.
AQ	C4	Operations/ Ongoing	The project owner, as requested by the Air Pollution Control Officer or CPM, shall conduct a requestor-approved performance test for particulate matter (PM), H2S, other species (i.e. benzene, mercury, arsenic, TRS, mercaptans, radon, other nitrogen compounds (amines) and compounds listed under NESHAPS and/or AB2588 from the power plant evaporative cooling tower and/or the Stretford evaporative cooling tower. Upon written request, the project owner shall submit to the Requestor at least 45 days prior to testing a detailed performance test plan. The requestor shall approve, disapprove or modify the plan within 45 days of receipt of the plan. The project owner shall incorporate the requestor's comments or modifications to the plan which are required to assure compliance with the requestor's regulations. The Air Pollution Control Officer shall be notified 15 days prior to the test date in order to arrange for an observer to be present for the test. The test results shall be provided to the District and CPM within 45 days of the test date unless a different submittal schedule is approved in advance. [ref. PTO 79-25a Cond. 9 and 10]	The project owner shall conduct performance tests as requested by the Air Pollution Control Officer or CPM. The project owner shall submit results to the CPM within 45 days if the test was requested by the CPM or in the quarterly reports according to Condition AQ-E1 if the test was requested by the Air Pollution Control Officer.	Ongoing	No requests to perform testing were requested during the reporting period
AQ	C5	Operations/ Ongoing	Compliance with the particulate mass emission limitation shall be estimated using calculations based on the evaporative cooling tower manufacturers design drift eliminator drift rate, 0.001 percent for the main cooling tower and 0.005% for the Stretford cooling tower, multiplied by the circulating water rate or Stretford solution circulating rate, and total dissolved solids (TDS) and total suspended solids (TSS). A circulating water sample shall be collected and analyzed for TDS and TSS on a monthly basis. [ref. PTO 82-45A Cond. 21]	The project owner shall maintain records according to Conditions AQ-D6 and AQ-D7 and submit reports as indicated in Condition AQ-E2.	Ongoing	Calculations indicate that the plant was in compliance with this condition during the reporting period. Reports are submitted in accordance to AQ-E2
AQ	C6	Operations/ Ongoing	Main steam supply H2S concentrations shall be determined minimally on a weekly basis and any additional times as required by the operating protocol or AQCP. [ref. PTO 82-45A Cond. 19]	The project owner shall maintain records according to Conditions AQ-D6 and AQ-D7 and submit reports as indicated in Conditions AQ-E1 and AQ-E2.	Ongoing	A protocol on file with the District describes the method used to determine H2S concentration. A review of the records indicates that the requirements of this condition are being met.
AQ	C7	Operations/ Ongoing	The project owner shall perform an abatement solution concentration test of the cooling tower circulating water once per operating shift when abatement solution is necessary in order to achieve compliance with Condition AQ-A1. The testing equipment shall be kept calibrated per the manufacturer's specifications. [ref. PTO 82-45A Cond. 19]	The project owner shall maintain records according to Conditions AQ-D6 and AQ-D7 and submit reports as indicated in Conditions AQ-E1 and AQ-E2. The project owner shall make the site and records available for inspection by representatives of the District, ARB, U.S. EPA, and Energy Commission upon request.	Ongoing	Operators perform tests required by this condition as a part of their daily routine. Iron concentration tests are validated by the plant chemistry staff using the "Hach" Ferreover colorimetric method. A review of the operating logs during this reporting period indicates compliance with this condition when circulating water abatement was in service.
AQ	C8	Operations/ Ongoing	Instruments used for the measurement of H2S or total organic gases to satisfy District permit conditions or regulations shall receive District approval prior to use. Test plans shall be submitted for District approval of instruments used for the measurement of H2S or Total Organic Gases to satisfy District permit conditions or regulations. [ref. Rule 240(d)]	The project owner shall submit any District approvals to the CPM in the quarterly reports. The project owner shall make the site and records available for inspection by representatives of the District, ARB, U.S. EPA, and Energy Commission upon request.	Ongoing	The NSCAPCD has approved the following instruments that are used to measure H2S: ASI Model; 102, Jerome Instruments Model 631, "Dräger" brand sampling and analysis tubes. Organic gases are analyzed utilizing an "Aglient" Model 3000C G.C.
AQ	C9	Operations/ Ongoing	All sampling protocols, chemical feed charts, targets and operational guidelines for using said charts and targets, necessary to abate H2S emissions from the power plant to the emission limits specified in Conditions AQ-A1 and AQ-A2 must be developed using good engineering judgment and supporting data. The APCO or CPM may review such sampling protocols, chemical feed charts, targets and guidelines upon request. If the APCO or CPM determines that any of the protocols, feed charts, targets, or guidelines are not sufficient to maintain compliance with Conditions AQ-A1 and AQ-A2, the APCO or CPM shall require the project owner to develop revised protocols, feed charts, targets and guidelines. [ref. Rule 240(d)]	The project owner shall submit any revised protocol, feed charts, targets and guidelines or summary to the CPM in the annual reports required by Condition AQ-E2. The project owner shall make the site and records available for inspection by representatives of the District, ARB, U.S. EPA, and Energy Commission upon request. The CPM shall consult with the APCO and the project owner when developing revised protocols, feed charts, targets and guidelines.	Ongoing	Protocols related to this condition were submitted and approved by the District in the initial Title V application. Plant unit engineers specify targets and guidelines based on good engineering judgment and recent chemical analyses. A copy of the Annual Report required by AQ-E2 is provided to the CPM at the time of submittal to NSCAPCD, and is also provided as attachment AQ-E2. There were no changes to monitoring protocols, feed charts, or guidelines during the reporting period. Additional records are available upon request.
AQ	CE1	Operations/ Ongoing	Emergency Engine At any time as specified by the Air Pollution Control Officer or CPM, the operator of this source shall conduct a requestor-approved source test to determine NOx and particulate emissions from the diesel powered generator. The test results shall be provided to the District and CPM within 30 days of the test [ref. PTO 17-10 Cond. D1]	The project owner shall perform an approved source test upon request of the District or CPM. Test results shall be submitted to the District and CPM.	Ongoing	No request has been made to perform emissions testing of the emergency engine.

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AQ	D1	Operations/ Ongoing	All records and logs shall be retained for a period of at least 5 years from the date the record or log was made and shall be submitted to the NSCAPCD or CPM upon request.	The project owner shall make the site and records available for inspection by representatives of the District, ARB, U.S. EPA, and Energy Commission upon request.	Ongoing	Records and logs are retained for a minimum of five years and available upon request.
AQ	D2	Operations/ Ongoing	The project owner shall maintain a weekly abatement solution inventory log available for on-site inspection. [ref. Rule 240(d)]	The project owner shall make the site and records available for inspection by representatives of the District, ARB, U.S. EPA, and Energy Commission upon request.	Ongoing	Operators conduct on-site inspections. Weekly chemical inventory files are kept and available for inspection.
AQ	D3	Operations/ Ongoing	The project owner shall maintain a strip chart or other District-approved data recording device of H2S readings measured by the CCM. All measurements, records, and data shall be maintained by the project owner for at least five (5) years. The project owner shall report all exceedances of Condition AQ-A3 in the quarterly report as required in AQ-E1. The report shall include a description of all measures taken to bring the Stretford system back into compliance with Condition AQ-A3. The project owner shall include in the report a copy of the output from the H2S CCM or alternative District-approved data during the upset condition. [ref. Rule 240(d)]	The project owner shall comply with all recordkeeping and reporting provisions. The project owner shall make the site and records available for inspection by representatives of the District, ARB, U.S. EPA, and Energy Commission upon request.	Ongoing	The District has approved Digital strip chart recorders to archive data in electronic format for later retrieval and review of CCM measurements per AQ-A3 and reported in the quarterly reports. There were no reportable exceedances during this reporting period. Records are available upon request.
AQ	D4	Operations/ Ongoing	The project owner shall maintain copies of the source test results as required in Condition AQ-C1 for a minimum of 5 years. [ref. PTO 82-45A Cond. 22]	The project owner shall make the site and records available for inspection by representatives of the District, ARB, U.S. EPA, and Energy Commission upon request.	Ongoing	Records and logs are retained for a minimum of five years and submitted upon request.
AQ	D5	Operations/ Ongoing	Fugitive Leak Records A. Any non-condensable gas leak in excess of the limitations of Condition AQ-B6 which has been detected by the project owner and is awaiting repair shall be identified in a manner which is readily verifiable by a District or Energy Commission inspector. Any leak in the above listed pieces of equipment exceeding the limitations of Condition AQ-B6 and not identified by the project owner and which is found by the District shall constitute a violation of this license. The project owner shall maintain a current listing of such leaks awaiting repair and shall make this list available to the District and CPM upon request. B. Any valve, flange, drip leg threaded fitting or seal on a pipeline or condensate collection system with a leak in excess of the limitations of Condition AQ-B6 which has been detected by the project owner and is awaiting repair shall be identified in a manner which is readily verifiable by a District or Energy Commission inspector. Any leak in the above listed pieces of equipment exceeding the limitations of Condition AQ-B6 and not identified by the project owner and which is found by the District shall constitute a violation of this license. The project owner shall maintain a current listing of such leaks awaiting repair and shall make this list available to the District and CPM upon request. [ref. PTO 82-45A Cond. 20]	The project owner shall comply with all recordkeeping and reporting provisions. The project owner shall report all deviations to the CPM as required in Condition AQ-F4. The project owner shall make the site and records available for inspection by representatives of the District, ARB, U.S. EPA, and Energy Commission upon request.	Ongoing	A & B. The operator conducts daily rounds to inspect the plant which include identifying any leaks and entering the information into the plant log and submitting a work order requesting repair. A review of maintenance records indicate that the plant is in compliance. A review of daily compliance checklists indicated that the operators inspect the system for fugitive leaks. Records are available on request.
AQ	D6	Operations/ Ongoing	The project owner shall maintain records detailing: a. Any periods of significant abatement equipment malfunction, reasons for malfunctions, and corrective action. b. The dates and hours in which the emission rates were in excess of the emission limitations specified in permit Conditions AQ-A3 and AQ-A4. c. Fugitive steam and non-condensable gas emission source inspections, leak rates, repairs, and maintenance. d. Total dissolved solids and total suspended solids in the circulating water. [ref. Rule 240 (d)]	The project owner shall make the site and records available for inspection by representatives of the District, ARB, U.S. EPA, and Energy Commission upon request.	Ongoing	GPC is in compliance. Records satisfying A-D are available upon request.
AQ	D7	Operations/ Ongoing	The project owner shall maintain records detailing: a. Hours of operation b. Types, concentrations, and amounts of chemicals used for Stretford absorbing solution and used for condensate treatment, including target levels for abatement solution concentration in the circulating water. c. A summary of any irregularities that occurred with a continuous compliance monitor. d. The dates and hours in which the emission rates were in excess of the emission limitations specified in permit Conditions AQ-A1, and AQ-A2. e. Periods of scheduled and unscheduled outages and the cause of the outages. f. Time and date of all pump and flowmeter calibrations required by this permit. g. Time and date of all alarm system tests h. Leaking equipment awaiting repair; time and date of detection and final repair. i. Total H2S, PM-10 and PM 2.5 annual emissions to date. [ref. Rule 240(d)]	The project owner shall make the site and records available for inspection by representatives of the District, ARB, U.S. EPA, and Energy Commission upon request.	Ongoing	GPC is in compliance. Records satisfying A-I are available upon request.
AQ	DE1	Operations/ Ongoing	Emergency Engine In order to demonstrate compliance with the above permit conditions, records shall be maintained in a District-approved log, shall be kept on site, and made available for District inspection for a period of 5 years from the date on which a record is made. The records shall include the following information summarized on a monthly basis: a. Total engine operating hours b. Emergency use hours of operation c. Maintenance and testing hours of operation. d. Type and amount of fuel purchased. [ref. PTO 17-10 Cond. E1]	The project owner shall make the site and records available for inspection by representatives of the District, ARB, U.S. EPA, and Energy Commission upon request. The project owner shall report hours of operation, identifying the reason for operation, to the CPM in the quarterly reports required by Condition AQ-E1.	Ongoing	Reporting of engine hours will be provided annually a an attachment in the ACR per Eric VeerKamp, CPM request by email to Sharon Peterson on 2/24/2022. See attachment AQ-E2b.

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AQ	E1	Operations/ Ongoing	A quarterly report shall be submitted to the District which contains the following information: a. CCM availability for the given quarter. b. Any periods of significant abatement equipment malfunction, reasons for malfunctions, and corrective action taken. c. Time and date of any monitor indicating an hourly average exceedance of 10 ppmv of H2S. d. Source test results. e. Steam stacking events. The quarterly report shall be submitted to the District and CPM within 30 days of the end of each quarter. The reports are due by May 1, August 1, November 1 and February 1 for each corresponding quarter. [ref. Rule 240(d)]	The project owner shall submit the quarterly reports to the CPM. The project owner shall make the site and records available for inspection by representatives of the District, ARB, U.S. EPA, and Energy Commission upon request.	Ongoing	Copies of the Quarterly Reports were submitted to the CPM at the time of submittal to NSCAPCD. The quarterly reports were submitted on 4/30/20, 7/29/20, 10/28/20, and 1/26/21.
AQ	E2	Operations/ Ongoing	An annual report shall be submitted to the District and CPM which contains the following information: a. Average main steam H2S and ammonia concentrations. b. Average total dissolved and suspended solids and average flowrate of the cooling tower water. c. Annual ammonia emissions. d. Gross megawatt hours generated. e. Steaming rate, gross average (gross steam flow; lb/ gross MW). f. Update to any changes in operating protocols used to determine plant chemical feed charts and targets; calibration and maintenance programs. g. Total organic gasses emitted as methane. h. Hours of plant operation. i. Annual carbon dioxide equivalent (CO2e) emissions j. Annual H2S, PM10 and PM2.5 emissions. Additional requirement for reports submitted to the Energy Commission: k. Hours of operation for the emergency engine. The hours of operation shall be reported according to total use, emergency use, and maintenance and testing. The annual report shall be submitted to the District within 45 days of the end of each calendar year. [ref. Rule 240(d)]	The project owner shall submit the annual reports to the CPM within 45 days of the end of each calendar year or another timeframe approved by the CPM. The project owner shall make the site and records available for inspection by representatives of the District, ARB, U.S. EPA, and Energy Commission upon request.	Ongoing	GPC submitted the required 2020 annual Criteria Pollutants Inventory Report to the CPM at the time of submittal to the NSCAPCD., on 2/9/2021. See attachment AQ-E2a.
AQ	E3	Operations/ Ongoing	The project owner shall submit reports to the California Air Resources Board in accordance with the provisions of CCR Title 17, Division 3, Chapter 1, Subchapter 10, Article 2, Regulation for Mandatory Reporting of Greenhouse Gas Emissions. Steam Stacking The project owner shall, on a quarterly basis, provide a written report to the District and CPM with the outage events, cause of each outage and the balance of events for the year. The Air Pollution Control Officer may change the frequency of reporting. The project owner shall inform the District and CPM when total outages have reached 12 in any consecutive 12-month period. The District and CPM shall be notified within 5 days of the 12th outage.	The project owner shall provide a statement of compliance in the annual report regarding the submittal of greenhouse gas emissions reporting to the ARB. The greenhouse gas emissions report is not required to be submitted to the CPM in the periodic compliance reports. The project owner shall make the reports available to the CPM upon request. If steam stacking occurs, the project owner shall provide the CPM with the required report and notifications.	Ongoing	The required outage information is included in the quarterly compliance reports. No stacking events occurred during this reporting period. The greenhouse gas emissions report for 2020 was submitted to CARB via the Cal-eGRRT reporting tool.
AQ	F1	Operations/ Ongoing	Payment of Fees The operating permits shall remain valid as long as the annual renewal fees are paid in accordance with the District Rules and Regulations and permit conditions are met.	No verification needed.	Ongoing	GPC is in compliance, annual permitting fees have been paid.
AQ	F10	Operations/ Ongoing	Permit Posting Operations under the operating permits must be conducted in compliance with all data and specifications included in the application which attest to the operator's ability to comply with District Rules and Regulations. The permits must be posted in such a manner as to be clearly visible and accessible at a location near the source. In the event that the permits cannot be so placed, the permits shall be maintained readily available at all times on the operating premises. [ref. Rule 240]	The project owner shall make the site and records available for inspection by representatives of the District, ARB, and Energy Commission upon request.	Ongoing	GPC is in compliance. Permit is posted in the Operator control room and available electronically.
AQ	F11	Operations/ Ongoing	Compliance Certification Compliance reports and certifications shall be submitted annually by the project owner of the facility to the Northern Sonoma County Air Pollution Control Dist and CPM. Each compliance certification shall be accompanied by a written statement from the responsible official which certifies the truth, accuracy, and completeness of the report. [ref. Regulation 5 Rule 650] Permits shall not authorize the emissions of air contaminants in excess of those allowed by the Health and Safety Code of the State of California or the Rules and Regulations of the Northern Sonoma County Air Pollution Control District. Permits shall not be considered as permissions to violate existing laws, ordinances, regulations or statutes of other governmental agencies. [Rule 240(d)]	The project owner shall submit the annual compliance reports and certification to the CPM.	Ongoing	GPC is compliance, see attachment for AQ-F11: Title V Annual Compliance Certification.
AQ	F12	Operations/ Ongoing	Permit Modification The project owner shall comply with all applicable requirements in NSCAPCD Regulation 1 Chapter II- Permits and New Source Review. [ref. Regulation 1 Rule 200]	No verification needed.	Ongoing	There were no modifications during the reporting period.

Technical Area	No.	Facility Status	Condition of Certification	Compliance Verification	Status	2020 Annual Compliance Report
AQ	F2	Operations/ Ongoing	Right to Entry and Inspection The Air Pollution Control Officer, the Chairman of the California Air Resources Board, the Regional Administrator of U.S. EPA, the CPM, and/or their authoriz representatives, upon the presentation of credentials, shall be permitted: a. To enter the premises where the source is located or in which any records are required to be kept under the terms and conditions of the operating permits; and b. At reasonable times to have access to and copy any records required to be kept under the terms and conditions of the operating permits; and c. To inspect any equipment, operation, or method required in the operating permits; and d. To sample emissions from the source. [NSCAPCD Rule 240.e and Reg. 5.610(e)]	The project owner shall make the site and records available for inspection by representatives of the District, ARB, and Energy Commission upon request.	Ongoing	Agency representatives are admitted to the project upon presentation of credentials. After receiving a safety advisory no restrictions are placed on access to plant premises, sample locations and records.
AQ	F3	Operations/ Ongoing	Compliance with Permit Conditions The project owner shall submit a complete application for renewal of the Title V operating permit in accordance with the District deadlines. [ref. Reg 5.660] The project owner shall comply with all conditions of the Title V operating permit. Any non-compliance with the terms and conditions of the Title V operating permit will constitute a violation of the law and may be grounds for enforcement action, including monetary civil penalties, permit termination, revocation and reissuance, or modification; or denial of a permit renewal application. [ref. Reg 5.610(f)(3)] In the event any enforcement action is brought as a result of a violation of any term or condition of the Title V operating permit, the fact that it would have been necessary for the project owner to halt or reduce the permitted activity in order to maintain compliance with such term or condition shall not be a defense to such enforcement action. [ref. Reg 5. 610(f)(4)] The filing of a request by the facility for a permit modification, revocation and reissuance, or termination, or of a notification of planned changes or anticipated non-compliance does not stay the applicability of any permit condition. [ref. Reg 5. 610(f)(5)] The Title V operating permit does not convey any property rights of any sort, nor any exclusive privilege. [ref. Reg 5. 610(f)(2)] The project owner shall supply in writing within 30 days any information that the District requests to determine whether cause exists, per Regulation 5.570, fo modifying, revoking and reissuing, or terminating the permit or to determine compliance with the permit. [ref. Reg 5. 610(f)(4)]	The project owner shall make the site and records available for inspection by representatives of the District, ARB, and Energy Commission upon request.	Ongoing	Application was submitted 6 months prior to expiration; ref. GPC-21-020 dated February 4, 2021. The current permit renewal was issued on August 8, 2021.
AQ	F4	Operations/ Ongoing	Reporting All deviations from permit requirements, including those attributable to upset conditions (as defined in the permit) must be reported to the District and CPM at least once every six months. For emissions of a hazardous air pollutant (HAP) or a toxic air pollutant (as identified in an applicable regulation) that continue fo more than an hour in excess of the permit requirements, the report must be made within 24 hours of the occurrence. For emissions of any regulated air pollutant, excluding those HAP emission requirements listed above, that continue for more than two hours in excess of permit requirements, the report must be made within 48 hours. All reports of deviation from permit requirements shall include the probable cause of the deviation and any preventative or corrective action taken. A progress report shall be made on a compliance schedule at least semi-annually and shall include the date when compliance will be achieved, an explanation of why compliance was not, or will not be, achieved by the scheduled date, and a log of any preventative or corrective action taken. The reports shall be certified by the responsible official as true, accurate and complete. [ref. Reg 5.625]	The project owner shall submit deviation reports to the CPM according to the outlined timeframes. The project owner makes the site and records available for inspection by representatives of the District, ARB, and Energy Commission upon request. an	Ongoing	There were no deviations to report during this period. No excess emissions occurred.
AQ	F5	Operations/ Ongoing	Severability Provisions of the operating permits are severable, and, if any provision of the operating permits is held invalid, the remainder of the operating permits shall not be affected. [ref. Reg 5.610]	No verification needed.	Ongoing	GPC is in compliance.
AQ	F6	Operations/ Ongoing	Transfer of Ownership In the event of any changes in control or ownership of facilities to be modified and/or operated, the operating permits are transferable and shall be binding on all subsequent owners and operators. The project owner shall notify the succeeding owner and operator of the existence of the operating permits and the conditions by letter, a copy of which shall be forwarded to the Air Pollution Control Officer. [NSCAPCD Rule 240]	The project owner shall provide a copy of the letter of notification to the CPM in the following quarterly report.	Ongoing	No ownership changes occurred during the reporting period.
AQ	F7	Operations/ Ongoing	Records Notwithstanding the specific wording in any requirement, all records for federally enforceable requirements shall be maintained for at least five years from the date of entry and shall include: date, place, and time of sampling, operating conditions at the time of sampling, date, place, and method of analysis and the results of the analysis. [ref. Reg 5.615]	The project owner shall make the site and records available for inspection by representatives of the District, ARB, and Energy Commission upon request.	Ongoing	Records and logs are retained for a minimum of five years and available upon request.
AQ	F8	Operations/ Ongoing	Emergency Provisions The project owner may seek relief from enforcement action in the event of a breakdown, as defined by Regulation 1 Rule 540 of the District's Rules and Regulations, by following the procedures contained in Regulation 1, rule 540 (b). the District will thereafter determine whether breakdown relief will be granted accordance with Regulation 1, Rule 540 (b)(3). The project owner may seek relief from enforcement action for a violation of any of the terms and conditions of this permit caused by conditions beyond the project owner's reasonable control by applying to the District's Hearing Board for a variance pursuant to Health and Safety Code Section 42350. The Hearing Board will determine after notice and hearing whether variance relief should be granted in accordance with the procedures and standards set forth in Health a Safety Code Section 42350 et seq. Any variance granted by the Hearing Board from any term or condition of this permit which lasts longer than 90 days will be subject to EPA approval. [ref. Reg 1 Rule 600] Notwithstanding the foregoing, the granting by the District of breakdown relief or the issuance by the Hearing Board of a variance will not provide relief from federal enforcement unless the Title V Operating Permit has been modified pursuant to Regulation 5 or other EPA-approved process. [ref. Reg 1 Rule 600]	The project owner shall notify the CPM of any breakdown, as defined by Regulation 1 Rule 540 of the District's Rules and Regulations, within the timeframes outlined in Regulation 1 Rule 540 of the District's Rules and Regulations. The project owner shall submit the required breakdown reports and report any variance to the CPM in the next quarterly report. The project owner shall make the site and records available for inspection by representatives of the District, ARB, and Energy Commission upon request.	Ongoing	GPC is in compliance with this condition.

Technical Area	No.	Facility Status	Condition of Certification	Compliance Verification	Status	2020 Annual Compliance Report
AQ	F9	Operations/ Ongoing	Malfunction The Regional Administrator shall be notified by telephone within 48 hours following any failure of air pollution control equipment, process equipment, or of a process to operate in a normal manner which results in an increase in emissions above allowable emissions limit stated in Condition AQ-A2. In addition, the Regional Administrator shall be notified in writing within fifteen (15) days of any such failure. This notification shall include a description of the malfunctioning equipment or abnormal operation, the date of the initial failure, the period of time over which emissions were increased due to the failure, the cause of the failure, the estimated resultant emissions in excess of those allowed under Condition AQ-A2, and the methods utilized to restore normal operations. Compliai with this malfunction notification provision shall not excuse or otherwise constitute a defense to any violation of this permit or of any law or regulations which such malfunction may cause. [ref. PSD SFB 81-03 Cond. IV.]	The project owner shall submit malfunction reports to the CPM in the quarterly reports. The project owner makes the site and records available for inspection by representatives of the District, ARB, and Energy Commission upon request.	Ongoing	NSCAPCD is notified for any such failures.
AQ	G1	Operations/ Ongoing	The project owner shall comply with the following District regulations: a. Regulation 1 Rule 400-General Limitations b. Regulation 1 Rule 410-Visible Emissions c. Regulation 1 Rule 430-Fugitive Dust Emissions d. Regulation 1 Rule 492 (40 CFR part 6 Subpart M)-Asbestos e. Regulation 1 Rule 540- Equipment Breakdown f. Regulation 2- Open Burning g. 40 CFR Part 82- Chlorinated Fluorocarbons If in the event this stationary source as defined in 40 CFR Part 68.3, becomes subject to Part 68, this stationary source shall submit a risk management plan (RMP) by the date specified in Part 68.10. As specified in Parts 68, 70, and 71, this stationary source shall certify compliance with the requirements of Part 68 as part of the annual compliance certification required by 40 CFR Part 70 or 71. If in the event this stationary source as defined in 40 CFR Part 63, becomes subject to Part 63, this stationary source shall notify the District and CPM within 90 days of becoming subject to the regulation. The stationary source shall identify all applicable requirements of Part 63 and submit a plan for complying with all applicable requirements.	The project owner shall make the site and records available for inspection by representatives of the District, ARB, U.S. EPA and Energy Commission upon request. The project owner shall submit required reports to the CPM (see AQ-SC2).	Ongoing	1-3 Reviewed Quarterly compliance reports and District Inspections. 4. Reviewed Asbestos Notification letters. Notifications were submitted as required during the reporting period. GPC20-058, dated 12/15/2020. 5. Reviewed Quarterly Site Compliance Records “Incidents Requiring Corrective Action”. 6. No open burning is performed at this location. 7. The Plant is exempt from the Risk Management Plan because quantities of flammable hydrocarbons are less than 67,000 lbs. Ref.: EPA notice dated March 13, 2000. 8. All work performed on appliances containing chlorinated fluorocarbons is performed by HVAC Technicians certified through EPA approved training programs in accordance with the Clean Air Act Section 608 and 40 CFR part 82, Subpart F. 9. Maintenance is a contracted service with the supplier of the generator performed at intervals per the manufacturer’s recommendation.
AQ	SC1	Operations/ Ongoing	The project owner shall provide the compliance project manager (CPM) copies of any Northern Sonoma County Air Pollution Control District (NSCAPCD or District) issued project air permit for the facility. The project owner shall submit any request or application for a new project air permit or project air permit modification to the CPM.	The project owner shall submit any request or application for a new project air permit or project air permit modification to the CPM at the time of its submittal to the permitting agency. The project owner shall provide the CPM a copy of all issued air permits, including all modified air permits, to the CPM within 30 days of finalization.	Ongoing	GPC is in compliance. Records are available upon request.
AQ	SC2	Operations/ Ongoing	The project owner shall provide the CPM with copies or summaries of the quarterly and annual reports submitted to the District, U.S. EPA, or ARB. The project owner shall submit to the CPM in the required quarterly reports a summary of any notices of violation and reports, and complaints relating to the project.	The project owner shall provide the reports to the CPM within the timeframes required in the conditions of certification.	Ongoing	GPC is in compliance. Copies of the quarterly and annual reports submitted to NSCAPCD, EPA, and ARB are provided to the CEC. A copy of the Annual Report required by AQ-E2 is provided to the CPM at the time of submittal to NSCAPCD, and is also provided as attachment AQ-E2.
AQ	SC3	Operations/ Ongoing	The project owner shall provide the CPM with an Annual Compliance Report demonstrating compliance with all the conditions of certification as required in the General Provisions of the Compliance Plan for the facility.	The project owner shall provide the Annual Compliance Report to the CPM within 45 calendar days after the end of the reporting period or a later date as approved by the CPM.	Ongoing	GPC is in compliance with all the conditions of certification as required in the General Provisions of the Compliance Plan. The ACR due date agreed upon with the CPM is December 31st for the 2020 report and June 30th annually thereafter.
AQ	SC4	Operations/ Ongoing	The project owner shall maintain a current equipment list for the facility.	The project owner shall provide the CPM with the equipment list upon request.	Ongoing	GPC is in compliance. Records are available upon request.

Technical Area	No.	Facility Status	Condition of Certification	Compliance Verification	Status	2020 Annual Compliance Report
Biological Resources	5-1	Operations/ Ongoing	PGandE shall reduce the potential for erosion as stated in AFC by: 1. Terracing cut and fill slopes, 2. Lining ditches with gunite, 3. Constructing and maintaining sediment ponds as designated in the AFC, 4. Constructing a berm as described in the AFC, 5. Applying cereal grain straw or rice straw as designated in the AFC, 6. Revegetating all exposed slopes as described in Section 5.4 of the AFC and in the Unit 20 biological Resource Mitigation and Monitoring Plan, 7. Revegetating approximately 1.7 miles of existing unpaved roads as described in the Monitoring and Mitigation Plan, 8. Protecting the Little Geysers Natural Area as defined in the AFC Appendix J, and 9. Implementing an erosion control program to reduce erosion at the Little Geysers (described in the PGandE and Union Oil proposal to CEC submitted September 1982).	PGandE shall submit an annual compliance statement to CEC to notify them of the status of each of the above items. CEC may, at its discretion, choose to inspect the power plant site for compliance and effectiveness.	Ongoing	GPC is in compliance. 1,2, 4-7: These items were completed during the initial construction of the plant. 3. See attached Biological Resources 5-1a: April 2021 Guzzler and Sediment Pond inspection pictures. 8 & 9. See attachment Biological Resources 5-1b: Geysers Panicum Monitoring Report.
Biological Resources	5-3	Operations/ Ongoing	PGandE shall take steps to protect the Little Geysers Natural Area from future disturbance in order to: (1) protect aquatic resources, and (2) protect the state endangered Geysers panicum (Dicanthelium acuminatum var. acuminatum). This shall be accomplished by: a.Securing a written agreement from Union Geothermal to avoid all surface disturbance within the Little Geysers Natural Area for the life of Unit 20 (letter from Union Oil to PGandE, August 1982). b.Monitoring the Dicanthelium population at Little Geysers as described in PGandE's proposal to the CEC dated September 1982. c.If the plant population is shown to be declining significantly, PGandE will: 1.Conduct an evaluation of the habitat and habitat requirements of the plant to determine what habitat parameters are necessary for its survival, and 2.Attempt to determine reasons for the population decline. If the CDFG determines that the significant decline is likely to be related to Unit 20, then PGandE shall work with CDFG and the CEC to develop and implement appropriate and technically feasible mitigation measures. CDFG, in consultation with PGandE and the CEC, shall determine whether or not a significant decline has occurred. d.Attempting to propagate Dicanthelium acuminatum var. acuminatum in a controlled environment (PGandE proposal for erosion control at the Little Geysers submitted to CEC, August 1982). e.Reporting annually the population status of Dicanthelium acuminatum var. acuminatum to CEC and DFG, using the DFG field survey form or other equivalent written form (PGandE Proposal to Monitor Hot Springs Panic Grass, dated September 1982). f.Obtaining a Memorandum of Understanding from the Department of Fish and Game prior to any work on this state endangered species.	PGandE shall provide CEC with the following written materials: a.A copy of the written agreement with Union to prevent surface disturbance at the Little Geysers Natural Area. (PGandE has already complied with this aspect of verification.) b.A detailed study plan of the monitoring program to be carried out at the Little Geysers Natural Area within 60 days or certification. c.A copy of the Memorandum of Understanding issued by the Department of Fish and Game within 90 days of certification. d.Reports on the status of monitoring including results of population monitoring, propagation efforts, and any mitigation attempts. (PGandE Proposal to Monitor Hot Springs Panic Grass submitted to CEC in September 1982.)	Ongoing	GPC is in compliance, see attached Geysers Panicum Monitoring Report under Biological Resources 5-1b.
Biological Resources	5-5	Operations/ Ongoing	PG&E shall maintain a photo record of the vegetation surrounding the Unit 20 power plant by using false color infrared aerial photography. PG&E shall photograph annually for the first three years of operation and every five years thereafter or until PG&E can demonstrate that the aerial photography shows that Unit 20 is not having a visible effect on the surrounding vegetation. If photography is discontinued because PG&E has demonstrated that no significant impacts are occurring and if, after termination of the aerial photography, significant changes are noted in the vegetation by PG&E or the CPM, a new set of aerial photographs shall be taken the following fall. They shall be used to assess changes as compared to the last set of aerial photographs and the first three years' aerial photography. If upon evaluation of the most recent aerial photography significant impacts are noted, PG&E may be required to continue the photography on a basis prescribed by the CPM. If no significant impacts are noted, the photography may be discontinued upon receiving CPM approval. PG&E and the CPM accept that preoperational data from the stress monitoring study for Units 13, 17, and 18 can also be used as baseline data for Unit 20.	PG&E shall provide the CPM with copies of aerial photographs whenever they are taken as a result of this condition.	Ongoing	GPC is in compliance. The most recent photographs from PG&E that GPC is aware of were taken on December 14, 1998. On April 1 2023, conversation with Jim Brownell of CEC staff provided concurrence that the Unit 20 aerial photography requirement is on hold unless problems were identified by the CEC.
Biological Resources	5-6	Operations/ Ongoing	PGandE shall mitigate wildlife habitat loss by the following enhancement measures as specified in the Monitoring and Mitigation Plan (AFC, Appendix J. pp. 2-29): a.Prescribed burns (to be initiated the first fall season following power plant certification) or participation in the California Department of Forestry Chaparral Management Plan, b.Development of three springs, c.Development of a wildlife guzzler with annual maintenance and inspection during dry periods to ensure a year-round water supply, d.Revegetation with wildlife food and cover plants, and e.Construction of two raptor perch sites.	PGandE shall submit an annual compliance statement to the CEC to notify them of the completion of the above tasks each year until the work is completed. CEC may, at its option, inspect for mitigation implementation.	Ongoing	a., b., d., e. : Completed conditions. c. Biological Resources 5-1a: April 2021 Guzzler and Sediment Pond inspection pictures.
Biological Resources	5-10	Operations/Ongoing	A PGandE biologist will be assigned to monitor construction activities as needed. The PGandE biologist will advise the supervising construction engineer as required of details concerning required mitigation prior to need for its implementation and shall advise the supervising construction engineer as necessary to ensure proper implementation of all mitigation measures. The supervising construction engineer will act on the advice of the assigned PGandE biologist to correct construction practices which are not in conformance with the compensation/mitigation plan or the terms and conditions of AFC approval to protect biological resources, including temporarily halting construction activities in sensitive areas until corrective action can be taken. If any specific mitigation measure or monitoring program is not implemented, is done incorrectly, or is determined to be substantially ineffective, PGandE, in consultation with CEC and CDFG, take action to correct the problem.	PGandE shall inform the CEC and CDFG as soon as possible of difficulties pertaining to this requirement, and PGandE shall submit within 30 days a written report describing the problem and corrective actions taken. PGandE shall submit an annual statement of progress to the CEC and CDFG indicating the various phases of the compensation/mitigation program that have been completed and the progress of ongoing measures. Reporting will be continued until all measures have been completed.	Ongoing	There were no construction activities at Unit 20 during the reporting period that required monitoring by a biologist.

Technical Area	No.	Facility Status	Condition of Certification	Compliance Verification	Status	2020 Annual Compliance Report
COM	1	Operations/ Ongoing	Unrestricted Access The project owner shall ensure that the CPM, responsible staff, and delegate agencies are granted unrestricted access to the facility site, related facilities, project-related staff, and the records maintained on-site for the purpose of conducting facility audits, surveys, inspections, or general or closure-related site visits. Although the CPM will normally schedule site visits on dates and times agreeable to the project owner, the CPM reserves the right to make unannounced visits at any time, whether such visits are by the CPM in person or through representatives from staff, delegated agencies, or consultants.	N/A	Ongoing	GPC is in compliance.
COM	2	Operations/ Ongoing	Compliance Record The project owner shall maintain electronic copies of all project files and submittals on-site, or at an alternative site approved by the CPM for the operational life and closure of the project. The files shall also contain at least: 1.the facility's Application for Certification, if available; 2.all amendment petitions, staff approvals and CEC orders; 3.all site-related environmental impact and survey documentation; 4.all appraisals, assessments, and studies for the project; 5.all finalized original and amended design plans and "as-built" drawings for the entire project; 6.all citations, warnings, violations, or corrective actions applicable to the project, and 7.the most current versions of any plans, manuals, and training documentation required by the conditions of certification or applicable LORS. Staff and delegate agencies shall, upon request to the project owner, be given unrestricted access to the files maintained pursuant to this condition.	N/A	Ongoing	GPC is in compliance.
COM	3	Operations/ Ongoing	Compliance Verification Submittals A cover letter or email from the project owner or an authorized agent is required for all compliance submittals and correspondence pertaining to compliance matters. The cover letter or email's subject line shall identify the project by the docket number for the compliance phase, cite the appropriate condition of certification number(s), and give a brief description of the subject of the submittal. When submitting supplementary or corrected information, the project owner shall reference the date of the previous submittal and the condition(s) of certification applicable. All reports and plans required by the project's conditions of certification shall be submitted in a searchable electronic format (.pdf, MS Word or Excel, etc.) and include standard formatting elements such as a table of contents identifying by title and page number each section, table, graphic, exhibit, or addendum. All report and/or plan graphics and maps shall be adequately scaled and shall include a key with descriptive labels, directional headings, a distance scale, and the most recent revision date. The project owner is responsible for the content and delivery of all verification submittals to the CPM and notification that the actions required by the verification were satisfied by the project owner or an agent of the project owner. All submittals shall be accompanied by an electronic copy on an electronic storage medium, or by e-mail, as agreed upon by the CPM. If hard copy submittals are required, they should be addressed as follows: Compliance Project Manager Geysers Energy Project (Docket Number) California Energy Commission 1516 Ninth Street (MS-2000)	N/A	Ongoing	GPC is in compliance.
COM	4	Pre-con	Monthly Compliance Report During the construction of approved project modifications requiring construction of 6 months or more, the project owner or authorized agent shall submit an electronic searchable version of the MCR to the CPM within ten (10) business days after the end of each reporting month. No MCR shall be required for maintenance and repair activities, regardless of duration. MCRs shall be submitted each month until construction is complete, and the final certificate of occupancy is issued by the DCBO. MCRs shall be clearly identified for the month being reported. The MCR shall contain, at a minimum: 1.A summary of the current project construction status, a revised/updated schedule if there are significant delays, and an explanation of any significant changes to the schedule; 2.Construction submittals pending approval, including those under review, and comments issued, and those approved since last MCR; 3.A projection of project compliance activities (compliance submittals, etc.) scheduled during the next (2) two months; the project owner shall notify the CPM as soon as any changes are made to the project construction schedule that would affect compliance with conditions of certification; 4.A listing of incidents (safety, etc.), complaints, inspections (status and those requested),notices of violation, official warnings, trainings administered, and citations received during the month; a list of any incidents that occurred during the month, a description of the actions, taken to date to resolve the issues; and the status of any unresolved actions noted in the previous MCRs; 5.Documents required by specific conditions (if any) to be submitted along with each MCR. Each of these items shall be identified in the transmittal letter, as well as the conditions they satisfy, and submitted as attachments to the MCR; 6.A list of conditions (if any) that have been satisfied during the reporting period, and a description or reference to the actions that satisfied the condition; and 7.A listing of the month's additions to the Compliance Record.	N/A	Ongoing	GPC is in compliance. Monthly compliance reports are sent to the CEC.

Technical Area	No.	Facility Status	Condition of Certification	Compliance Verification	Status	2020 Annual Compliance Report
COM	5	Operations/ Ongoing	Periodic and Annual Compliance Reports The project owner shall continue to submit searchable electronic ACRs to the CPM, as well as other PCRs required by the various technical disciplines. ACRs shall be completed for each year of commercial operation and are due each year on a date agreed to by the CPM. Other PCRs (e.g. quarterly reports), may be specified by the CPM. The searchable electronic copies may be filed on an electronic storage medium or by e-mail, subject to CPM approval. Each ACR must include the AFC number, identify the reporting period, and contain the following: 1.an updated list showing the status of all conditions of certification (fully satisfied conditions do not need to be included in the matrix after they have been reported as completed); 2.a summary of the current project operating status and an explanation of any significant changes to facility operating status during the year; 3.documents required by specific conditions to be submitted along with the ACR; each of these items shall be identified in the transmittal letter with the conditions it satisfies, and submitted as an attachment to the ACR; 4.a cumulative list of all known post-certification changes approved by the CEC or the CPM; 5.an explanation for any submittal deadlines that were missed, accompanied by an estimate of when the information will be provided; 6.a listing of filings submitted to, or permits issued by, other governmental agenciesduring the year; 7.a projection of project compliance activities scheduled during the next year; 8.a listing of the year's additions to the Compliance Record; 9.an evaluation of the Site Contingency Plan, including amendments and plan updates; and 10.a listing of complaints, incidents, notices of violation, official warnings, and citations received during the year, a description of how the issues were resolved, and the status of any unresolved complaints.	N/A	Ongoing	The Compliance Plan has been updated for all applicable verification items for the applicable time frame in 2020.
COM	6	Operations/ Ongoing	Confidential Information Any information that the project owner designates as confidential shall be submitted to the CEC's Executive Director with an application for confidentiality, pursuant to Title 20, California Code of Regulations, section 2505(a).	N/A	Ongoing	GPC is in compliance.
COM	7	Operations/ Ongoing	Annual Energy Facility Compliance Fee Pursuant to the provisions of section 25806 (b) of the Public Resources Code, the project owner shall continue paying an annual compliance fee which is adjusted annually, due by July 1 of each year in which the facility retains its certification.	N/A	Ongoing	GPC is in compliance.
COM	8	Operations/ Ongoing	Amendments and Staff Approved Project Modifications The project owner shall petition the CEC, pursuant to Title 20, California Code of Regulations, section 1769, to modify the design, operation, or performance requirements of the project or linear facilities, or to transfer ownership or operational control of the facility. Section 1769 details the required contents for a Petition to Amend a CEC Decision. A project owner is required to submit a five thousand ($5,000) dollar fee for every Petition to Amend a previously certified facility, pursuant to Public Resources Code section 25806(e). If the actual amendment processing costs exceed $5,000.00, the total Petition to Amend reimbursement fees owed by a project owner will not exceed seven hundred fifty thousand dollars ($750,000), adjusted annually.	N/A	Ongoing	GPC is in compliance.
COM	9	Operations/ Ongoing	Incident-Reporting Requirements Within 24 hours of its occurrence, the project owner shall report to the CPM any safety-related incident. Such reporting shall include any incident that has resulted in death to a person; an injury or illness to a person requiring overnight hospitalization; a report to Cal/OSHA, OSHA, or other regulatory agency; or damage to the property of the project owner or another person of more than $50,000. If not initially provided, a written report also will be submitted to the CPM within five business days of the incident. The report will include copies of any reports concerning the incident that have been submitted to other governmenta agencies.	N/A	Ongoing	GPC is in compliance.
COM	10	Operations/ Ongoing	Non-Operation and Restoration Plans If the facility ceases operation temporarily because it is physically unable to operate (excluding maintenance or repair) for longer than three (3) months (or other CPM-approved date), the project owner shall notify the CPM. Notice of planned non-operation, excluding maintenance or repair, shall be given at least two (2) weeks prior to the scheduled date. Notice of unplanned non-operation shall be provided no later than one (1) week after non-operation begins.	N/A	Ongoing	GPC is in compliance.
COM	11	Operations/ Closure	Facility Closure Planning The project owner shall coordinate with the CEC to plan and prepare for eventual permanent closure and license termination by filing a Facility Closure Plan. The Facility Closure Plan shall be filed 90 days before the commencement of closure activities or at such other time agreed to between the CPM and the project owner. The Facility Closure Plan shall include the information set forth in Title 20, California Code of Regulations, section 1769, but shall not be subject to the fee set forth in Public Resources Code section 25806(e).	N/A	Ongoing	GPC is in compliance.

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Cultural Resources	4-2	Operations/ Ongoing	PGandE shall continue to maintain the existing fencing around the archaeological site identified as CA-SON-793, located approximately one and one-half miles ENE of the proposed Unit 20 project site.	PGandE shall annually submit a statement verifying that the fencing around the site has remained intact.	Ongoing	GPC is in compliance. See attached April 2021 Guzzler and Sediment Pond inspection pictures under Biological Resources 5-1a. Fence is intact.
FIRE PROTECTION	1	Operations/ Ongoing	The project owner shall notify and submit design drawings to the compliance project manager (CPM) for any planned modifications that would materially change the design, operation, or performance of the fire protection or fire alarm systems.	At least 15 business days before the start of any construction that materially changes the design, operation or performance made to the fire protection or fire alarm systems, the project owner shall submit a complete set of design drawings to the CPM for review and approval, and to the DCBO for plan check against the applicable LORS and construction inspection.	Ongoing	There were no modifications made during this reporting period.
FIRE PROTECTION	2	Operations/ Ongoing	The project owner shall maintain and update, as appropriate, the fire protection Basis of Design documents and appendices to ensure that the fire protection and fire alarm systems are documented and accurately depicted on drawings for the project site.	The project owner shall provide the CPM with an updated Basis of Design document within 30 days of completing any changes to fire protection or fire alarm systems that result in changes to the Basis of Design.	Ongoing	Once Basis of Design is completed and approved by CEC, an inspection program will be implemented.
FIRE PROTECTION	3	Operations/ Ongoing	The project owner shall ensure that all required inspections, testing, and maintenance (ITM) are performed on the project's fire protection systems as specified and in the frequencies set forth in Title 19, California Code of Regulations, section 904(a) and on the project's fire alarm systems as specified in the applicable edition of the National Fire Protection Association (NFPA) 72 National Fire Alarm and Signaling Code.	The project owner shall provide to the CPM copies of the completed ITM reports for the project's fire protection systems and fire alarm systems within 15 days of receiving the ITM reports. The ITM reports shall be submitted quarterly for the first two years following approval of this condition, then all ITM reports shall be submitted annually thereafter.	Ongoing	ITMs were completed and reported per December 2020 Recommissioning report dated 1/8/21, TN# 240528. ITM activities were submitted to the CEC under confidential designation.
FIRE PROTECTION	4	Operations/ Ongoing	Whenever deficiencies or failures are identified in any of the ITM reports for the project's fire protection or fire alarm systems, the project owner shall provide the CPM with a summary of the following information from the ITM reports required by FIRE SAFETY-3: (a)A summary of all deficiencies or failures identified; (b)The corrective action the project owner has taken, or plans to take, to address each identified deficiency or failure; and (c)The completion date or an estimated completion date to implement the corrective action.	The project owner shall provide the CPM with the information from (a)-(c) within 15 days of receiving the ITM reports.	Ongoing	GPC is in compliance
FIRE PROTECTION	5	Operations/ Ongoing	In the case of a fire protection system impairment, as defined in the latest applicable edition of NFPA-25, Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems, California Edition, that would prevent the proper functioning of any portion of the fire protection or fire alarms systems during a fire event, the project owner shall inform the CPM of the impairment along with the following information: (a)The date discovered; (b)The location of the impairment; (c)A short description, including a photograph (if applicable), of the impairment and its cause (if known), and a description of the actions to be taken to protect life and safety until the impairment is corrected; (d)The corrective action outlining how the impairment was repaired, including any engineering drawings or inspections, not already provided to the CPM or the DCBO; (e)The date the impairment was repaired; and (f)Before and after photographs (if applicable) showing the completed impairment repair.	The project owner shall provide the CPM with information from (a)-(c) within two business days of the discovery of an impairment, or within a time as approved by the CPM. The project owner shall provide the CPM with information from (d)-(f) within 5 days of correction of the impairment.	Ongoing	No impairments were discovered during the reporting period.

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GEN	1	Operations/ Ongoing	Whenever material modifications to the facility are planned, the project owner shall design, construct, and inspect project modifications in accordance with the applicable version of the California Building Standards Code (CBSC), also known as Title 24, California Code of Regulations, which encompasses the Califor Building Code (CBC), California Administrative Code, California Electrical Code, California Mechanical Code, California Plumbing Code, California Energy Code, California Fire Code, California Code for Building Conservation, California Reference Standards Code, and all other applicable engineering laws, ordinances, regulations and standards (LORS) in effect at the time initial design plans are submitted to the chief building official (CBO) for review and approva (the CBSC in effect is the edition that has been adopted by the California Building Standards Commission and published at least 180 days previously). The project owner shall ensure that the provisions of the above applicable codes are enforced during the construction, addition, alteration, or demolition of the modifications. Where, in any specific case, different applicable sections of the code specify different materials, methods of construction or other requirements, the most restrictive shall govern. Where there is a conflict between a general requirement and a specific requirement, the specific requirement shall govern. The project owner shall ensure that all contracts with contractors, subcontractors, and suppliers clearly specify that all work performed, and materials supplied comply with the codes listed above.	Within 30 days following receipt of the certificate of occupancy (if one is required by the CBO) for any material project modification completed after the effective date of this condition, the project owner shall submit to the compliance project manager (CPM) a statement of verification, signed by the responsible design engineer, attesting that all designs, construction, installation, and inspection requirements of the applicable LORS and the CEC's decision have been met in the area of facility design. The project owner shall also provide the CPM a copy of the certificate of occupancy within 30 days of receipt from the CBO. Once the certificate of occupancy has been issued, the project owner shall inform the CPM at least 30 days prior to any construction, addition, alteration, or demolition to be performed on any portion(s) of the completed facility that requires CBO approval for compliance with the above codes. The CPM will then determine if the CBO needs to approve the work.	Ongoing	On December 17, 2018, the CEC approved the installation of a stationary permanent emergency diesel-driven engine for the cooling tower wet-down system to aid in fire prevention, per order #18-1210-2 Documents were submitted by the DCBO to the CEC.
Geotech Seismic Hazards	7-6	Operations/ Ongoing	PGandE shall ensure that geologic records of site inspections, especially detailed logs of excavated surfaces, will be made available during site preparation and submitted to the CEC upon request.	PGandE shall notify the CEC of the availability of geologic records of site inspections in the periodic progress reports.	Ongoing	GPC is in compliance.
Noise	16-1	Operations/ Ongoing	PGandE shall comply with Sonoma County Geothermal Use Permit Standard Conditions (1981), which are 65 dBA for daytime hours (7 a.m. to 10 p.m.) and 45 dBA for nighttime hours (10 p.m. to 7 a.m.) for residences, or with conditions given in the Sonoma County Zoning Ordinance if adopted. In the event the Sonoma County Planning Department of PGandE receives public complaints of the noise due to construction or operation, Sonoma County and PGandE agree to promptly conduct an investigation to determine the extent of the problem. PGandE shall take reasonable measures to resolve the complaints.	At least 90 days before construction begins, PGandE shall develop and submit to the Sonoma County Planning Department a procedure for handling public complaints. The Sonoma County Planning Department will notify PGandE and the CEC when the County deems the PGandE plan acceptable.	Ongoing	No complaints were received during the reporting period.
Noise	16-2	Operations/ Ongoing	Within 10 days of a request by the Sonoma County Planning Department, PGandE shall conduct noise surveys at the sensitive receptors which register complaints and at the facility property line nearest the complaining receptors. PGandE shall conduct surveys for the period of the construction working day and if possible, under circumstances similar to those when the noise was perceived. The survey should be reported in terns of the Lx and Leq levels (x = 10, 50, and 90). PGandE shall identify and implement feasible mitigation measures necessary to assure compliance with the county standards.	PGandE shall promptly forward to Sonoma County the survey results, the mitigation measures applied to solve the problem, and the results of these efforts. Sonoma County shall advise the CEC of any continuing noncompliance conditions.	Ongoing	No requests to perform a noise survey have been received.
Noise	16-3	Operations/ Ongoing	Within 90 days after the plant reaches its rated power generation capacity and construction is complete, PGandE shall conduct a noise survey at 500 feet from the generating station or at a point acceptable to PGandE, CEC, and Sonoma County Planning Department. The survey will cover a 24-hour period with results reported in terms of Lx (x = 10, 50, and 90), Leq, and Ldn levels. PGandE shall prepare a report of the survey that will be used to determine the plants conformance with county standards. In the event that county standards are being exceeded, the report shall also contain a mitigation plan and a schedule to correct the noncompliance. No additional noise surveys of off-site operational noise are required unless the public registers complaints or the noise from the project is suspected of increasing due to a change in the operation of the facility.	Within 30 days of the noise survey, PGandE shall submit its report to the Sonoma County Planning Department.	Ongoing	No complaints were received during the reporting period.

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Noise	16-4	Operations/ Ongoing	Within 180 days after the start of commercial operation, PGandE shall prepare a noise survey report for the noise-hazardous areas in the facility. The survey shall be conducted by a qualified person in accordance with the provisions of Title 8, CAC, Article 105. The survey results will be used to determine the magnitude of employee noise exposure. If employee complaints of excessive noise arise during the life of the project, CAL/DOSH, Department Of Industrial Relations, shall make a compliance determination.	PGandE shall notify Cal/DOSH and the CEC of the availability of the report.	Ongoing	No complaints were received during the reporting period.
Public Health	2-1	Operations/ Ongoing	PGandE shall conduct quarterly sampling and analysis of radon-222 concentrations either: (1) in noncondensable gases entering the power plant in incoming steam; (2) in vent off-gas; or (3) in the condensate, in accordance with the most recent California Department of Health Services, Radiologic Health Service (CDHS/RSS) requirements for monitoring and reporting on radon-222. The radon-222 steam monitoring program will be conducted for at least the first three years of commercial operation. If monitoring results indicate that the radon-222 release from Unit 20 is well within applicable standards, the monitoring program may be modified, reduced in scope, or eliminated, provided PGandE obtains the permission of CDHS/SHS. With concurrence of PGandE and CDHS/RHS, changes may be made to the program as new information and techniques become available.	PGandE will provide annual reports to CDHS/RHS (with an informational copy to the CEC) which will comply in format and content with the most recent CDHS/RHS reporting requirements.	Ongoing	See attachment Public Health 2-1 for table of quarterly analysis.
Public Health	2-2	Operations/ Ongoing	If the radon-222 concentration exceeds 3.0 pCi/liter in the cooling tower exhaust, PGandE must inform the CDHS/RHS with an advisory report.	PGandE shall provide a written report of sample results to CDHS/RHS within 30 days of confirmation of levels in excess of 3.0 pCi/liter radon-222 in the cooling tower exhaust.	Ongoing	See the attached table referenced in Public Health 2-1. There was no exceedance of 3.0 pCi/l during the reporting period.
Public Health	2-3	Operations/ Ongoing	If the radon-222 concentrations exceed 6.0 pCi/liter in the cooling tower exhaust, PGandE shall notify the CDHS/RHS and the CEC by telegram or telephone upon confirming the sample result. The sample result shall be confirmed by reanalyzing the sample using the normal analysis procedure. The reanalysis may be performed by PGandE, CDHS/RHS, or other qualified laboratories. Confirmation of sample results must be accomplished in the most expedient manner possible and should take less than five calendar days.	PGandE shall notify CDHS/RHS and the CEC within 24 hours of the confirming the sample. PGandE shall provide an advisory report to CDHS/RHS and the CEC within 30 days outlining corrective actions taken.	Ongoing	See the attached table referenced in Public Health 2-1. There was no exceedance of 6.0 pCi/l during the reporting period.
Public Health	2-4	Operations/ Ongoing	PGandE shall conduct ambient monitoring for arsenic, mercury, silica, vanadium, ammonia, benzene, boron, and radon-222 for a one year period before initial operation and one year after initial operation, at Anderson Springs in an equivalent manner to that in the Geysers Air Monitoring Program (GAMP). This program may be reduced ia scope upon agreement by CEC, NSCAPCO, and PGandE. PGandE can participate in the GAMP, if it is implemented, to meet this requirement. If the GAMP ends before completing the equivalent of the above, the NSCAPCO and CEC can require PGandE to continue monitoring to meet the requirement.	If PGandE participates in GAMP, PGandE shall notify the CEC. If PGandE does not participate in GAMP, PGandE shall submit to the NSCAPCO, CARB, and CEC, for their review, a detailed ambient monitoring plan at least 60 days before monitoring begins.	Ongoing	GPC participates in GAMP
Public Health	2-5	Complete - report only for 2020	PGandE shall design and perform a program of quarterly steam analysis for ammonia, arsenic, mercury, silica, boron, benzene, fluoride, and asbestos in steam entering Unit 20. The quarterly steam analysis program shall commence within 45 days after commercial operation of Unit 20 and shall run for 1 year. After one year, the NSCAPCO, in consultation with CEC, shall determine if annual testing is sufficient.	PGandE shall submit the program design to the CEC staff, NSCAPCO, and CARB for approval 60 days prior to commercial operation. PGandE shall submit steam reports and analysis to the CEC staff, NSCAPCO, and the CARB. Such reports shall be submitted within 60 days of the quarterly sampling.	Complete	Condition is complete and will no longer be provided to the CEC in the ACR.

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Public Health	2-8	Complete - report only for 2020	PGandE shall promptly fund reasonable studies or tests as required by the NSCAPCO to ascertain the impact of Unit 20 when operating, specifically at the residence located approximately 0.6 miles south and west of the plant site, in the event that the residents, in good faith, file complaints with the NSCAPCO or the CEC indicating the air quality is worsening or becoming a nuisance or unhealthful as result of Unit 20 operation. Reasonable mitigation steps shall be applied upon request of the NSCAPCO to attempt to remedy any unlawful impacts of the power plant upon the residence. Within 60 days after certification of Unit 20, PGandE shall post the notice shown below to residents of the Beigel Cabin. PGandE shall also ensure that the notice contains the most recent address and telephone number of the NSCAPCO. NOTICE TO OCCUPANTS OF THE BEIGEL CABIN Pacific Gas and Electric Company (PGandE) has received a permit to construct and operate Geysers 20, a geothermal power plant located approximately 0.6 miles northeast of this cabin. As a means of mitigating possible air pollutant impacts, should they occur, the California Energy Commission (CEC) staff and PGandE have agreed to the following condition: "PGandE shall promptly fund reasonable studies or tests as required by the Northern Sonoma County Air Pollution Control Officer (NSCAPCO) to ascertain the impact of Unit 20 when operating, specifically at the residence located approximately 0.6 miles south and west of the plant site, in the event that the resident, in good faith, files complaints with the NSCAPCO or the CEC indicating the air quality is worsening or becoming a nuisance or unhealthful as a result of Unit 20 operation. Reasonable mitigation steps shall be applied upon request of the NSCAPCO to attempt to remedy any unlawful impacts of the power plant upon the residence." Any questions or complaints that the air quality is worsening or becoming a nuisance or unhealthful should be directed to: Northern Sonoma County Air Pollution Control Officer 118 North Street Healdsburg, CA 95448 (707) 433-5911	PGandE shall indicate in a periodic compliance report the date the notice was posted at the Beigel Cabin. PGandE shall forward to the CEC copies of all correspondence with the NSCAPCO and cabin owner regarding complaints, studies or tests, and mitigation measures related to Unit 20.	Complete	Condition is complete and will no longer be provided to the CEC in the ACR.
Pwr Plant Efficiency and Reliability	17-2	Operations/ Ongoing	PGandE shall continuously obtain performance-related data over the life of the plant for the following operating parameters: a.Main condenser absolute pressure, b.Turbine inlet steam pressure, and c.Plant generation capacity as net and gross megawatts. PGandE shall start obtaining the above data on the first day of plant operation which attains at least 90 percent of the net rated electrical power output at the plant busbar for a minimum of 48 hours of continuous steady state operation. Steady state operation is defined as sustained operation of the plant, wherein the net electrical power output at the plant output busbar does not vary by more than plus or minus 5 percent over one hour time period. If the monitoring instrumentation systems are off line for more than 24 hours, PGandE shall manually collect sufficient data as defined above in order to provide the required performance-related data.	PGandE shall submit to the CEC, at least 30 days prior to scheduled operation, a letter describing the instrumentation, its accuracy, and the intended frequency of calibration.	Ongoing	GPC is in compliance. GPC collects data via the DCS, and eDNA. The data is reported to CA ISO
Pwr Plant Efficiency and Reliability	17-3	Operations/ Ongoing	PGandE shall retain the plant performance-related data for each five years of plant operation or as required by the FERC or the CPUC or until the CEC has given its approval to dispose of the data. Further, PGandE shall provide a representative of the CEC, upon reasonable notice, access to the performance-related data at the plant site.	PGandE shall inform the CEC of the location of the performance-related data in a periodic compliance report.	Ongoing	GPC retains plant performance-related data for 5 years and such data is available on request
Pwr Plant Efficiency and Reliability	17-5	Operations/ Ongoing	PGandE shall collect the routine performance-related data defined in requirement 17-2.	PGandE shall file the data with the CEC in a periodic compliance report.	Ongoing	Routine performance-related data is stored in the Site Compliance Record
Pwr Plant Efficiency and Reliability	17-6	Operations/ Ongoing	After each overhaul of the Geysers 20 plant (estimated to be after 24 months of operation) or major emergency overhaul or repairs, PGandE shall undertake a post overhaul power plant performance test . The power plant performance test results for the Geysers 20 power plant will include, but not be limited to information on the following parameters: a.Mass-flow rate of inlet steam, b.Steam temperatures and pressures, c.Power plant auxiliary usage in Megawatts, d.Power plant Output at the busbar in megawatts, e.Power plant auxiliary steam flow, f.Turbine steam inlet pressure, and g.Main condenser absolute pressure.	PGandE shall submit the results of this test to the CEC within 60 days of test completion.	Ongoing	Plant overhaul was not performed during the reporting period.

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Pwr Plant Efficiency and Reliability	17-7	Operations/ Ongoing	Information regarding the following parameters, at a minimum, will be available to the CEC staff for review at the power plant site upon request: a.Mass-flow rate of steam, b.Steam temperature and pressures, c.Power plant auxiliary usage in Megawatts, d.Power plant electrical generation output at the busbar, e.Power plant auxiliary steam flow, f.Turbine steam inlet pressure, and g.Main condenser absolute pressure.	PGandE shall provide CEC staff with access, upon reasonable notice, to this data at the plant site.	Ongoing	Routine performance-related data is stored in the Site Compliance Record
Pwr Plant Efficiency and Reliability	17-8	Operations/ Ongoing	If the routine data defined in requirement 17-2 indicates a significant degradation (defined as plant electrical output dropping 15 percent below the month to month levels indicated in the figure below) in performance prior to a regularly scheduled maintenance overhaul, PGandE shall develop and submit to the CEC a plan to restore performance to a level comparable to that indicated by the immediately preceding post-overhaul test results unless limited by economics or replacement parts availability.	Within 60 days of detecting a significant degradation of the performance, PGandE shall submit a plan for corrective action to the CEC. CEC shall respond within 15 days to PGandE's proposed plan. In the event that PGandE and the CEC cannot achieve an agreement on the plan to restore plant performance as defined in requirement 17-8, the matter may be referred to the CEC for resolution under the procedures contained in the Compliance Plan Dispute Resolution Procedures. If PGandE so requests, the CEC will solicit comments from the CPUC concerning the rate impacts of any such plan, and, in any event, shall forward its final determination on this matter to the CPUC.	Ongoing	GPC is in compliance, no significant degradation occurred during the reporting period. Records available on request.
Safety	12-14	Operations/ Ongoing	PGandE and the California Department of Forestry shall annually re-examine the fire protection plan.	PGandE shall note and summarize the joint re-examination of the fire protection plan in its periodic compliance report.	Ongoing	A meeting was held June, 2020 to discuss improvement plans
Safety	12-15	Operations/ Ongoing	On-site worker safety inspections shall be conducted by the CAL/DOSH. (California Division of Occupational Safety and Health) during construction and operation of the facility of when an employee complaint has been received.	CAL/DOSH shall notify the CEC in writing in the event of a violation that could involve DOSH action affecting the construction or operation schedule and shall notify CEC of the necessary corrective action. PGandE shall note any CAL/DOSH inspections and actions in its periodic compliance reports.	Ongoing	No inspections have been performed by Cal/OSHA during the reporting period.
Safety	12-8	Operations/ Ongoing	PGandE shall ensure that certified code papers for the facility and pressure vessels are available for review at the plant site.	Prior to commercial operation, PGandE shall notify CAL/DOSH and the CEC of the availability of the documents.	Ongoing	GPC is in compliance.
Soils	8-4	Operations/ Ongoing	PGandE or its contractor shall implement erosion and sediment control measures at the power plant site and the alternate fill disposal site equivalent to those described in the AFC.	Upon reasonable notice, CEC compliance and monitoring staff shall be allowed access to the power plant site and the alternate fill disposal site by PGandE or its contractor to verify that the mitigation measures are in place and effective.	Ongoing	No inspections were performed by CEC during the reporting period.

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Soils	8-5	Operations/ Ongoing	PGandE shall comply with NCRWQCB waste discharge specifications governing freeboard for sediment ponds.	PGandE shall submit to the CEC copies of correspondence between PGandE and the Regional Board or any permits which address the question of adequate sediment pond freeboard.	Ongoing	No correspondence with NCRWQCB relating to the sediment pond freeboard during the reporting period.
Soils	8-6	Operations/ Ongoing	PGandE shall continue to monitor streambed sediment composition for the power plant site and steam field as a participant in the KGRA ARM program. If the ARM program is not extended beyond its initial two year period, PGandE shall develop an appropriate site-specific monitoring plan.	PGandE shall either continue to submit ARM monitoring data to CEC or the results of an independent, site monitoring effort.	Ongoing	Compliance Verification for this measure continues, on a triannual basis, as a focused panicum (panicum acuminate var. thermal) monitoring program. Refer to attachment Biological Resources 5-1b: Geysers Panicum Monitoring Report.
Solid Waste Management	11-1	Operations/ Ongoing	PGandE shall ensure that any hazardous waste hauler employed by PGandE has a certificate of registration from the California Department of Health Services (CDOHS), Hazardous Materials Management Section.	PGandE shall keep a letter on file verifying that hazardous wastes haulers for the Geysers 20 project have valid CDOHS certificates or registration.	Ongoing	All waste haulers are in compliance and on file in the DTSC database.
Solid Waste Management	11-2	Operations/ Ongoing	The Stretford process wastes include a sulfur and a Stretford purge stream. PGandE shall ensure that the Sulfur is properly stored in accordance with CDOHS regulations, and removed periodically to be sold or to be disposed at a site approved for such wastes. Any sludge which accumulates in the cooling tower basins will be removed and hauled by a registered hazardous waste hauler to an approved disposal site.	PGandE shall submit final design plans and "as built" drawings to the Sonoma County CBO incorporating these storage design features. In addition, PGandE shall each month submit completed hazardous waste manifests to CDOHS in compliance with Section 66475 to Title 22, CAC.	Ongoing	GPC is in compliance.
Solid Waste Management	11-3	Operations/ Ongoing	PGandE shall ensure that hazardous wastes are taken to a facility permitted by CDOHS to accept such wastes.	PGandE shall notify the CEC, CDOHS, and Solid Waste Management Board of the selected disposal site. Any notice of change in disposal sites will be submitted as changes occur.	Ongoing	GPC is in compliance. No update to changes in approved disposal sites
Solid Waste Management	11-4	Operations/ Ongoing	If hazardous wastes, including Stretford sulfur effluent, are stored on site for more than 60 days, PGandE shall obtain a determination from the CDOHS that the requirements of a hazardous waste facility permit have been satisfied.	PGandE shall promptly notify the CEC if it files an in-lieu application with CDOHS for the operation of a hazardous waste facility.	Ongoing	GPC abides by DTSC Guidance for GPC's generator status.

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Solid Waste Management	11-6	Operations/ Ongoing	The sewage wastes include a liquid effluent and sludge. PGandE shall ensure that the liquid effluent is conveyed by pipe to the injection wells and not exposed prior to injection or disposed of by such alternative disposal methods as are consistent with all applicable laws. Any sludge which accumulates in the sewage system shall be hauled by a liquid waste hauler to an approved disposal site, or disposed of such alternative disposal methods as are consistent with all applicable laws.	PGandE shall submit final design plans and "as built" drawings to the Sonoma County CBO incorporating these design features.	Ongoing	GPC is in compliance. Sewage waste is reinjected in a closed system onsite.
Solid Waste Management	11-7	Operations/ Ongoing	PG&E shall comply with all applicable provisions of the Resource Conservation and Recovery Act (RCRA) and the California hazardous waste laws. Copies of all required documents under RCRA and the California Hazardous Waste Laws will be kept on file at the plant.	The Commission will contact PG&E, when necessary, to request copies of the documents or to provide notice that the documents will be reviewed at PG&E offices.	Ongoing	GPC is in compliance.
Solid Waste Management	11-8	Operations/ Ongoing	PGandE shall notify the CEC of any renown enforcement actions against PGandE, the waste hauler, or the disposal site operator.	Within 10 days of notification of an impending enforcement action, PGandE shall notify the CEC.	Ongoing	DTSC discovered minor violations of the Hazardous Waste Control Law upon inspection March 4-5, 2020 and April 10, 2020 at Chemical Waste Management, GPC's TSDF. Findings are available on Envirostor under site ID# CAT000646117
Transmission Line Safety and Nuisance	13-2	Operations/ Ongoing	PGandE shall construct, operate, and maintain the transmission lines in accordance with Title 14, California Administrative Code, Sections 1254 - 1256, and Public Resources Code, Sections 4292 - 4296.	Within 60 days after completion of construction, PGandE's registered engineer in responsible charge shall submit a statement to the appropriate PGandE Chief Engineer who shall transmit it to the California Department of Forestry (CDF) and the CEC indicating that the transmission line has been constructed in accordance with applicable requirements. PGandE shall also inspect the transmission line annually to ensure that the line maintains required clearances, especially during the fire season. In the event that noncompliance is determined by the CDF, the CDF shall require PGandE to take the measures necessary to correct the noncompliance.	Ongoing	GPC is in compliance with GPC's Transmission Line maintenance program. There aren't any transmission lines at Grant owned by GPC. Inspections are performed by PG&E.
Transmission Line Safety and Nuisance	13-4	Operations/ Ongoing	In the event of complaints regarding induced currents from vehicles, portable objects, large metallic roofs, fences, gutters, or other objects, PGandE shall investigate and take all reasonable measures at its own expense to correct the problem for valid complaints, provided that: (a) the object is located outside the right-of-way; or (b) the object is within the right-of-way and existed prior to right-of-way acquisition. For objects constructed, installed, or otherwise placed within the right-of-way after right-of-way acquisition, PGandE shall notify the owner of the object that it should be grounded. In this case, rounding is the responsibility of the property owner. PGandE shall advise the property owner of this responsibility in writing prior to signing the right-of-way agreement.	PGandE shall maintain a record of activities related to this paragraph. These records shall be made available to authorized CEC staff upon request.	Ongoing	No complaints received concerning induced currents from the GPC plants
Transmission Line Safety and Nuisance	13-6	Operations/ Ongoing	On-site worker safety inspections may be conducted by the California Division of Occupational Safety and Health (CAL/DOSH) during construction and operation of the transmission line or when an employee complaint has been received. PGandE shall notify the CEC in writing in the event of a violation if such violation may delay the transmission line construction schedule.	PGandE shall maintain records of CAL/DOSH inspections and shall make them available to authorized CEC staff upon request.	Ongoing	No Cal/OSHA complaints have been received
Transmission Line Safety and Nuisance	13-7	Operations/ Ongoing	PGandE shall make every reasonable effort to locate and correct, on a case-by-case basis, all causes of radio interference and television interference attributable to the transmission line facilities, including, if necessary, modifying receivers and furnishing and installing antennas. In addition, PGandE shall take reasonable care to prevent the conductors from being scratched or abraded.	PGandE shall maintain records of complaints and corrective action and shall make these records available to authorized CEC staff upon request.	Ongoing	No complaints received concerning induced currents from the GPC plants

Technical Area	No.	Facility Status	Condition of Certification	Compliance Verification	Status	2020 Annual Compliance Report
Transmission Line Safety and Nuisance	13-8	Operations/ Ongoing	Within seven days of a serious accident (as defined under State Labor Codes) or fatality, PGandE shall file a report by telephone with the CEC.	Within 30 days of an injury or fatality, PGandE shall prepare a report which includes: 1.the date the accident occurred; 2.the name and job title of the employee or the name of the public, 3.a description of the injury, 4.a description and cause of the accident, 5.a discussion of compliance with General Order 95 requirements and applicable DOSH regulations in the vicinity of the accident, and 6.a statement of corrective/preventative measures taken or to be taken. PGandE shall keep copies of all such applicable report in a separate file under Geysers Unit 20 and make such reports available to the CEC in PGandE's offices upon reasonable notice.	Ongoing	No injuries have been reported
Transmission Line Safety and Nuisance	13-9	Operations/ Ongoing	The CPUC and PGandE shall take all reasonable steps to ensure that the PUC's decision on the Application for Certification of Public Convenience and Necessity (CPCN) accurately reflects the conditions adopted by the CEC.	Within 30 days of PGandE's receipt of the CPUC's decision on the CPCN, PGandE shall provide copies of the following to the CEC: a.All revisions to the CPCN, and b.A copy of the CPUC decision with all attachments.	Ongoing	GPC is in compliance, no revisions to the CPCN have been made.
Water Quality/ Hydrology/ Water Resources	6-1	Operations/ Ongoing	If PGandE uses an H2S abatement system, PGandE shall ensure that any chemicals will be stored within the bermed area of the plant site.	The final design plans and "as-built" drawings submitted to the Sonoma County CBO shall reflect the storage facilities for any chemicals stored on site.	Ongoing	GPC is in compliance.
Water Quality/ Hydrology/ Water Resources	6-12	Operations/ Ongoing	PGandE shall provide, to all of its contractors working on Geysers Unit 20, a letter documenting the necessary procedures to be followed if any material is spilled into Anderson Creek or Gunning Creek. These procedures are to immediately: a.Notify the local police, b.Notify the Anderson Springs Community Service District, and c.Notify PGandE. The letter shall include phone numbers for the specific individuals to be contacted in each instance.	PGandE shall send the CEC a copy of the letters sent to all of its contractors working on geysers Unit 20.	Ongoing	GPC is in compliance.
Water Quality/ Hydrology/ Water Resources	6-14	Operations/ Ongoing	In the event that any vehicle used during the construction process or operating process of Unit No. 20 ejects or releases matter into the waters of Anderson or Gunning Creeks or impedes the natural flow of Anderson or Gunning Creeks, thereby causing adverse impacts to the ASCSD, PGandE will cooperate fully with the CVRWCB, CDF&G, State Health Department or any other appropriate agency investigating the incident, and will expeditiously comply with all applicable regulations of such appropriate agencies in reestablishing the condition of water quality in the Anderson Springs Drainage. PGandE will consult with the ASCSD in developing appropriate actions.	PGandE shall notify the CEC immediately following an accidental discharge into Anderson or Gunning Creeks and shall provide a description of the problem and necessary corrective actions.	Ongoing	GPC is in compliance.
Water Quality/ Hydrology/ Water Resources	6-17	Operations/ Ongoing	PGandE and its contractor(s) shall divert water from the Geysers Development Corporation (GDC) Pond whenever feasible. PGandE or its contractor(s) may divert additional water form Big Sulphur Creek only, consistent with riparian rights, for the period of construction of the Geysers 20 power plant. The flow rate shall not be greater than 0.07 ft3/sec (31.4 gpm), as measured by an accurate and reliable in-line water meter, which shall be installed prior to PGandE removing water from Big Sulphur Creek.	PGandE shall annually supply the CEC with a monthly tabulation of the amounts (in gallons) of water removed from Big Sulphur Creek for construction use at the Geysers Unit 20 power plant site. The project owner shall provide the Compliance Project Manager with copies of all local and state water quality permits related to the use and disposal of reclaimed municipal wastewater within thirty (30) days of receipt. In the annual compliance reports, the project owner shall provide the CPM with data on the annual quantity of water reinjected at the facility, and a copy of the report submitted to the California Department of Health Services on the additional uses of recycled water per Provision #2 of the December 5, 2003 California Department of Health Services approval letter.	Ongoing	GPC is in compliance. A copy of the reinjection water report is provided with this ACR.
Water Quality/ Hydrology/ Water Resources	6-2	Operations/ Ongoing	To prevent spills of Stretford process material from leaving the immediate vicinity, PGandE shall surround the H2S abatement process area with an impermeable barrier. Spilled process chemicals shall be drained to a sump where they will be pumped to a chemical storage tank for reuse or off-site disposal at an approved waste disposal site.	PGandE shall submit final design plans and "as-built" drawings to the Sonoma County CBO incorporating this design requirement.	Ongoing	GPC is in compliance.

Technical Area	No.	Facility Status	Condition of Certification	Compliance Verification	Status	2020 Annual Compliance Report
Water Quality/ Hydrology/ Water Resources	6-3	Operations/ Ongoing	Design Aspects to Assure Water Quality a.To prevent spills of steam condensate and other materials from leaving the site, PGandE shall construct an impermeable concrete or asphaltic concrete retention barrier around the plant. PGandE shall also pave the site with 2 inches of asphaltic concrete and attain a permeability of at least 1 x 10-6 cm/sec. As a result of this construction, the paved area of the plant site will serve as a spill retention basin. b.PGandE shall design the proposed retention basin referring to the Sonoma County Water Agency "Flood Control Design Criteria," revised April 1973, to determine the rain fall recurrence intervals. The basin will be capable of retaining the maximum condensate spill expected to occur before plant personnel can correct the cause of the spill. In addition, the design shall accommodate the runoff from a 100-year storm of 30-minute duration. c.PGandE shall equip storm water sumps with 100-gallon per minute pumps to return spilled material to the cooling tower basin for reinjection. Should a spill occur which exceeds the capacity of the pumps, PGandE plant personnel shall use portable pumps to remove excess materials. d.Alarm systems will notify plant operators when a spill has occurred and when the catch basin pumps have started. PGandE plant personnel shall respond to the alarms within 30 minutes and take measures necessary to correct the problem.	PGandE shall submit final design plans and "as-built" drawings to the Sonoma County CBO incorporating the design requirements listed in requirements 6-3a, b, c, and d. In addition, the plant superintendent shall file a statement with the CVRWQCB and the CEC at the start of the power plant operations verifying that plant personnel are trained and prepared to handle spills.	Ongoing	GPC is in compliance.
Water Quality/ Hydrology/ Water Resources	6-4	Operations/ Ongoing	PGandE shall ensure that rainwater entering the Stretford process area will not enter surface water or groundwater. PGandE shall use the rainwater in the Stretford process or pump it to the cooling tower overflow structure. PGandE shall use the steam condensate from the plant for cooling water and reinject any excess into the geothermal reservoir.	PGandE shall submit final design plans and "as-built" drawings to the Sonoma County CBO incorporating this design requirement.	Ongoing	GPC is in compliance.
Water Quality/ Hydrology/ Water Resources	6-5	Operations/ Ongoing	To minimize the potential adverse impacts of storm runoff on the water quality of the area, PGandE shall route plant site runoff to the cooling tower basin for subsequent injection into the geothermal reservoir. When the capacity of the return system is exceeded, the runoff will be released. Under such conditions, the impacts on water quality should be minimal due to pollutant material dilution from heavy rainfall.	PGandE shall submit final design plans and as-built drawings to the Sonoma County CBO incorporating this design requirement.	Ongoing	GPC is in compliance.
Water Quality/ Hydrology/ Water Resources	6-6	Operations/ Ongoing	PGandE shall dispose of domestic waste water by injection into the reinjection system or other appropriate method. PGandE shall treat the waste in a septic tank to remove solids and then discharge it to the reinjection line at a point between the cooling tower basin and the reinjection well, or implement such other discharge method as is appropriate and in conformity with all applicable laws.	PGandE shall obtain an in-lieu sanitation permit in accordance with Sonoma County ordinances and shall provide final design plans and "as-built" drawings to the Sonoma County CBO incorporating this design requirement for the domestic waste disposal system.	Ongoing	GPC is in compliance.
Water Quality/ Hydrology/ Water Resources	6-9	Operations/ Ongoing	During heavy rainstorms, when the water level in the retention basin continues to rise to a level that could inundate the road within the yard, PGandE shall be allowed to open the valve and drain the site water into Calm Creek.	Within 30 days after receipt, PGandE shall forward to the CEC a copy of the waste discharge permit issued by the NCRWQCB.	Ongoing	GPC is in compliance.
Worker Safety	1	Complete - report only for 2020	The project owner shall physically disconnect the piping connection between the cooling tower wet-down system and the plant's fire protection system unless the integrated wet down/fire protection system is approved by the CPM. Completion of the commissioning of the integrated system terminates the requirement to disconnect the system.	The project owner shall complete the physical disconnection of the cooling tower wet-down system from the plant's fire protection system no later than June 1, 2019, or a later date agreed upon by the CPM, unless the CPM has approved a commissioned, integrated system. Within 10 days after the disconnection, the project owner shall submit a letter stating that the physical disconnection has occurred and provide a photograph showing the disconnection. The CPM shall be notified at least 30 days prior to the current disconnection date if the project owner wishes to seek an extension to the current disconnection date.	Complete	Condition is complete and will no longer be provided to the CEC in the ACR.
Worker Safety	2	Complete - report only for 2020	The project owner shall physically label the diesel engine and wet down pump and the pump house with clear signage so that it would not be mistakenly identified as an emergency fire pump by plant personnel or first responders during an emergency	At least 30 days prior to the start of construction of the diesel engine and wet-down pump and the pump house, the project owner shall submit a plan and photographs showing the language and location of the signage to the CPM for review and approval.	Complete	Condition is complete and will no longer be provided to the CEC in the ACR.

CONDITION OF CERTIFICATION
BIOLOGICAL RESOURCES 5-1 & 5-6

Attachment BIOLOGICAL RESOURCES 5-1a: April 2021 Guzzler and Sediment Pond Inspection Pictures

Geysers Grant Plant (Unit 20) 82-AFC-01C
2020 Annual Compliance Report to the California Energy Commission
January 2020-December 2020


Check dam below Sonoma


Drainage outfall below Sonoma

Injun Mine pond below Unit 16 (road down to pond is inaccessible)


Sediment pond below Unit 16


Replacement guzzler above Unit 16


Guzzler below Unit 17


Guzzler below Unit 17

Pond off Pine Flat Rd - south of Unit 18


Reconstructed "Joe Guzzler" above Unit 18


Reconstructed "Joe Guzzler" above Unit 18


Replacement guzzler east of Unit 18


Replacement guzzler east of Unit 18


Pond between Post 3 and Unit 18


Pond below Unit 20


Outlet of pond
below Unit 20

Replacement guzzler below Unit 20 ("Bathtub Guzzler")

Replacement guzzler below Unit 20 (east of steamline between U16 and 20)

CONDITION OF CERTIFICATION
BIOLOGICAL RESOURCES 5-1 & 5-3

Attachment BIOLOGICAL RESOURCES 5-1b:
Geysers Panicum Monitoring Report

Geysers Grant Plant (Unit 20) 82-AFC-01C
2020 Annual Compliance Report to the California Energy Commission
January 2020-December 2020

GEYSERS PANICUM AT THE GEYSERS

2020 Final Monitoring Report

Prepared for
Calpine Corporation

December 2020

ESA

GEYSERS PANICUM AT THE GEYSERS

2020 Final Monitoring Report

Prepared for
Calpine Corporation

December 2020

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Geysers Panicum at the Geysers 2020 Final Monitoring Report

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EXECUTIVE SUMMARY

The state endangered plant Geysers panicum (*Panicum acuminatum* var. *thermale*[1]) was monitored from 2012 through 2020 at the Geysers geothermal area in Sonoma County according to the Memorandum of Understanding (MOU) between Calpine Corporation and the California Department of Fish and Wildlife (CDFW) dated November 20, 2012. Geysers panicum has been monitored since 1982 at The Geysers as a requirement by the California Energy Commission (CEC) for the operation of Geysers Geothermal Power Plant Unit 20.

The monitoring activities during the period of the current MOU, which spans 2012-2021, follow the methods described in the MOU's Exhibit 1: Monitoring Plan for Geysers Dichanthelium (*Dichanthelium thermale* var. *acuminatum*). Monitoring occurred at three-year intervals in 2014, 2017, and 2020 at the ten populations (corresponding with seven known occurrences of Geysers panicum tracked in the California Natural Diversity Database (CNDDB)) present at the Geysers geothermal area. The results of the 2014 and 2017 monitoring events were presented in letter reports to CDFW at the end of those years, and population trends were compared with 2008 monitoring data which were used as a baseline.

Results from 2020 monitoring are presented in this final report along with summaries and analysis from across the monitoring period (2012-2021). Smaller population sizes were observed in 2014 and 2020- both years were dry with precipitation around 50 percent of normal, and with preceding dry years. In contrast, population sizes in 2017 were larger than previous years, most likely due to above- average rainfall in 2017 and average rainfall in 2016. Population 2 declined in size in 2020 while populations 4 and 6 show trends of increasing over the monitoring period. Population 3 seems to show a general trend towards decline; however, in 2017 the total number of plants (70) was the largest since 2005. Over the monitoring period there has been no evidence of vehicles accessing abandoned roads within or near populations 2 and 8, or vehicles driving off the paved roadbed at populations 1, 2, and 4 where Geysers panicum grows on slopes on either side of the road.

Geothermal surface manifestations fluctuated in intensity as well as size and spatial distribution at some of the populations while geothermal surface activity remained fairly constant at others. At the locations where changes were observed, the distribution of Geysers panicum also shifted- in most cases resulting in a similar overall population size. Over the course of the monitoring period there were also several fires that burned through a handful of the Geysers panicum populations. Fortunately, being a perennial grass Geysers panicum appears to have been largely unaffected by

[1] The synonymy recognized by Jepson Flora Project editors and the California Native Plant Society Inventory of Rare and Endangered Plants for Geysers panicum has changed since the start of the MOU monitoring period. At the time of preparation of this report, the accepted taxonomy was *Panicum acuminatum* Sw. var. *thermale* (Bol.) Wipff.

the fires and in some areas new seedlings were observed where the fires eliminated competing vegetation.

While four decades of periodic monitoring have documented the Geysers panicum population changes over time, concluding that all monitored populations are extant and have not seen major decline as a result of operations and maintenance activities (or for any other reason), continued monitoring of these populations is recommended at an interval of once every four years. ESA further recommends incorporating phytosanitary best management practices into ongoing monitoring to prevent the inadvertent introduction or spread of invasive plants and pathogens, and recommends alternative methods for estimating population sizes for accessible and inaccessible populations, respectively.

CHAPTER 1
Introduction

1.1 Purpose

Environmental Science Associates (ESA) prepared this final monitoring report on behalf of Calpine Corporation in accordance with the Memorandum of Understanding (MOU) by and between Geysers Power Company, LLC. and the California Department of Fish and Wildlife (CDFW), and the *Monitoring Plan for Geysers Dichanthelium (*Dichanthelium acuminatum *subsp.* thermale*)* that is included as Attachment 1 to the MOU (monitoring plan). This report documents the results of the 2020 monitoring of Geysers panicum (*Panicum acuminatum* var. *thermale*[2]) and summarizes the results from across the monitoring period of the MOU which covers 2012-2021. In accordance with the MOU and associated monitoring plan, ten populations of Geysers panicum, located at The Geysers in Sonoma County, California, were monitored once every three years from 2012 through 2021.

The purpose of ongoing monitoring is to document and assess trends, changes, and threats to the existing populations of Geysers panicum at The Geysers.

1.2 Regulatory Requirements

In 1982 the California Energy Commission (CEC) and CDFW were concerned that the construction and operation of Geysers Geothermal Power Plant Unit 20 (Unit 20) could adversely affect the population of Geysers panicum at Little Geysers (California Natural Diversity Database (CNDDB) occurrence 3, population 7). Geysers panicum is listed as endangered under the California Endangered Species Act and is considered a species of concern by the U.S. Fish and Wildlife Service. Pacific Gas and Electric Company (PG&E) agreed to monitor the grass as part of the licensing agreement for Unit 20 (Condition Bio 5-3). The Little Geysers population of Geysers panicum has been monitored and researched since 1982 (see Research and Monitoring History below), and the results indicate that fluctuations in the plant populations are affected by variations in annual rainfall and not by geothermal development activities (PG&E, 2000). However, CEC and CDFW were concerned that populations of this plant would be vulnerable to unintentional habitat degradation or destruction because they are accessible by roads, and in some cases are located adjacent to roads. The monitoring program covered by the 2012 MOU along with monitoring from the previous two decades were designed to detect unintentional habitat degradation.

[2] The synonymy recognized by Jepson Flora Project editors and the California Native Plant Society Inventory of Rare and Endangered Plants for Geysers Panicum has changed since the start of the MOU monitoring period. At the time of preparation of this report, the accepted taxonomy was *Panicum acuminatum* Sw. var. *thermale* (Bol.) Wipff.

1.3 Research and Monitoring History

PG&E botanists first began monitoring the populations in 1982 and continued through 1989, which lead to some experimental studies in 1992-1994 by Bruce Pavlik (2001) and Pavlik and Enberg (2001). Annual monitoring continued at approximately three-year intervals from 1995 through 2011 by Gerrit Platenkamp. This monitoring was conducted under two successional MOUs: the first executed in December, 2002, and a second in January 2008.

1.3.1 Summary of Research and Monitoring Results

Monitoring and research of Geysers panicum starting in 1982 have focused on the demography, physiological ecology, population dynamics, and geographic distribution of Geysers panicum. Initial studies conducted by PG&E (de Becker, 1990) from 1982 to 1989 focused on investigating various methods for detecting population change of Geysers panicum, measuring soil and tissue boron concentrations, and preliminary plant water relationships. De Becker (1990) concluded that before a meaningful monitoring program could be designed, an understanding of the unique ecology of Geysers panicum was needed.

From 1992 to 1994 Gerrit Platenkamp with Jones & Stokes and Bruce Pavlik with Mills College continued the monitoring program and studied the effects of environmental factors on the physiology and population ecology of Geysers panicum under contract with PG&E. The results of that study (PG&E, 1995; Pavlik and Enberg, 2001; Pavlik, 2001) indicated that soil temperature and soil moisture dynamics associated with surface geothermal manifestations strongly affect germination, growth, and survival of Geysers panicum. Elevated temperatures near fumaroles causes higher germination rates, lower seedling mortality rates, and higher growth rates than at locations further away from fumaroles. Optimum average soil temperatures for these processes range from 20 to 30°C. Rain storms strongly affect soil temperatures; therefore, the amount and distribution of precipitation are likely to have an indirect effect on population dynamics. Ambient temperatures were shown to affect soil temperatures at 10 centimeters depth. Boron deposition did not appear to affect the plant, and little evidence was found for a competitive effect from the nonnative grass broomsedge (*Andropogon virginicus*) at Little Geysers.

From 1995 to 1999, population size and soil temperature at Little Geysers were measured annually and precipitation data were compiled for Geysers Power Plant Unit 13 (PG&E, 2000). The status of all known occurrences of Geysers panicum were assessed at three-year intervals. The results of the study (PG&E, 2000) combined with those of the previous years as well as monitoring and research between 2000 and 2011 showed that population size fluctuations are largely caused by changes in population density and that only small changes in patch size occurred (Platenkamp and deBecker, 2011). Population density fluctuations are strongly dependent on precipitation occurring two winters prior to the density measurement (PG&E, 2000), due to effects of rainfall on emergence and survival. Regression analysis showed that when the effect of rainfall is removed, no trend over time in the residual population size could be discerned.

CHAPTER 2
Methods

2.1 Monitoring Dates and Staff

On September 29, 2020 ESA botanists Rachel Brownsey and Joe Sanders visited three of the ten populations of Geysers panicum at The Geysers in Sonoma County; populations 1, 7, and 10 (**Figure 1**). CDFW staff Jeb Bjerke and Raffica La Rosa attended the monitoring visits at population 7 (CNDDB occurrence 3) and population 1 (CNDDB occurrence 1). Due to hazardous air quality conditions resulting from the nearby Glass fire, the September monitoring visit was cut short and rescheduled. The subsequent survey was conducted on October 29, 2020 by ESA botanist Rachel Brownsey and biologist Julie McNamara. The remaining seven populations were monitored on this date; populations 2, 3, 4, 5, 6, 8, and 9.

2.2 Geysers Panicum Population Monitoring

Each of the ten Geysers panicum populations was visited in 2020 and population size, geographic distribution, plant health, and population age distribution were assessed at a qualitative level, and in comparison with previous monitoring site visits. The following qualitative data were recorded for each population:

- Habitat assessment, including extent and activity of surface geothermal features;
- Apparent threats to the Geysers panicum population, if any;
- Occurrence of significant land use changes or incidents in the vicinity of the population that could have an effect on the plant's habitat, and;
- General status of the Geysers panicum population.

This information is included in Chapter 3 (Results) as well as on the CNDDB forms contained in **Appendix A**.

In 2020, ESA mapped the extent of existing populations using global positioning system (GPS) with sub-meter accuracy (Trimble R1 GNSS receiver with Esri's ArcGIS Collector application) or hand-recorded on aerial images of the population using a mobile device (tablet computer or smartphone) in order to update the population figure (Figure 1). The boundaries shown on Figure 1 correspond with the outside limit of the populations; all populations have a patchy distribution corresponding with the geothermal conditions of suitable microsites within the larger population area. ESA also carried out a more localized count of individuals within population patches at populations 2, 3, 4, 5, and 8 because these populations are accessible or partially accessible, such that monitors can see individual plants and make an informed estimate.

Populations 1, 9, and 10 are inaccessible and were estimated at a distance based on previous estimates. Population 7 (Little Geysers) is accessible and a localized count of individuals within population patches is recommended for any future monitoring.

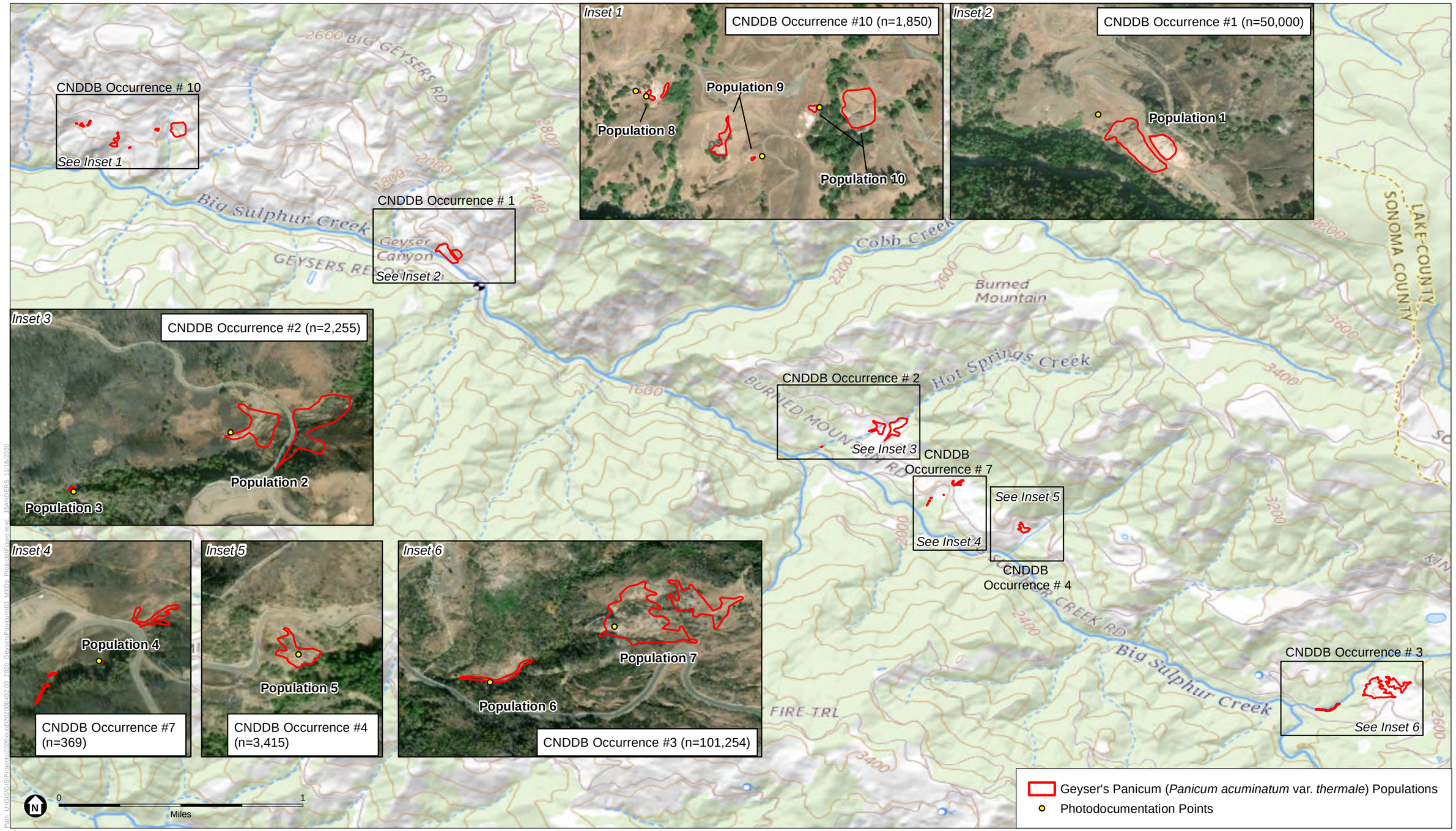
2.3 Photo Documentation

A permanent photograph location was established in 2008 at each population at a point where a typical portion of the Geysers panicum population was visible. In 2008, a photograph was taken at each point with a Pentax Optio W30 digital camera in wide angle setting with focal length = 6.3 mm (equivalent to a focal length of 38 mm of a 35 mm camera) on a tripod. Since 2011 higher resolution photographs were taken with digital single-lens reflex (DSLR cameras) set at approximately 21 - 38 mm focal length (depending on site conditions). The height of the optical axis of the lens was approximately 54 inches.

In 2008, the photograph locations were marked with a non-corroding plastic resin core plant stake with an aluminum tree tag. The coordinates of the location (latitude and longitude in decimal degrees, NAD83) were recorded with a GPS unit and compass bearing from camera to subject (optical axis) was also recorded (declination = 15°) (**Table 1**). Coordinates were differentially corrected. In 2020, the monitoring points were relocated with a EOS Arrow global positioning system (GPS) unit with submeter accuracy. Many of the original stakes were relocated while a few located in stream channels, in active geothermal locations, or on shallow rocky substrate were not found. Hardcopy prints of the 2008, 2011, 2014, and 2017 photographs were used to match the viewfinder image on the camera in 2020. In some cases, new growth of trees and shrubs, or steam, blocked part of the images in 2020.

TABLE 1
PERMANENT PHOTOGRAPH MONITORING LOCATIONS

Population Number	CNDDB Occurrence	Description	Easting	Northing	Bearing (o)
1	Occ 1	Historic Geysers Resort Area	-122.805221557617	38.800277709961	122
2	Occ 2	Hot Springs Creek	-122.779258728027	38.789157867432	226
3	Occ 2	Hot Springs Creek (canyon)	-122.78211157500	38.78808059600	10
4	Occ 7	Big Sulphur Creek Rd. 0.3 mi S of Burned Mtn. Rd.	-122.774948120117	38.785301208496	92
5	Occ 4	USGS Bench Mark 2163	-122.770141601562	38.783237457275	318
6	Occ 3	Little Geysers Creek	-122.752235412597	38.772460937500	312
7	Occ 3	Little Geysers	-122.749748229980	38.773571014404	85
8	Occ 10	Sulphur Bank Drive Area (west)	-122.826438903808	38.807334899902	86
8b	Occ 10	Sulphur Bank Drive Area (west)	-122.82615775200	38.80721979500	30
9	Occ 10	Sulphur Bank Drive Area (central)	-122.822990417480	38.805946350098	280
10A	Occ 10	Sulphur Bank Drive Area (east)	-122.821418762207	38.806983947754	285
10B	Occ 10	Sulphur Bank Drive Area (far east)	-122.821418762207	38.806983947754	102



SOURCE: USGS, 2020; ESRI, 2020; ESA, 2020

2020 Geyser's Panicum Monitoring

Figure 1
Geyser's Panicum Occurences

ESA

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In 2017, a photopoint was added at population 8 (CNDDB occurrence 10), and designated as Point 8B. This photo location shows the presence and distribution of Geysers panicum plants along the slope to the east of that shown from photo monitoring location 8. Plants shown in photos at monitoring location 8 have died or been washed downslope with eroded material since 2008 and oak trees have grown up to block much of the photo frame. The original photo at population 8 should continue to be taken through the end of the monitoring period; however, its utility in representing this population is expected to continue to be limited in future years.

Figure 1 shows the location of the monitored populations, the corresponding CNDDB occurrence number, and estimated population size. Photographs taken at the permanent monitoring locations in 2008 and 2020 are provided in **Appendix B**.

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CHAPTER 3
Results

This section discusses the results of 2020 monitoring and compares them with the results from previous monitoring to discuss overall population and habitat status and trends. Monitoring reports from 2014 and 2017 are included as **Appendices C and D**, respectively; all other research documentation and earlier reports can be provided upon request.

Local climate conditions in 2020 were substantially drier than average. A total of 26.80 inches of precipitation was measured at the Whispering Pines CDEC station [http://cdec.water.ca.gov] between October 2019 and October 2020. This total is around 53 percent of average. Previous studies have shown that the amount of rainfall can strongly affect population size in Geysers panicum (Platenkamp 2005; Platenkamp and De Becker 2011). Drier conditions have the result that at the end of the dry season less meteoric (rain- and snow-derived) water is available in the soil and therefore less geothermal steam will be observed at the surface.

Several populations of Geysers panicum have been affected by wildfires during the monitoring period. Populations 5, 6, and 7 were affected by the Valley Fire that occurred in September 2015 and burned a substantial part of the Geysers area. The fire burned trees and shrubs at these sites. The 2019 Kincade Fire burned areas around populations 1 and 2; and the downstream (western) extent of population 4 was heavily burned. The effects of these wildfires on the individual populations are discussed below.

3.1 Population and Habitat Status and Trends

Occurrence 1 – Historic Geysers Resort Site, Population #1

This large population (50,000 plants) is in stable condition and the habitat has not substantially changed over the monitoring period. Upslope of the road, a small eroded area was evident in 2017, and in 2020 many of the plants upslope of the road appeared to be stressed (very little green vegetation was observed). Most plants downslope of the road appear to be in good health with green leaves sprouting from the base of the plant. No dead plants were observed.

Occurrence 2 – Hot Springs Creek, Populations #2 and #3

Population 2 had a total of 2,255 plants in 2020. There was a steep drop in the total number of plants on the upslope side of the road (east), and also several areas of mortality downslope of the road (west). In previous years, population 2 supported around 10,000 plants. Very few plants (around 50) were observed growing along Hot Springs Creek upslope of the road, whereas in previous years there were hundreds of plants in the creek bed and along the north bank of the creek. There are Geysers panicum plants growing in the roadside ditch upslope of Burned

Mountain Road and along the roadcut, both north and south of Hot Springs Creek. Plants in the roadside ditch and adjacent slope are healthy and there are some seedlings.

There was quite a bit of mortality observed downslope of Burned Mountain Road (see additional photo of population 2 following the photos from established photopoints). There was some isolated mortality of plants at the active geothermal feature shown in the photo. This feature has eroded since 2014 causing some plants along the banks to loose substrate.

Hot Springs Creek continues to support a diverse suite of wetland plants including many non-natives such as Bermuda grass (*Cynodon dactylon*) and watergrass (*Echinochloa* sp.), as well as native cattails (*Typha* sp.) and smartweed (*Persicaria* sp.). The areas downslope of Burned Mountain Road have abundant geothermal activity, which, in combination with the dry conditions in 2020 could be part of the reason for the many patches of mortality at this site.

Although population 3 showed an upward population trend in 2017 (23 plants), it has generally been in decline since 2008 when 70 plants were observed. In 2020, a total of 12 individuals were observed, in two discrete patches- one at the photo point location (7 plants) and the other around 50 feet downstream (5 plants). Only three living plants were observed in 2014 while 21 plants were observed in 2011. Population 3 occurs on a dry rocky slope where there has been some localized erosion. It is also an increasingly shaded channel; the effect of canopy cover is unknown. Bermuda grass appears to be increasing in and adjacent to the channel, and smilo grass (*Stipa miliacea*) was observed for the first time in this channel in 2020.

Occurrence 3 – Little Geysers Area, Populations #6 and #7

Population 6 has been steadily increasing over the past decade, with 854 plants in 2020; double the number from the 2017 monitoring event. The largest area of increase is at the eastern extent where there is a now a large floodplain terrace dominated by Geysers panicum. Three-hundred fifty plants were observed in 2017, 400 in 2014, 200 in 2011, 180 plants in 2008, and 120 plants in 2005. The population increase could be the result of erosion of the creek banks that provides new substrate for the Geysers panicum plants. Several years ago Calpine enlarged the culvert under the road downstream of the population. The original undersized culvert had caused substantial upstream deposition and that process has now been reversed, and apparently has benefitted the Geysers panicum.

The hillslopes along both sides of the creek at Population 6 burned in 2015 during the Valley Fire. There is quite a bit of downed woody material on the slopes but so far no erosion or deposition of large wood debris has been observed in this creek segment in or around the Geysers panicum patches. Shrub regeneration on the slopes to the north by bush poppy (*Dendromecon rigida*), yerba santa (*Eriodictyon californicum*), and re-sprouting oak trees may be providing soil stability.

Population 7 is the Little Geysers population that has remained in stable condition over the past several years. The total number of individuals is estimated at 100,400. The distribution has shifted slightly with some areas declining and other areas increasing, but overall the population size has remained stable. In 2020 there were small areas of localized mortality, mainly associated

with areas of greater geothermal surface activity, including many vents, but overall the patches appeared to be multi-aged with some seedlings scattered throughout.

The Little Geysers area burned during the Valley Fire in 2015. The fire killed many of the knobcone pine (*Pinus attenuata*), McNab cypress (*Hesperocyparis macnabiana*) and manzanita (*Arctostaphylos* sp.) at the Little Geysers which is apparent in monitoring photos (Appendix B). There is no evidence that Geysers panicum plants were burned, and in 2017 monitors observed some seedlings on the bare substrate under the shrubs adjacent to existing Geysers panicum patches. The exotic grass broomsedge bluestem (*Andropogon virginicus* var. *virginicus*) has a very patchy distribution at this site and is mainly located near the streams. It also did not show any evidence of adverse effects from the fire.

Occurrence 4 – USGS Bench Mark 2163, Population #5

Geysers panicum plants at population 5 appeared to be stressed in 2020 but still had some green vegetation and were therefore considered "alive." This is consistent with what was observed in 2017 when most of the plants appeared dormant. The total number of plants in 2020 was estimated at 3,415, down from 4,000 in 2017. Around 4,100 plants were observed in 2014 and 4,500 in both 2008 and 2005. Mudpots, fumaroles, and vents were very active during monitoring events in 2014, 2017, and 2020, and this surface activity may be related to the change in population size over the monitoring period.

Occurrence 7 – Big Sulphur Creek Rd., Population #4

Population 4 has increased over the monitoring period, though the 369 total plants observed in 2020 is down from the 500 plants were observed in 2017. Around 435 plants were observed in 2014, 300 in 2011, and 200 in 2008.

Part of the population decrease from 2017 could be attributed to relatively drier conditions; however, only five individuals were observed at the upstream (upslope) location in 2020, and none of these are visible in the monitoring photo from 2020. The upstream location does not appear to have much geothermal activity and over the monitoring period has filled in with upland annual grasses, primarily wild oats (*Avena barbata*).

The downstream location has seen an increase in plant numbers over the monitoring period as well as an increase in extent (now extending further downstream) and all plants in the channel appear to be vigorous with many young plants. The 2019 Kincade Fire burned portions of the downstream extent, and Geysers panicum may be responding positively to the decrease in canopy cover which was quite dense prior to the fire. Currently there is no evidence of erosion in this portion of the creek channel as a result of fire.

Occurrence 10 – Sulphur Bank Drive Area, Populations #8, #9, and #10

Populations 8, 9, and 10 collectively remain stable with approximately 1,850 plants. This is a drop from the 2,000 plants observed in 2017, 2014, and 2008, but 2020 was substantially drier than 2017. There was some mortality of plants on the west end of population 8 just upslope of the road and this is evident in the site photo; most of the plants present along the slope in the photo foreground have either died or slid downslope with eroded material. Due to this population shift,

along with two growing oak trees that now obscure part of the monitoring photo, ESA established another photo location: 8b. Photo 8b faces the same slope and is located further to the east (Appendix B). In addition, in 2017 monitors observed vigorous young plants and many seedlings spreading in the abandoned roadbed while in 2020 the roadbed appeared to be invaded by Bermuda grass. The decrease in the size of population 8 is the source of population size change for CNDDB occurrence 10.

Population 9 is considered stable. Most plants appear to be healthy and have green leaves at the base. No mortality was observed and the population extent does not appear to have decreased.

Population 10a had very vigorous growth in 2020 and appears to have increased over the monitoring period (see population 10a monitoring photo; Appendix B). Several seedlings were observed on the slope and mature plants are green and vigorous. Population 10b is now somewhat difficult to assess from the monitoring photo because of the trees and shrubs that obscure the view of this inaccessible slope. While many of the plants in population 10B appear stressed, they have green leaves at the base, and no change in population extent was evident.

3.2 Additional CNDDB Occurrence Information

Based on information from the 2005 monitoring report (Platenkamp, 2005), which draws on earlier monitoring and research information, the following useful notes are included about Geysers panicum populations and CNDDB occurrence numbers:

- More than one population described in the first PG&E report (1995) are grouped together into CNDDB occurrences that are less than 0.25 miles apart. There are no CNDDB occurrences #5 and #9 probably as a result of combining populations into occurrences that are less than 0.25 miles apart.
- CNDDB occurrence #6 has not been found since it was first reported in 1977, and is presumed extirpated.
- CNDDB occurrence #8 is most likely identical to CNDDB occurrence #4, but was probably given incorrect coordinates when it was initially reported. Based on the description of the location of these CNDDB occurrences, they should be considered identical.

CHAPTER 4
Conclusions and Recommendations

The monitoring of Geysers panicum during the monitoring period of the current MOU (2012-2021) has successfully documented habitat and population changes over time. Similar to earlier monitoring periods, the current monitoring period has observed trends that are consistent with the research conducted in the 1990's and 2000's. Population sizes tend to be lower in dry years and higher in years with above-average precipitation. Mortality is often observed in association with shifting surface activity of geothermal features, and with natural erosion on steep slopes. No damage or destruction of Geysers panicum or its habitat were observed during the monitoring period, and no evidence of human use was observed at any of the populations.

Wildfires within and adjacent to Geysers panicum populations do not appear to have negatively affected the populations, potentially as a result of the fact that this perennial grass often has substantial living vegetation during the fire season (late summer-fall) and grows in areas that are not densely vegetated and therefore do not carry groundfires. Invasive plants are persistent at several populations (populations 2 and 7), and Bermuda grass appears to be expanding at populations 3 and 8.

Monitoring results spanning four decades have documented the population changes over time, concluding that all monitored populations are extant and have not seen major decline. However, continued monitoring of these populations is recommended, at an interval of once every four years. A reduced interval is proposed based on the results of studies and monitoring of stable populations, Calpine's demonstrated success in avoiding impacts to roadside populations 1, 2, and 4 during road and infrastructure maintenance activities, and to further minimize the potential effects of monitoring activities on the Geysers panicum habitat conditions.

In order to address a number of monitoring challenges, as well as to ensure the continued protection of Geysers panicum populations, ESA presents the following recommendations for future monitoring:

1. Implement phytosanitary best management practices (BMPs) during monitoring work to prevent the introduction and spread of introduced plants and pathogens. Human access to populations of Geysers panicum is extremely limited. While Calpine Corporation has no control over spread of propagules by deer and other wildlife, spread resulting from future population monitoring and from vehicle use on paved roads should avoid inadvertent introductions, to the greatest extent feasible. Future monitoring should emphasize monitoring roadsides near Geysers panicum populations for new weed introductions, and include management recommendations. Weeds such as sweet clover (*Melilotus* spp.) and stinkwort (*Dittrichia graveolens*) have been observed along roadsides on Big Sulphur Creek Road and

Burned Mountain Road and may tolerate moderate levels of boron and other extreme soil conditions associated with geothermal surface manifestations.

2. Monitor patch sizes at populations 2, 3, 4, 5, 6, 7, 8, and 10a where access is feasible and safe. This will allow for a more precise tabulation of population size. GPS technology can be utilized to map and track individual patches within these populations. Research by de Becker and Platenkamp (2011) demonstrated that population sizes fluctuate over time due to increases or decreases in number of individuals within patches while patch sizes remain relatively constant.

3. Utilize drone-based aerial photography methods to monitor inaccessible populations 1, 9, and 10b.

CHAPTER 5
References

de Becker, S. 1990. Monitoring the Geysers' Panicum (*Dichanthelium lanuginosum* var. *thermale*) at Little Geysers, 1982-1989. (TES Report 417-90.36). Pacific Gas & Electric Company, Technical and Ecological Services. San Ramon, CA.

Pavlik, B. M. 2001. Developing an ecosystem perspective from experimental monitoring programs: II. Ecophysiological responses of a rare geothermal grass to soil water. Environmental Management 28: 243–253.

Pavlik, B. M, and A. Enberg. 2001. Developing an ecosystem perspective from experimental monitoring programs: I. Demographic responses of a rare geothermal grass to soil temperature. Environmental Management 28: 225–242.

Pacific Gas & Electric Company (PG&E). 1995. Monitoring the Geysers' Panicum (*Dichanthelium lanuginosum* var. *thermale*) at Little Geysers, 1992-1994. (TES Report 417-95.29). Pacific Gas & Electric Company, Technical and Ecological Services. San Ramon, CA.

Pacific Gas & Electric Company (PG&E). 2000. Monitoring the Geysers' Panicum (*Dichanthelium lanuginosum* var. *thermale*) at Little Geysers, 1995-1999. (TES Report 417-00.12). Pacific Gas & Electric Company, Technical and Ecological Services. San Ramon, CA.

Platenkamp, G. 2005. Monitoring Geysers Dichanthelium (*Dichanthelium acuminatum* subsp. *thermale*) 2001-2005 Final Report. Prepared for Calpine by Moore Iacofano Goltsman, Inc. Davis, CA.

Platenkamp, G.A.J and S. De Becker. 2011. Monitoring Demography and Population Dynamics of Geysers Dichanthelium (*Dichanthelium acuminatum* subsp. *thermale*). Pp. 256–263 In: J.W. Willoughby, B.K. Orr, K.A. Schierenbeck, and N.J. Jensen [eds.], Proceedings of the CNPS Conservation Conference: Strategies and Solutions, 17–19 Jan 2009, California Native Plant Society, Sacramento, CA.

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Appendix A
CNDDB Forms

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Mail to:
California Natural Diversity Database
California Dept. of Fish & Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: (916) 324-0475 email: CNDDB@wildlife.ca.gov

Date of Field Work (mm/dd/yyyy): 09/29/2020

For Office Use Only
Source Code: _____ Quad Code: _____
Elm Code: _____ Occ No.: _____
EO Index: _____ Map Index: _____

Clear Form

California Native Species Field Survey Form

Print Form

Scientific Name: *Panicum acuminatum var. thermale*

Common Name: Geysers panicum

Species Found? (●) Yes ( ) No _____ If not found, why?

Total No. Individuals: 50,000 Subsequent Visit? (●) Yes ( ) No

Is this an existing NDDB occurrence? 1 Yes, Occ. # ☐ No ☐ Unk.

Collection? If yes: no Number _____ Museum / Herbarium

Reporter: Rachel Brownsey, Joseph Sanders
Address: ESA 2600 Capitol Ave, suite 200
Sacramento, CA 95816
E-mail Address: rbrownsey@esassoc.com
Phone: 916.564.4500

Plant Information

Phenology:
100 % vegetative _____ % flowering _____ % fruiting

Animal Information

_____ # adults _____ # juveniles _____ # larvae _____ # egg masses _____ # unknown

☐ wintering ☐ breeding ☐ nesting ☐ rookery ☐ burrow site ☐ lek ☐ other

Location Description (please attach map AND/OR fill out your choice of coordinates, below)

County: Sonoma Landowner / Mgr: Private
Quad Name: The Geysers Elevation: 1600'
T___ R___ Sec___, ___¼ of ___ ¼, Meridian: H ( ) M ( ) S ( ) Source of Coordinates (GPS, topo. map & type): GPS
T___ R___ Sec___, ___¼ of ___ ¼, Meridian: H ( ) M ( ) S ( ) GPS Make & Model: Trimble R1
DATUM: NAD27 ( ) NAD83 (●) WGS84 ( ) Horizontal Accuracy: 1 m meters/feet
Coordinate System: UTM Zone 10 ( ) UTM Zone 11 ( ) ***OR*** Geographic (Latitude & Longitude) (●)
Coordinates: Photo monitoring point 38.8002777, -122.8052216

Habitat Description (plants & animals) *plant communities, dominants, associates, substrates/soils, aspects/slope:*
Animal Behavior *(Describe observed behavior, such as territoriality, foraging, singing, calling, copulating, perching, roosting, etc., especially for avifauna):*

Annual grassland and bare, steep eroded slope on geothermally altered soil, mostly facing south.

Please fill out separate form for other rare taxa seen at this site.

Site Information

Overall site/occurrence quality/viability (site + population): ( ) Excellent (●) Good ( ) Fair ( ) Poor
Immediate AND surrounding land use: Geothermal development
Visible disturbances: many plants upslope of the road appeared to have very minimal green vegetation; no additional erosion since 2017
Threats: _____
Comments: This occurrence is in stable condition. Generally plants appear to be in good health with green leaves sprouting from the base of the plants. Several of the plants upslope of the road appeared to be stressed (very little green vegetation) but still alive.

Determination: *(check one or more, and fill in blanks)*

☐ Keyed (cite reference): _____
☐ Compared with specimen housed at: _____
☐ Compared with photo / drawing in: _____
☐ By another person (name): _____
☒ Other: previous identification

Photographs: *(check one or more)*

	Slide	Print	Digital
Plant / animal	☐	☐	☐
Habitat	☐	☐	☒
Diagnostic feature	☐	☐	☐

May we obtain duplicates at our expense? (●) yes ( ) no

Mail to:
California Natural Diversity Database
California Dept. of Fish & Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: (916) 324-0475 email: CNDDB@wildlife.ca.gov

Date of Field Work (mm/dd/yyyy): 10/29/2020

For Office Use Only
Source Code: _____ Quad Code: _____
Elm Code: _____ Occ No.: _____
EO Index: _____ Map Index: _____

Clear Form

California Native Species Field Survey Form

Print Form

Scientific Name: *Panicum acuminatum var. thermale*

Common Name: Geysers panicum

Species Found? (●) Yes ( ) No _____ If not found, why?

Total No. Individuals: 2,255 Subsequent Visit? (●) Yes ( ) No

Is this an existing NDDB occurrence? 2 Yes, Occ. # ☐ No ☐ Unk.

Collection? If yes: no Number _____ Museum / Herbarium

Reporter: Rachel Brownsey, Julie McNamara
Address: ESA 2600 Capitol Ave, suite 200
Sacramento, CA 95816
E-mail Address: rbrownsey@esassoc.com
Phone: 916.564.4500

Plant Information

Phenology:
100 % vegetative _____ % flowering _____ % fruiting

Animal Information

_____ # adults _____ # juveniles _____ # larvae _____ # egg masses _____ # unknown

☐ wintering ☐ breeding ☐ nesting ☐ rookery ☐ burrow site ☐ lek ☐ other

Location Description (please attach map AND/OR fill out your choice of coordinates, below)

County: Sonoma Landowner / Mgr: Private
Quad Name: The Geysers Elevation: 1900'
T___ R___ Sec___, ___¼ of ___ ¼, Meridian: H ( ) M ( ) S ( ) Source of Coordinates (GPS, topo. map & type): GPS
T___ R___ Sec___, ___¼ of ___ ¼, Meridian: H ( ) M ( ) S ( ) GPS Make & Model: Trimble R1
DATUM: NAD27 ( ) NAD83 (●) WGS84 ( ) Horizontal Accuracy: 1 m meters/feet
Coordinate System: UTM Zone 10 ( ) UTM Zone 11 ( ) ***OR*** Geographic (Latitude & Longitude) (●)
Coordinates: Photo monitoring point for population #2: 38.78915787, -122.7792587
Photo monitoring point for population #3: 38.788080596, -122.782111575

Habitat Description (plants & animals) *plant communities, dominants, associates, substrates/soils, aspects/slope:*
Animal Behavior *(Describe observed behavior, such as territoriality, foraging, singing, calling, copulating, perching, roosting, etc., especially for avifauna):*

Population #2: steep drop in number of plants from 2017 on the upslope (east) and downslope (west) of the side of the road; growing with diverse wetland vegetation, including non-natives such as Bermuda grass (Cynodon dactylon), watergrass (Echinochloa sp.), native cattails (Typha sp.) and smartweed (Persicaria sp.). Area is highly geothermally active.
Population #3: plants observed in two discrete patches along a dry rocky slope with some localized erosion and an increasingly shaded channel; Bermuda grass also appears to be increasing, along with smilo grass (Stipa milacea).

Please fill out separate form for other rare taxa seen at this site.

Site Information

Overall site/occurrence quality/viability (site + population): ( ) Excellent ( ) Good (●) Fair ( ) Poor
Immediate AND surrounding land use: Geothermal development
Visible disturbances: Erosion of active geothermal feature (population #2)
Threats: Erosion and competition with Bermuda grass
Comments: This occurrence is comprised of populations #2 and #3. Both populations 2 and 3 had many fewer plants than previous years. The size of population 3 has fluctuated quite a bit over the monitoring period; this population has experienced some erosion, and is located in a steep, shaded canyon.

Determination: *(check one or more, and fill in blanks)*

☐ Keyed (cite reference): _____
☐ Compared with specimen housed at: _____
☐ Compared with photo / drawing in: _____
☐ By another person (name): _____
☒ Other: previous identification

Photographs: *(check one or more)*

	Slide	Print	Digital
Plant / animal	☐	☐	☐
Habitat	☐	☐	☒
Diagnostic feature	☐	☐	☐

May we obtain duplicates at our expense? (●) yes ( ) no

Mail to:
California Natural Diversity Database
California Dept. of Fish & Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: (916) 324-0475 email: CNDDB@wildlife.ca.gov

Date of Field Work (mm/dd/yyyy): 10/29/2020

For Office Use Only
Source Code: _____ Quad Code: _____
Elm Code: _____ Occ No.: _____
EO Index: _____ Map Index: _____

Clear Form

California Native Species Field Survey Form

Print Form

Scientific Name: *Panicum acuminatum var. thermale*

Common Name: Geysers panicum

Species Found? (●) Yes ( ) No _____ If not found, why?

Total No. Individuals: 101,254 Subsequent Visit? (●) Yes ( ) No

Is this an existing NDDB occurrence? 3 Yes, Occ. # ☐ No ☐ Unk.

Collection? If yes: no Number _____ Museum / Herbarium

Reporter: Rachel Brownsey, Julie McNamara
Address: ESA 2600 Capitol Ave, suite 200
Sacramento, CA 95816
E-mail Address: rbrownsey@esassoc.com
Phone: 916.564.4500

Plant Information

Phenology:
100 % vegetative _____ % flowering _____ % fruiting

Animal Information

_____ # adults _____ # juveniles _____ # larvae _____ # egg masses _____ # unknown

☐ wintering ☐ breeding ☐ nesting ☐ rookery ☐ burrow site ☐ lek ☐ other

Location Description (please attach map AND/OR fill out your choice of coordinates, below)

County: Sonoma Landowner / Mgr: Private
Quad Name: The Geysers Elevation: 2700'
T___ R___ Sec___, ___¼ of ___ ¼, Meridian: H ( ) M ( ) S ( ) Source of Coordinates (GPS, topo. map & type): GPS
T___ R___ Sec___, ___¼ of ___ ¼, Meridian: H ( ) M ( ) S ( ) GPS Make & Model: Trimble R1
DATUM: NAD27 ( ) NAD83 (●) WGS84 ( ) Horizontal Accuracy: 1 m meters/feet
Coordinate System: UTM Zone 10 ( ) UTM Zone 11 ( ) ***OR*** Geographic (Latitude & Longitude) (●)
Coordinates: Photo monitoring point for population #6: 38.772460937500, -122.752235412597
Photo monitoring point for population #7: 38.773571014404, -122.749748229980

Habitat Description (plants & animals) *plant communities, dominants, associates, substrates/soils, aspects/slope:*
Animal Behavior *(Describe observed behavior, such as territoriality, foraging, singing, calling, copulating, perching, roosting, etc., especially for avifauna):*

Plants growing in a variety of geothermally altered habitats, along streams, on slopes of various exposures, surrounded by annual grassland. A 2015 fire killed many of the McNab cypress (Hesperocyparis macnabiana) and manzanita shrubs (Arctostaphylos sp.). The exotic grass broomsedge bluestem (Andropogon virginicus var. virginicus) has a very patchy distribution at this site and is mainly located near the stream. Shrub regeneration along the slopes to the north by bush poppy (Dendromecon rigida), yerba santa (Eriodictyon californicum), and resprouting oak trees may be providing soil stability.

Please fill out separate form for other rare taxa seen at this site.

Site Information

Overall site/occurrence quality/viability (site + population): ( ) Excellent (●) Good ( ) Fair ( ) Poor
Immediate AND surrounding land use: Geothermal development
Visible disturbances: Flooding of Little Geysers Creek causes some erosion and deposition of geothermal materials (population #6).
Threats: _____
Comments: Although the population declined slightly in 2017 from 400 in 2014 to 350 in 2017, Population #6 is steadily increasing, with 854 plants in 2020. Population #7 has remained stable, with the total number of individuals estimated at 100,400, although in 2020 there were a few areas of localized mortality around geothermal features.

Determination: *(check one or more, and fill in blanks)*

☐ Keyed (cite reference): _____
☐ Compared with specimen housed at: _____
☐ Compared with photo / drawing in: _____
☐ By another person (name): _____
☒ Other: previous identification

Photographs: *(check one or more)*

	Slide	Print	Digital
Plant / animal	☐	☐	☐
Habitat	☐	☐	☒
Diagnostic feature	☐	☐	☐

May we obtain duplicates at our expense? (●) yes ( ) no

Mail to:
California Natural Diversity Database
California Dept. of Fish & Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: (916) 324-0475 email: CNDDB@wildlife.ca.gov

Date of Field Work (mm/dd/yyyy): 10/29/2020

For Office Use Only
Source Code: _____ Quad Code: _____
Elm Code: _____ Occ No.: _____
EO Index: _____ Map Index: _____

Clear Form

California Native Species Field Survey Form

Print Form

Scientific Name: *Panicum acuminatum var. thermale*

Common Name: Geysers panicum

Species Found? (●) Yes ( ) No _____ If not found, why?

Total No. Individuals: 3,415 Subsequent Visit? (●) Yes ( ) No

Is this an existing NDDB occurrence? 4 Yes, Occ. # ☐ No ☐ Unk.

Collection? If yes: no Number _____ Museum / Herbarium

Reporter: Rachel Brownsey, Julie McNamara
Address: ESA 2600 Capitol Ave, suite 200
Sacramento, CA 95816
E-mail Address: rbrownsey@esassoc.com
Phone: 916.564.4500

Plant Information

Phenology:
100 % vegetative _____ % flowering _____ % fruiting

Animal Information

_____ # adults _____ # juveniles _____ # larvae _____ # egg masses _____ # unknown

☐ wintering ☐ breeding ☐ nesting ☐ rookery ☐ burrow site ☐ lek ☐ other

Location Description (please attach map AND/OR fill out your choice of coordinates, below)

County: Sonoma Landowner / Mgr: Private
Quad Name: The Geysers Elevation: 2054'
T___ R___ Sec___, ___¼ of ___¼, Meridian: H ( ) M ( ) S ( ) Source of Coordinates (GPS, topo. map & type): GPS
T___ R___ Sec___, ___¼ of ___¼, Meridian: H ( ) M ( ) S ( ) GPS Make & Model: Trimble R1
DATUM: **NAD27** ( ) **NAD83** (●) **WGS84** ( ) Horizontal Accuracy: 1 m meters/feet
Coordinate System: UTM Zone 10 ( ) UTM Zone 11 ( ) ***OR*** Geographic (Latitude & Longitude) ( )
Coordinates: Photo monitoring point for population #5: 38.78323746, -122.7701416

Habitat Description (plants & animals) *plant communities, dominants, associates, substrates/soils, aspects/slope:*
Animal Behavior *(Describe observed behavior, such as territoriality, foraging, singing, calling, copulating, perching, roosting, etc., especially for avifauna):*

On geothermally altered soil surrounded by annual grassland. Mostly on south-facing slope 5-15% in full sun. Extremely active mudpots, fumaroles, and vents.

Please fill out separate form for other rare taxa seen at this site.

Site Information

Overall site/occurrence quality/viability (site + population): ( ) Excellent (●) Good ( ) Fair ( ) Poor
Immediate AND surrounding land use: Geothermal development
Visible disturbances: _____
Threats: Increased natural geothermal activity
Comments: Population #5 appeared to be stressed with very little green vegetation, and may be affected by increased natural geothermal activity in the area. This was consistent with what was observed in 2017 when most of the plants appeared dormant.

Determination: *(check one or more, and fill in blanks)*

☐ Keyed (cite reference): _____
☐ Compared with specimen housed at: _____
☐ Compared with photo / drawing in: _____
☐ By another person (name): _____
☒ Other: previous identification

Photographs: *(check one or more)*

	Slide	Print	Digital
Plant / animal	☐	☐	☐
Habitat	☐	☐	☒
Diagnostic feature	☐	☐	☐

May we obtain duplicates at our expense? (●) yes ( ) no

Mail to:
California Natural Diversity Database
California Dept. of Fish & Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: (916) 324-0475 email: CNDDB@wildlife.ca.gov

Date of Field Work (mm/dd/yyyy): 09/29/2020

For Office Use Only
Source Code: _____ Quad Code: _____
Elm Code: _____ Occ No.: _____
EO Index: _____ Map Index: _____

Clear Form

California Native Species Field Survey Form

Print Form

Scientific Name: *Panicum acuminatum var. thermale*

Common Name: Geysers panicum

Species Found? (●) Yes ( ) No _____ If not found, why?

Total No. Individuals: 369 Subsequent Visit? (●) Yes ( ) No

Is this an existing NDDB occurrence? 7 Yes, Occ. # ☐ No ☐ Unk.

Collection? If yes: no Number _____ Museum / Herbarium

Reporter: Rachel Brownsey, Joseph Sanders
Address: ESA 2600 Capitol Ave, suite 200
Sacramento, CA 95816
E-mail Address: rbrownsey@esassoc.com
Phone: 916.564.4500

Plant Information

Phenology:
100 % vegetative _____ % flowering _____ % fruiting

Animal Information

_____ # adults _____ # juveniles _____ # larvae _____ # egg masses _____ # unknown

☐ wintering ☐ breeding ☐ nesting ☐ rookery ☐ burrow site ☐ lek ☐ other

Location Description (please attach map AND/OR fill out your choice of coordinates, below)

County: Sonoma Landowner / Mgr: Private
Quad Name: The Geysers Elevation: 1900'
T___ R___ Sec___, ___¼ of ___¼, Meridian: H ( ) M ( ) S ( ) Source of Coordinates (GPS, topo. map & type): GPS
T___ R___ Sec___, ___¼ of ___¼, Meridian: H ( ) M ( ) S ( ) GPS Make & Model: Trimble R1
DATUM: NAD27 ( ) NAD83 (●) WGS84 ( ) Horizontal Accuracy: 1 m meters/feet
Coordinate System: UTM Zone 10 ( ) UTM Zone 11 ( ) ***OR*** Geographic (Latitude & Longitude) (●)
Coordinates: Photo monitoring point for population #4: 38.78530121, -122.7749481

Habitat Description (plants & animals) *plant communities, dominants, associates, substrates/soils, aspects/slope:*
Animal Behavior *(Describe observed behavior, such as territoriality, foraging, singing, calling, copulating, perching, roosting, etc., especially for avifauna):*

On geothermally altered soil near thermal hot springs along creek. The upstream location does not appear to have much geothermal acitvity and has filled in with upland annual grasses, primarily wild oats (Avena barbata). Plants also grow on bare soil. Downstream extent of the area was recently burned in 2019 during the Kincade Fire and Geysers panicum responding positively to decrease in canopy cover. Plants are growing on bare soil along the stream channel.

Please fill out separate form for other rare taxa seen at this site.

Site Information

Overall site/occurrence quality/viability (site + population): ( ) Excellent (●) Good ( ) Fair ( ) Poor
Immediate AND surrounding land use: Geothermal development
Visible disturbances: Natural erosion at upstream location in 2017
Threats: relatively drier conditions
Comments: Population #4 has been increasing in recent years (since 2008 estimate of 200 plants), but has decreased from 500 in 2017 to 369 in 2020. Downstream patches along the creek have increased in extent and all plants in the stream channel appear to be vigorous with many young plants.

Determination: *(check one or more, and fill in blanks)*

☐ Keyed (cite reference): _____
☐ Compared with specimen housed at: _____
☐ Compared with photo / drawing in: _____
☐ By another person (name): _____
☒ Other: previous identification

Photographs: *(check one or more)*

	Slide	Print	Digital
Plant / animal	☐	☐	☐
Habitat	☐	☐	☒
Diagnostic feature	☐	☐	☐

May we obtain duplicates at our expense? (●) yes ( ) no

Mail to:
California Natural Diversity Database
California Dept. of Fish & Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: (916) 324-0475 email: CNDDB@wildlife.ca.gov

Date of Field Work (mm/dd/yyyy): 09/29/2020

For Office Use Only
Source Code: _____ Quad Code: _____
Elm Code: _____ Occ No.: _____
EO Index: _____ Map Index: _____

Clear Form

California Native Species Field Survey Form

Print Form

Scientific Name: *Panicum acuminatum var. thermale*

Common Name: Geysers panicum

Species Found? (●) Yes ( ) No _____ If not found, why?

Total No. Individuals: 1,850 Subsequent Visit? (●) Yes ( ) No

Is this an existing NDDB occurrence? 10 Yes, Occ. # ☐ No ☐ Unk.

Collection? If yes: no Number _____ Museum / Herbarium

Reporter: Rachel Brownsey, Joseph Sanders
Address: ESA 2600 Capitol Ave, suite 200
Sacramento, CA 95816
E-mail Address: rbrownsey@esassoc.com
Phone: 916.564.4500

Plant Information

Phenology:
99 % vegetative | _____ % flowering | 1 % fruiting

Animal Information

_____ # adults | _____ # juveniles | _____ # larvae | _____ # egg masses | _____ # unknown

☐ wintering ☐ breeding ☐ nesting ☐ rookery ☐ burrow site ☐ lek ☐ other

Location Description (please attach map AND/OR fill out your choice of coordinates, below)

County: Sonoma Landowner / Mgr: Private
Quad Name: The Geysers Elevation: 1650'
T___ R___ Sec___, ___¼ of ___ ¼, Meridian: H ( ) M ( ) S ( ) Source of Coordinates (GPS, topo. map & type): GPS
T___ R___ Sec___, ___¼ of ___ ¼, Meridian: H ( ) M ( ) S ( ) GPS Make & Model: Trimble R1
DATUM: NAD27 ( ) NAD83 (●) WGS84 ( ) Horizontal Accuracy: 1 m meters/feet
Coordinate System: UTM Zone 10 ( ) UTM Zone 11 ( ) ***OR*** Geographic (Latitude & Longitude) (●)
Coordinates: Photo monitoring point for pop. #8: 38.8073349, -122.8264389; pop. #8b: 38.8072198, -122.8261578; pop. #9: 38.8059464, -122.8229904; pop. #10a: 38.8069839, -122.8214188; pop. #10b: 38.8069839, -122.8214188

Habitat Description (plants & animals) *plant communities, dominants, associates, substrates/soils, aspects/slope:*
Animal Behavior *(Describe observed behavior, such as territoriality, foraging, singing, calling, copulating, perching, roosting, etc., especially for avifauna):*

Annual grassland around bare geothermally active areas with steam vents. Associated with typical grassland species, e.g., Italian ryegrass (Festuca perennis) and soft chess (Bromus hordeaceus), and non-native perennial Bermuda grass.

Please fill out separate form for other rare taxa seen at this site.

Site Information

Overall site/occurrence quality/viability (site + population): ( ) Excellent (●) Good ( ) Fair ( ) Poor
Immediate AND surrounding land use: Geothermal development
Visible disturbances: natural erosion
Threats: _____
Comments: Population #8, 9 and 10 remain stable, with some mortality on the west end of population #8, since most of the plants along the slope have either dried or slid downslope, an additional population (#8b) was established further to the east. Pop. #10a has increased with vigorous growth, and Pop. #10b appears somewhat stressed.

Determination: *(check one or more, and fill in blanks)*

☐ Keyed (cite reference): _____
☐ Compared with specimen housed at: _____
☐ Compared with photo / drawing in: _____
☐ By another person (name): _____
☒ Other: previous identification

Photographs: *(check one or more)*

	Slide	Print	Digital
Plant / animal	☐	☐	☐
Habitat	☐	☐	☒
Diagnostic feature	☐	☐	☐

May we obtain duplicates at our expense? (●) yes ( ) no

Appendix B

Geysers Panicum Monitoring Photos

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Population 1- Occurrence 1 – Historic Geysers Resort Area

2008

2020

Population 2- Occurrence 2 – Hot Springs Creek

2008

2020

Population 3 Occurrence 2 – Hot Springs Creek

2008

2017

Population 4 Occurrence 7 – Big Sulphur Creek Road
0.3 miles south of Burned Mountain Road

2008

2020

Population 5 Occurrence 4 – USGS Bench Mark 2163

2008

2020

Population 6 Occurrence 3 – Little Geysers Creek

2008

2020

Population 7 Occurrence 3 – Little Geysers

2008

2020

Population 8 Occurrence 10 – Sulphur Bank Drive Area

2008

2020

Population 8 Occurrence 10 – Sulphur Bank Drive Area

New Photo Point 8B

2017

2020

Population 9 Occurrence 10 – Sulphur Bank Drive Area

2008

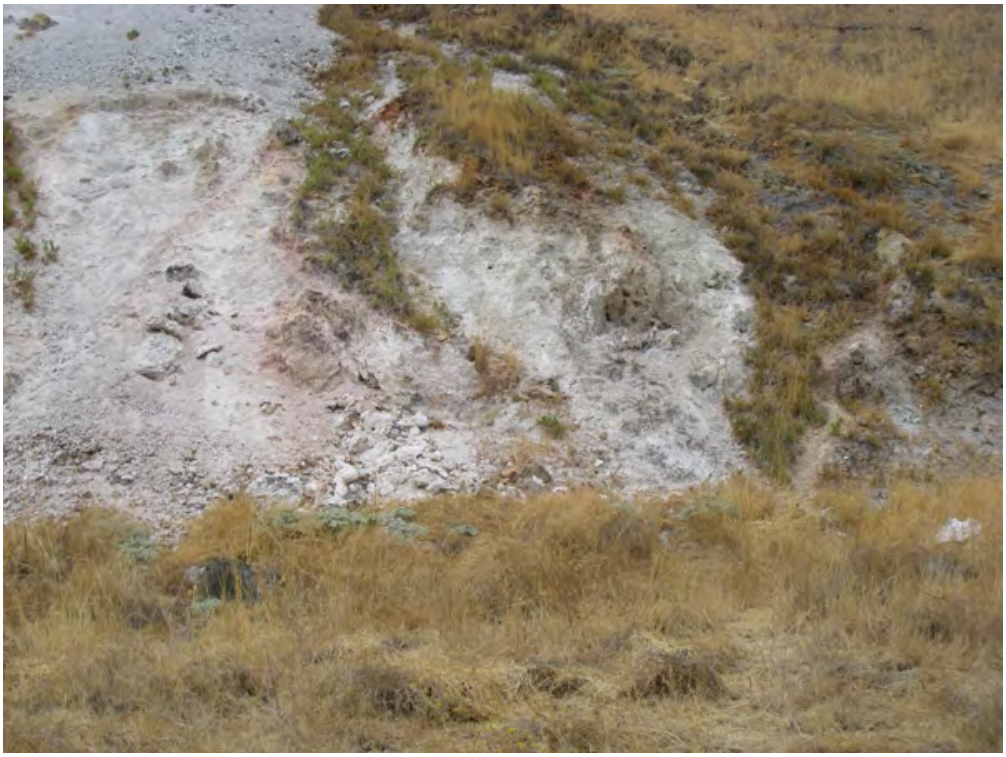
2020

Population 9 Occurrence 10 – Sulphur Bank Drive Area (zoomed in)

2008

2020

Population 10A Occurrence 10 – Sulphur Bank Drive Area



2008

2020

Population 10B Occurrence 10 – Sulphur Bank Drive Area

2008

2020

Population 2, view facing downslope from Burned Mountain Road. Areas of mortality are circled in pink.

Appendix C

2014 Geysers Dichanthelium Monitoring Report

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ESA Biological Resources

2600 Capitol Avenue
Suite 200
Sacramento, CA 95816
916.564.4500 phone
916.564.4501 fax

www.esassoc.com

November 4, 2014

Cherilyn Burton
Habitat Conservation Branch
Department of Fish and Wildlife
1416 9th Street, Suite 1260
Sacramento, CA 95814

Subject: 2014 Geysers Dichanthelium Monitoring Report

Dear Ms. Burton:

This memorandum documents the results of the 2014 monitoring of Geysers dichanthelium (*Dichanthelium acuminatum* ssp. *thermale*). Ten populations of Geysers dichanthelium, located at The Geysers in Sonoma County, California, are being monitored once every three years from 2008 through 2022 in accordance with the Memorandum of Understanding (MOU) by and between Geysers Power Company, LLC. and the California Department of Fish and Wildlife and the *Monitoring Plan for Geysers Dichanthelium (*Dichanthelium acuminatum *subsp.* thermale*)* that is included as an attachment to the MOU. The purpose of this monitoring is to document and assess trends, changes, and threats to the existing populations of Geysers dichanthelium at The Geysers.

On September 29-30, 2014 ESA botanists Gerrit Platenkamp and Rachel Brownsey visited the ten populations of Geysers dichanthelium at The Geysers in Sonoma County. These populations correspond with six known California Natural Diversity Database (CNDDB) occurrences in this area and have been monitored and studied since the 1980s.

Pacific Gas and Electric (PG&E) botanists first began monitoring the populations in 1982 and continued through 1989 which lead to some experimental studies in 1992-1994 by Bruce Pavlik (2001) and Pavlik and Enberg (2001). Annual monitoring continued from 1995 through 2005 by Gerrit Platenkamp (2005). The 2005 monitoring report includes a summary of the results of earlier monitoring and a summary of the scientific studies conducted at the Geysers dichanthelium population at Little Geysers, providing a comprehensive discussion of plant taxonomy, physiological ecology, and population changes over time. Geysers dichanthelium plant demography and population dynamics are also described in Platenkamp and De Becker (2011) based on the many years of monitoring and scientific research of the Geysers dichanthelium population at Little Geysers sponsored by PG&E and Calpine.

Standardized Photograph Monitoring Methods

A permanent photograph location was established in 2008 at each population at a point where a typical portion of the dichanthelium population was visible. In 2008 a photograph was taken at each point with a Pentax Optio W30 digital camera in wide angle setting with focal length = 6.3 mm (equivalent to a focal length of 38 mm of a 35 mm camera) on a tripod. In 2011 and 2014 higher resolution photographs were taken with a Canon EOS Digital SLR set at approximately 38 mm focal length. The height of the optical axis of the lens was approximately 54 inches.

In 2008, the photograph locations were marked with a non-corroding plastic resin core plant stake with an aluminum tree tag. The coordinates of the location (latitude and longitude in decimal degrees, NAD83) were recorded with a GPS unit and compass bearing from camera to subject (optical axis) was also recorded (declination = 15°) (Table 1). Coordinates were differentially corrected. In 2014, the monitoring points were located with a Trimble GeoXT global positioning system (GPS) unit with submeter accuracy. Hardcopy prints of the 2008 and 2011 photographs were used to match the viewfinder image on the camera in 2014 to the 2008 and 2011 images. In some cases new growth of trees and shrubs, or steam, blocked part of the images in 2011 and 2014.

Photographs taken at the permanent monitoring locations for 2008 and 2014 are provided in Figure 1 (attached).

Table 1. Permanent Photograph Monitoring Locations

Population Number	CNDDB Occurrence	Description	Easting	Northing	Bearing (o)
1	Occ 1	Historic Geysers Resort Area	-122.805221557617	38.800277709961	122
2	Occ 2	Hot Springs Creek	-122.779258728027	38.789157867432	226
3*	Occ 2	Hot Springs Creek (canyon)	-122.781865000000	38.788423000000	10
4	Occ 7	Big Sulphur Creek Rd. 0.3 mi S of Burned Mtn. Rd.	-122.774948120117	38.785301208496	92
5	Occ 4	USGS Bench Mark 2163	-122.770141601562	38.783237457275	318
6	Occ 3	Little Geysers Creek	-122.752235412597	38.772460937500	312
7	Occ 3	Little Geysers	-122.749748229980	38.773571014404	85
8	Occ 10	Sulphur Bank Drive Area (west)	-122.826438903808	38.807334899902	86
9	Occ 10	Sulphur Bank Drive Area (central)	-122.822990417480	38.805946350098	280
10A	Occ 10	Sulphur Bank Drive Area (east)	-122.821418762207	38.806983947754	285
10B	Occ 10	Sulphur Bank Drive Area (far east)	-122.821418762207	38.806983947754	102

Note:

* In steep canyon: no GPS reading possible, coordinates based on aerial image (Google Earth)

Population and Habitat Status and Trends

Natural geothermal surface manifestations continue to fluctuate in intensity throughout the property. Although precipitation for the 2014 water year (October 2013 – September 2014) was far below average (26.4 inches or 53.2% of average at the Whispering Pines CDEC station [http://cdec.water.ca.gov]), the precipitation in the previous two water years was close to average (44.8 and 51.7 inches, or 90.1 and 104.0% of average, respectively). Previous studies have shown that the amount of rainfall can strongly affect population size in Geysers dichanthelium (Platenkamp 2005; Platenkamp and De Becker 2011). Drier conditions have the result that at the end of the dry season less meteoric (rain- and snow-derived) water is available in the soil and therefore less geothermal steam will be observed at the surface.

The following is a summary of the assessments recorded on the CNDDB field survey forms for all known occurrences of Geysers dichanthelium at The Geysers (Attached).

Occurrence 1 – Historic Geysers Resort Site, Population #1

This large population is in stable condition and the habitat has not changed since the site visit in 2011. Most plants appear to be in good health and there are many flowering stalks present from this year. Some erosion has occurred on the slope above the road.

Occurrence 2 – Hot Springs Creek, Populations #2 and #3

Population 2 is in stable condition with plants downslope of Burned Mountain road appearing very healthy and vigorous near the active geothermal features and along the northwest-facing slope on the opposite side of the creek. Hot Springs Creek, upstream of the road, supports dense cover of Bermuda grass (*Cynodon dactylon*) and only a few Geysers dichanthelium plants were observed at the upstream part of the creek after it leaves the wooded area. Upslope of Burned Mountain road there are also a few patches of Geysers dichanthelium along a dirt road that parallels the creek and along the slope that leads down to the creek.

Population 3 has declined over the past several years. Only three living plants were observed in 2014 while 21 plants were observed in 2011 and 70 were observed in 2008. All vegetation cover on the steep south-facing slope where Geysers dichanthelium occurs has declined since the previous monitoring events; this effect is evident in the photo (Figure 1). The south-facing slope where Geysers dichanthelium plants are rooted appeared to be very dry though there is evidence of geothermal activity (salt crust along the slope).

Occurrence 3 – Little Geysers Area, Populations #6 and #7

Population 6 has been steadily increasing over the past decade. Four-hundred plants were observed in 2014, 200 plants in 2011, 180 plants in 2008, and 120 plants in 2005. The population increase could be the result of deposition of geothermal materials on the creek banks from flooding and erosion that could be providing new substrate for the plants.

Population 7 is the Little Geysers population that has remained in stable condition over the past several years. The total number of individuals is estimated at 100,000, an approximately 10% decline compared to 2011. In 2014, plants appeared to be experiencing drought stress evident by much dead above-ground material, few vigorous green leaves, and very few seedlings. Densities for most patches appeared to be lower than in previous years, except on north-facing slopes. The exotic grass broomsedge bluestem (*Andropogon virginicus* var. *virginicus*) has a very patchy distribution at this site and is mainly located near the stream.

Occurrence 4 – USGS Bench Mark 2163, Population #5

Geysers dichanthelium plants at population 5 appeared to be mostly dormant at the time of monitoring in 2014. Although very few plants were observed to be dead, most plants had little green foliage and much dead above-ground material. There were few plants at this site that could be described as vigorous. Some erosion was observed at this site that was not present during previous visits. The total number of plants in 2014 is estimated at

4,100, a decrease from the 5,000 observed in 2011, though not much different from the 4,500 plants observed in 2008 and 2005.

Occurrence 7 – Big Sulphur Creek Rd., Population #4

Population 4 has been increasing in recent years. Approximately 435 plants were observed in 2014, up from 300 in 2011, and 200 in 2008. Plants in drier sites appear to be mostly dormant, while plants closer to the geothermal features are vigorous with plenty of green leaves.

Occurrence 10 – Sulphur Bank Drive Area, Populations #8, #9, and #10

Populations 8, 9, and 10 collectively remain stable with approximately 2,000 plants. There was some mortality of plants on the west end of population 8 just upslope of the road while vigorous young plants are spreading in the abandoned roadbed. This population shift is evident in the site photo (Figure 1). Population 9 is considered stable. Most plants appear to be healthy despite the dry conditions. Plants of population 10 appeared to be mostly dormant due to drought this year, but most plants have some green leaves and mortality was not observed at this site. The fig trees (*Ficus carica*) and Himalayan blackberry (*Rubus armeniacus*) thickets along the road leading to population 8 have continued to expand making it difficult to access this population.

Conclusion

The recent drought conditions appear to have impacted density and dormancy status at some, but not all populations. In cases where population reductions were observed (populations 3 and 8), it is likely that a reduction in the availability of meteoric water (originating from rainfall) is the main cause of plant mortality. Overall, population numbers have remained stable in 2014 when compared with previous monitoring events (2011 and 2008).

Invasive plants, including Bermuda grass and broomsedge bluestem, continue to occupy large areas at populations 2 and 7, respectively. Natural erosion along steep slopes and creek channels where Geysers dichanthelium plants are present could result in plant mortality. However, natural erosion has been limited in extent during the recent monitoring periods, as can be seen in the photo comparisons (Figure 1). At population 6 a substantial increase in population size was observed within an area of active deposition and erosion of sediment.

References

Pavlik, B. M. 2001. Developing an ecosystem perspective from experimental monitoring programs: II. Ecophysiological responses of a rare geothermal grass to soil water. Environmental Management 28: 243–253.

Pavlik, B. M, and A. Enberg. 2001. Developing an ecosystem perspective from experimental monitoring programs: I. Demographic responses of a rare geothermal grass to soil temperature. Environmental Management 28: 225–242.

Platenkamp, G. 2005. Monitoring Geysers Dichanthelium (*Dichanthelium acuminatum* subsp. *thermale*) 2001-2005 Final Report. Prepared for Calpine by Moore Iacofano Goltsman, Inc. Davis, CA.

Platenkamp, G.A.J and S. De Becker. 2011. Monitoring Demography and Population Dynamics of Geysers Dichanthelium (*Dichanthelium acuminatum* subsp. *thermale*). Pp. 256–263 In: J.W. Willoughby, B.K. Orr, K.A. Schierenbeck, and N.J. Jensen [eds.], Proceedings of the CNPS Conservation Conference: Strategies and Solutions, 17–19 Jan 2009, California Native Plant Society, Sacramento, CA.

Sincerely,

Rachel Brownsey, Project Manager

Attachments: Figure 1 (photographs)
California Native Field Survey Forms

cc: Ms. Andrea Martine (CEC)
Mr. Jeb Bjerke (CDFW)
Ms. Kristi Lazar (CDFW)
Mr. Bruce Carlsen (Calpine)
Ms. Jody Spooner (Calpine)

Population 1- Occurrence 1 – Historic Geysers Resort Area

2008

2014

Population 2- Occurrence 2 – Hot Springs Creek

2008

2014

Population 3 Occurrence 2 – Hot Springs Creek

2008

2014

Population 4 Occurrence 7 – Big Sulphur Creek Road

0.3 miles south of Burned Mountain Road

2008

2014

Population 5 Occurrence 4 – USGS Bench Mark 2163

2008

2014

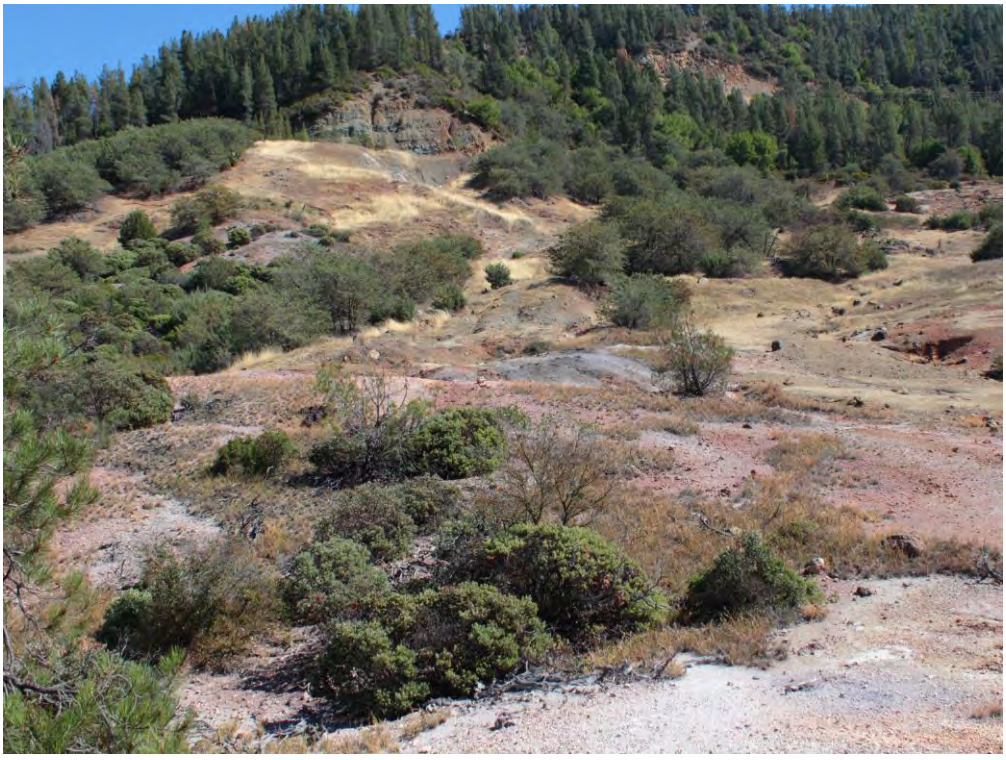
Population 6 Occurrence 3 – Little Geysers Creek

2008

2014

Population 7 Occurrence 3 – Little Geysers

2008



2014

Population 8 Occurrence 10 – Sulphur Bank Drive Area

2008

2014

Population 9 Occurrence 10 – Sulphur Bank Drive Area

2008

2014

Population 9 Occurrence 10 – Sulphur Bank Drive Area (zoomed in)

2008

2014

Population 10A Occurrence 10 – Sulphur Bank Drive Area

2008

2014

Population 10B Occurrence 10 – Sulphur Bank Drive Area

2008

2014

Mail to:
California Natural Diversity Database
California Dept. of Fish & Wildlife
1807 13th Street, Suite 202
Sacramento, CA 95811
Fax: (916) 324-0475 email: CNDDB@wildlife.ca.gov

Date of Field Work (mm/dd/yyyy): 09/30/2014

For Office Use Only
Source Code: _____ Quad Code: _____
Elm Code: _____ Occ No.: _____
EO Index: _____ Map Index: _____

Clear Form

California Native Species Field Survey Form

Print Form

Scientific Name: *Dichanthelium acuminatum subsp. thermale*

Common Name: Geysers dichanthelium

Species Found? (●) Yes ( ) No _____ If not found, why?

Total No. Individuals: 50,000 Subsequent Visit? (●) Yes ( ) No

Is this an existing NDDB occurrence? 1 Yes, Occ. # ☐ No ☐ Unk.

Collection? If yes: no Number _____ Museum / Herbarium

Reporter: Gerrit Platenkamp, Rachel Brownsey
Address: ESA 2600 Capitol Ave, suite 200
Sacramento, CA 95816
E-mail Address: rbrownsey@esassoc.com
Phone: 916.564.4500

Plant Information

Phenology:
0 % vegetative | 0 % flowering | 100 % fruiting

Animal Information

_____ # adults | _____ # juveniles | _____ # larvae | _____ # egg masses | _____ # unknown

☐ wintering ☐ breeding ☐ nesting ☐ rookery ☐ burrow site ☐ lek ☐ other

Location Description (please attach map AND/OR fill out your choice of coordinates, below)

County: Sonoma Landowner / Mgr: Private
Quad Name: The Geysers Elevation: 1600'
T___ R___ Sec___, ___¼ of ___¼, Meridian: H ( ) M ( ) S ( ) Source of Coordinates (GPS, topo. map & type): GPS
T___ R___ Sec___, ___¼ of ___¼, Meridian: H ( ) M ( ) S ( ) GPS Make & Model: Trimble GH
DATUM: **NAD27** ( ) **NAD83** (●) **WGS84** ( ) Horizontal Accuracy: _____ meters/feet
Coordinate System: UTM Zone 10 ( ) UTM Zone 11 ( ) ***OR*** Geographic (Latitude & Longitude) ( )
Coordinates: Photo monitoring point 38.80027771, -122.8052216

Habitat Description (plants & animals) *plant communities, dominants, associates, substrates/soils, aspects/slope:*
Animal Behavior *(Describe observed behavior, such as territoriality, foraging, singing, calling, copulating, perching, roosting, etc., especially for avifauna):*

Annual grassland and bare, steep eroded slope on geothermally altered soil, mostly facing south.

Please fill out separate form for other rare taxa seen at this site.

Site Information

Overall site/occurrence quality/viability (site + population): (●) Excellent ( ) Good ( ) Fair ( ) Poor
Immediate AND surrounding land use: Geothermal development
Visible disturbances: some natural erosion on slope above the road.
Threats: _____
Comments: This occurrence is in stable condition. Plants appear to be in good health and many flowering stalks are present from this year.

Determination: *(check one or more, and fill in blanks)*

☐ Keyed (cite reference): _____
☐ Compared with specimen housed at: _____
☐ Compared with photo / drawing in: _____
☐ By another person (name): _____
☒ Other: previous identification

Photographs: *(check one or more)*

	Slide	Print	Digital
Plant / animal	☐	☐	☐
Habitat	☐	☐	☒
Diagnostic feature	☐	☐	☐

May we obtain duplicates at our expense? (●) yes ( ) no

Mail to:
California Natural Diversity Database
California Dept. of Fish & Wildlife
1807 13th Street, Suite 202
Sacramento, CA 95811
Fax: (916) 324-0475 email: CNDDB@wildlife.ca.gov

Date of Field Work (mm/dd/yyyy): 09/30/2014

For Office Use Only
Source Code: _____ Quad Code: _____
Elm Code: _____ Occ No.: _____
EO Index: _____ Map Index: _____

Clear Form

California Native Species Field Survey Form

Print Form

Scientific Name: *Dichanthelium acuminatum subsp. thermale*

Common Name: Geysers dichanthelium

Species Found? (●) Yes ( ) No _____ If not found, why?

Total No. Individuals: 10,000 Subsequent Visit? (●) Yes ( ) No

Is this an existing NDDB occurrence? 2 Yes, Occ. # ☐ No ☐ Unk.

Collection? If yes: no Number _____ Museum / Herbarium

Reporter: Gerrit Platenkamp, Rachel Brownsey
Address: ESA 2600 Capitol Ave, suite 200
Sacramento, CA 95816
E-mail Address: rbrownsey@esassoc.com
Phone: 916.564.4500

Plant Information

Phenology:
0 % vegetative | 0 % flowering | 100 % fruiting

Animal Information

_____ # adults | _____ # juveniles | _____ # larvae | _____ # egg masses | _____ # unknown

☐ wintering ☐ breeding ☐ nesting ☐ rookery ☐ burrow site ☐ lek ☐ other

Location Description *(please attach map AND/OR fill out your choice of coordinates, below)*

County: Sonoma Landowner / Mgr: Private
Quad Name: The Geysers Elevation: 1900'
T___ R___ Sec___, ___¼ of ___¼, Meridian: H ( ) M ( ) S ( ) Source of Coordinates (GPS, topo. map & type): GPS
T___ R___ Sec___, ___¼ of ___¼, Meridian: H ( ) M ( ) S ( ) GPS Make & Model: Trimble GH
DATUM: **NAD27** ( ) **NAD83** (●) **WGS84** ( ) Horizontal Accuracy: _____ meters/feet
Coordinate System: UTM Zone 10 ( ) UTM Zone 11 ( ) ***OR*** Geographic (Latitude & Longitude) ( )
Coordinates: Photo monitoring point for population #2: 38.78915787, -122.7792587
Photo monitoring point for population #3: 83.788423, -122.781865 (coordinates from Google Earth)

Habitat Description (plants & animals) *plant communities, dominants, associates, substrates/soils, aspects/slope:*
Animal Behavior *(Describe observed behavior, such as territoriality, foraging, singing, calling, copulating, perching, roosting, etc., especially for avifauna):*

Population #2: Growing along stream in annual grassland, with monkeyflower (Mimulus guttatus) and broomsedge (Andropogon virginicus var. virginicus). Bermuda grass (Cynodon dactylon) is very dense and may be expanding. Area is highly geothermally active.
Population #3: Three plants growing along canyon wall on geothermally altered soil near seeps and geothermal springs in the creek. Plants are growing in the shade of riparian trees and exotic fig (Ficus carica).

Please fill out separate form for other rare taxa seen at this site.

Site Information

Overall site/occurrence quality/viability (site + population): ( ) Excellent (●) Good ( ) Fair ( ) Poor
Immediate AND surrounding land use: Geothermal development
Visible disturbances: _____
Threats: competition with Bermuda grass (population #2), scour from high water (population #3)
Comments: This occurrence is comprised of populations #2 and #3. Population #2 is stable with approximately 10,000 plants. Population #3 has steadily declined over the past several years with only three living plants observed in 2014.

Determination: *(check one or more, and fill in blanks)*

☐ Keyed (cite reference): _____
☐ Compared with specimen housed at: _____
☐ Compared with photo / drawing in: _____
☐ By another person (name): _____
☒ Other: previous identification

Photographs: *(check one or more)*

	Slide	Print	Digital
Plant / animal	☐	☐	☐
Habitat	☐	☐	☒
Diagnostic feature	☐	☐	☐

May we obtain duplicates at our expense? (●) yes ( ) no

Mail to:
California Natural Diversity Database
California Dept. of Fish & Wildlife
1807 13th Street, Suite 202
Sacramento, CA 95811
Fax: (916) 324-0475 email: CNDDB@wildlife.ca.gov

Date of Field Work (mm/dd/yyyy): 09/30/2014

For Office Use Only
Source Code: _____ Quad Code: _____
Elm Code: _____ Occ No.: _____
EO Index: _____ Map Index: _____

Clear Form

California Native Species Field Survey Form

Print Form

Scientific Name: *Dichanthelium acuminatum subsp. thermale*

Common Name: Geysers dichanthelium

Species Found? (●) Yes ( ) No _____ If not found, why?

Total No. Individuals: 100,400 Subsequent Visit? (●) Yes ( ) No

Is this an existing NDDB occurrence? 3 Yes, Occ. # ☐ No ☐ Unk.

Collection? If yes: no Number _____ Museum / Herbarium

Reporter: Gerrit Platenkamp, Rachel Brownsey
Address: ESA 2600 Capitol Ave, suite 200
Sacramento, CA 95816
E-mail Address: rbrownsey@esassoc.com
Phone: 916.564.4500

Plant Information

Phenology:
0 % vegetative | 0 % flowering | 100 % fruiting

Animal Information

_____ # adults | _____ # juveniles | _____ # larvae | _____ # egg masses | _____ # unknown

☐ wintering ☐ breeding ☐ nesting ☐ rookery ☐ burrow site ☐ lek ☐ other

Location Description (please attach map AND/OR fill out your choice of coordinates, below)

County: Sonoma Landowner / Mgr: Private
Quad Name: The Geysers Elevation: 2700'
T___ R___ Sec___, ___¼ of ___¼, Meridian: H ( ) M ( ) S ( ) Source of Coordinates (GPS, topo. map & type): GPS
T___ R___ Sec___, ___¼ of ___¼, Meridian: H ( ) M ( ) S ( ) GPS Make & Model: Trimble GH
DATUM: NAD27 ( ) NAD83 (●) WGS84 ( ) Horizontal Accuracy: _____ meters/feet
Coordinate System: UTM Zone 10 ( ) UTM Zone 11 ( ) ***OR*** Geographic (Latitude & Longitude) ( )
Coordinates: Photo monitoring point for population #6: 38.772.16093750, -122.752235412597
Photo monitoring point for population #7: 38.77357101, -122.7497482

Habitat Description (plants & animals) *plant communities, dominants, associates, substrates/soils, aspects/slope:*
Animal Behavior *(Describe observed behavior, such as territoriality, foraging, singing, calling, copulating, perching, roosting, etc., especially for avifauna):*

Plants growing in a variety of geothermally altered habitats, along streams, on slopes of various exposures. Surrounded by annual grassland, knobcone pine (Pinus attenuata), McNab cypress (Hesperocyparis macnabiana), manzanita (Arctostaphylos sp.), and interior live oak (Quercus wislizenii). The non-native large rattlesnake grass (Briza maxima) noted in 2005 is still present.

Please fill out separate form for other rare taxa seen at this site.

Site Information

Overall site/occurrence quality/viability (site + population): ( ) Excellent (●) Good ( ) Fair ( ) Poor
Immediate AND surrounding land use: Geothermal development
Visible disturbances: Flooding of Little Geysers Creek causes some erosion and deposition on creek banks (population #6)
Threats: _____
Comments: Population #6 is increasing while population #7 shows 10% reduction. Population #7 shows reduced density. Many plants in population #7 appeared to be dormant, particularly those along the stream which was dry at the time of the survey. Several young plants were observed on the N. facing slope along the creek at population #7.

Determination: *(check one or more, and fill in blanks)*

☐ Keyed (cite reference): _____
☐ Compared with specimen housed at: _____
☐ Compared with photo / drawing in: _____
☐ By another person (name): _____
☒ Other: previous identification

Photographs: *(check one or more)*

	Slide	Print	Digital
Plant / animal	☐	☐	☐
Habitat	☐	☐	☒
Diagnostic feature	☐	☐	☐

May we obtain duplicates at our expense? (●) yes ( ) no

Mail to:
California Natural Diversity Database
California Dept. of Fish & Wildlife
1807 13th Street, Suite 202
Sacramento, CA 95811
Fax: (916) 324-0475 email: CNDDB@wildlife.ca.gov

For Office Use Only
Source Code: _____ Quad Code: _____
Elm Code: _____ Occ No.: _____
EO Index: _____ Map Index: _____

Date of Field Work (mm/dd/yyyy): 09/29/2014

Clear Form

California Native Species Field Survey Form

Print Form

Scientific Name: *Dichanthelium acuminatum subsp. thermale*

Common Name: Geysers dichanthelium

Species Found? (●) Yes ( ) No _____ If not found, why?

Total No. Individuals: 4,100 Subsequent Visit? (●) Yes ( ) No

Is this an existing NDDB occurrence? 4 Yes, Occ. # [ ] No [ ] Unk.

Collection? If yes: no Number _____ Museum / Herbarium

Reporter: Gerrit Platenkamp, Rachel Brownsey
Address: ESA 2600 Capitol Ave, suite 200
Sacramento, CA 95816
E-mail Address: rbrownsey@esassoc.com
Phone: 916.564.4500

Plant Information

Phenology:
0 % vegetative | 0 % flowering | 100 % fruiting

Animal Information

_____ # adults | _____ # juveniles | _____ # larvae | _____ # egg masses | _____ # unknown

[ ] wintering [ ] breeding [ ] nesting [ ] rookery [ ] burrow site [ ] lek [ ] other

Location Description (please attach map AND/OR fill out your choice of coordinates, below)

County: Sonoma Landowner / Mgr: Private
Quad Name: The Geysers Elevation: 2054'
T___ R___ Sec___, ___¼ of ___¼, Meridian: H ( ) M ( ) S ( ) Source of Coordinates (GPS, topo. map & type): GPS
T___ R___ Sec___, ___¼ of ___¼, Meridian: H ( ) M ( ) S ( ) GPS Make & Model: Trimble GH
DATUM: NAD27 ( ) NAD83 (●) WGS84 ( ) Horizontal Accuracy: _____ meters/feet
Coordinate System: UTM Zone 10 ( ) UTM Zone 11 ( ) ***OR*** Geographic (Latitude & Longitude) ( )
Coordinates: Photo monitoring point for population #5: 38.78323746, -122.7701416

Habitat Description (plants & animals) *plant communities, dominants, associates, substrates/soils, aspects/slope:*
Animal Behavior *(Describe observed behavior, such as territoriality, foraging, singing, calling, copulating, perching, roosting, etc., especially for avifauna):*

On geothermally altered soil surrounded by annual grassland. Mostly on south-facing slope 5-15% in full sun.

Please fill out separate form for other rare taxa seen at this site.

Site Information

Overall site/occurrence quality/viability (site + population): ( ) Excellent ( ) Good (●) Fair ( ) Poor
Immediate AND surrounding land use: Geothermal development
Visible disturbances: Natural erosion is increasing
Threats: _____
Comments: The estimated number of plants at population #6 has decreased from previous years (5,000 in 2011, 4,500 in 2008 and 2005), and 4,100 in 2014. Plants appear dormant this year with very few green plants.

Determination: *(check one or more, and fill in blanks)*

[ ] Keyed (cite reference): _____
[ ] Compared with specimen housed at: _____
[ ] Compared with photo / drawing in: _____
[ ] By another person (name): _____
[x] Other: previous identification

Photographs: *(check one or more)*

	Slide	Print	Digital
Plant / animal	[ ]	[ ]	[ ]
Habitat	[ ]	[ ]	[x]
Diagnostic feature	[ ]	[ ]	[ ]

May we obtain duplicates at our expense? ( ) yes ( ) no

Mail to:
California Natural Diversity Database
California Dept. of Fish & Wildlife
1807 13th Street, Suite 202
Sacramento, CA 95811
Fax: (916) 324-0475 email: CNDDB@wildlife.ca.gov

Date of Field Work (mm/dd/yyyy): 09/29/2014

For Office Use Only
Source Code: _____ Quad Code: _____
Elm Code: _____ Occ No.: _____
EO Index: _____ Map Index: _____

Clear Form

California Native Species Field Survey Form

Print Form

Scientific Name: *Dichanthelium acuminatum subsp. thermale*

Common Name: Geysers dichanthelium

Species Found? (●) Yes ( ) No _____ If not found, why?

Total No. Individuals: 435 Subsequent Visit? (●) Yes ( ) No

Is this an existing NDDB occurrence? 7 Yes, Occ. # ☐ No ☐ Unk.

Collection? If yes: no Number _____ Museum / Herbarium

Reporter: Gerrit Platenkamp, Rachel Brownsey
Address: ESA 2600 Capitol Ave, suite 200
Sacramento, CA 95816
E-mail Address: rbrownsey@esassoc.com
Phone: 916.564.4500

Plant Information

Phenology:
0 % vegetative | 0 % flowering | 100 % fruiting

Animal Information

_____ # adults | _____ # juveniles | _____ # larvae | _____ # egg masses | _____ # unknown

☐ wintering ☐ breeding ☐ nesting ☐ rookery ☐ burrow site ☐ lek ☐ other

Location Description (please attach map AND/OR fill out your choice of coordinates, below)

County: Sonoma Landowner / Mgr: Private
Quad Name: The Geysers Elevation: 1900'
T___ R___ Sec___, ___¼ of ___¼, Meridian: H ( ) M ( ) S ( ) Source of Coordinates (GPS, topo. map & type): GPS
T___ R___ Sec___, ___¼ of ___¼, Meridian: H ( ) M ( ) S ( ) GPS Make & Model: Trimble GH
DATUM: **NAD27** ( ) **NAD83** (●) **WGS84** ( ) Horizontal Accuracy: _____ meters/feet
Coordinate System: UTM Zone 10 ( ) UTM Zone 11 ( ) ***OR*** Geographic (Latitude & Longitude) ( )
Coordinates: Photo monitoring point for population #4: 38.78530121, -122.7749481

Habitat Description (plants & animals) *plant communities, dominants, associates, substrates/soils, aspects/slope:*
Animal Behavior *(Describe observed behavior, such as territoriality, foraging, singing, calling, copulating, perching, roosting, etc., especially for avifauna):*

On geothermally altered soil near thermal hot springs along creek. Associated species include broomsedge, yerba santa (Eriodictyon californicum), and monkeyflower. Plants also grow on bare soil. Area burned in 1991. Plants are also growing on bare soil on eroding banks.

Please fill out separate form for other rare taxa seen at this site.

Site Information

Overall site/occurrence quality/viability (site + population): (●) Excellent ( ) Good ( ) Fair ( ) Poor
Immediate AND surrounding land use: Geothermal development
Visible disturbances: _____
Threats: _____
Comments: Population 4 appears to be increasing in recent years. Approximately 435 plants were observed in 2014, up from 300 in 2011 and 200 in 2008. Plants in drier sites appear to be dormant, while plants closer to the geothermal features show plenty of green leaves.

Determination: *(check one or more, and fill in blanks)*

☐ Keyed (cite reference): _____
☐ Compared with specimen housed at: _____
☐ Compared with photo / drawing in: _____
☐ By another person (name): _____
☒ Other: previous identification

Photographs: *(check one or more)*

	Slide	Print	Digital
Plant / animal	☐	☐	☐
Habitat	☐	☐	☒
Diagnostic feature	☐	☐	☐

May we obtain duplicates at our expense? (●) yes ( ) no

Mail to:
California Natural Diversity Database
California Dept. of Fish & Wildlife
1807 13th Street, Suite 202
Sacramento, CA 95811
Fax: (916) 324-0475 email: CNDDB@wildlife.ca.gov

Date of Field Work (mm/dd/yyyy): 09/30/2014

For Office Use Only
Source Code: _____ Quad Code: _____
Elm Code: _____ Occ No.: _____
EO Index: _____ Map Index: _____

Clear Form

California Native Species Field Survey Form

Print Form

Scientific Name: *Dichanthelium acuminatum subsp. thermale*

Common Name: Geysers dichanthelium

Species Found? (●) Yes ( ) No _____ If not found, why?

Total No. Individuals: 2,000 Subsequent Visit? (●) Yes ( ) No

Is this an existing NDDB occurrence? 10 Yes, Occ. # [ ] No [ ] Unk.

Collection? If yes: no Number _____ Museum / Herbarium

Reporter: Gerrit Platenkamp, Rachel Brownsey
Address: ESA 2600 Capitol Ave, suite 200
Sacramento, CA 95816
E-mail Address: rbrownsey@esassoc.com
Phone: 916.564.4500

Plant Information

Phenology:
0 % vegetative | 0 % flowering | 100 % fruiting

Animal Information

_____ # adults | _____ # juveniles | _____ # larvae | _____ # egg masses | _____ # unknown

[ ] wintering [ ] breeding [ ] nesting [ ] rookery [ ] burrow site [ ] lek [ ] other

Location Description (please attach map AND/OR fill out your choice of coordinates, below)

County: Sonoma Landowner / Mgr: Private
Quad Name: The Geysers Elevation: 1650'
T___ R___ Sec___, ___¼ of ___ ¼, Meridian: H ( ) M ( ) S ( ) Source of Coordinates (GPS, topo. map & type): GPS
T___ R___ Sec___, ___¼ of ___ ¼, Meridian: H ( ) M ( ) S ( ) GPS Make & Model: Trimble GH
DATUM: **NAD27** ( ) **NAD83** (●) **WGS84** ( ) Horizontal Accuracy: _____ meters/feet
Coordinate System: UTM Zone 10 ( ) UTM Zone 11 ( ) ***OR*** Geographic (Latitude & Longitude) ( )
Coordinates: Photo monitoring point for population #8: 38.8073349, -122.8264389; population #9: 38.80594635, -122.8229904; population #10: 38.80698395, -122.8214188

Habitat Description (plants & animals) *plant communities, dominants, associates, substrates/soils, aspects/slope:*
Animal Behavior *(Describe observed behavior, such as territoriality, foraging, singing, calling, copulating, perching, roosting, etc., especially for avifauna):*

Annual grassland around bare geothermally active areas with steam vents. Associated with typical grassland species, e.g., Italian ryegrass (Festuca perennis) and soft chess (Bromus hordeaceus), and non-native perennial Bermuda grass.

Please fill out separate form for other rare taxa seen at this site.

Site Information

Overall site/occurrence quality/viability (site + population): ( ) Excellent (●) Good ( ) Fair ( ) Poor
Immediate AND surrounding land use: Geothermal development
Visible disturbances: natural erosion
Threats: _____
Comments: Populations #8, #9, and #10 collectively remain stable with approximately 2,000 plants. Some mortality was observed at Population #8 just upslope of the road and there is no evidence of recent road maintenance at this site.

Determination: *(check one or more, and fill in blanks)*

[ ] Keyed (cite reference): _____
[ ] Compared with specimen housed at: _____
[ ] Compared with photo / drawing in: _____
[ ] By another person (name): _____
[x] Other: previous identification

Photographs: *(check one or more)*

	Slide	Print	Digital
Plant / animal	[ ]	[ ]	[ ]
Habitat	[ ]	[ ]	[x]
Diagnostic feature	[ ]	[ ]	[ ]

May we obtain duplicates at our expense? (●) yes ( ) no

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Appendix D
2017 Geysers Panicum Monitoring Report

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ESA

2600 Capitol Avenue
Suite 200
Sacramento, CA 95816
916.564.4500 phone
916.564.4501 fax

www.esassoc.com

December 20, 2017

Cherilyn Burton
Habitat Conservation Branch
Department of Fish and Wildlife
1416 9th Street Suite 1260
Sacramento, CA 95814

Subject: 2017 Monitoring of Geysers Panicum Populations at The Geysers

Dear Ms. Burton:

Environmental Science Associates (ESA) is submitting this monitoring report on behalf of Geysers Power Company LLC. in accordance with the Memorandum of Understanding (MOU) by and between Geysers Power Company, LLC. and the California Department of Fish and Wildlife, and the *Monitoring Plan for Geysers Dichanthelium (*Dichanthelium acuminatum *subsp.* thermale*)* that is included as an attachment to the MOU. This report documents the results of the 2017 monitoring of Geysers panicum (*Panicum acuminatum* var. *thermale*[1]). Ten populations of Geysers panicum, located at The Geysers in Sonoma County, California, are being monitored once every three years from 2008 through 2022 in accordance with the MOU. The purpose of this monitoring is to document and assess trends, changes, and threats to the existing populations of Geysers panicum at The Geysers.

On November 1 and 2, 2017 ESA botanists Gerrit Platenkamp and Rachel Brownsey visited the ten populations of Geysers panicum at The Geysers in Sonoma County. These populations correspond with six known California Natural Diversity Database (CNDDB) occurrences in this area and have been monitored and studied since the 1980s. The monitoring period in 2017 was postponed from early October 2017 due to local wildfires which created unsafe conditions and poor air quality.

Pacific Gas and Electric (PG&E) botanists first began monitoring the populations in 1982 and continued through 1989 which lead to some experimental studies in 1992-1994 by Bruce Pavlik (2001) and Pavlik and Enberg (2001). Annual monitoring continued from 1995 through 2005 by Gerrit Platenkamp (2005). The 2005 monitoring report includes a summary of the results of earlier monitoring and a summary of the scientific studies conducted at the Geysers panicum population at Little Geysers, providing a comprehensive discussion of plant taxonomy, physiological ecology, and population changes over time. Geysers panicum plant demography and population dynamics are also described in Platenkamp and De Becker (2011) based on the many years of monitoring and scientific research of the Geysers panicum population at Little Geysers sponsored by PG&E and Calpine.

Standardized Photograph Monitoring Methods

A permanent photograph location was established in 2008 at each population at a point where a typical portion of the panicum population was visible. In 2008 a photograph was taken at each point with a Pentax Optio W30

[1] The synonymy recognized by Jepson Flora Project editors and the California Native Plant Society Inventory of Rare and Endangered Plants for Geysers Panicum has changed since the start of the MOU monitoring period. At the time of preparation of this letter, the accepted taxonomy was *Panicum acuminatum* Sw. var. *thermale* (Bol.) Wipff.

digital camera in wide angle setting with focal length = 6.3 mm (equivalent to a focal length of 38 mm of a 35 mm camera) on a tripod. Since 2011 higher resolution photographs were taken with a Canon EOS Digital SLR set at approximately 21 - 38 mm focal length (depending on site conditions). The height of the optical axis of the lens was approximately 54 inches.

In 2008, the photograph locations were marked with a non-corroding plastic resin core plant stake with an aluminum tree tag. The coordinates of the location (latitude and longitude in decimal degrees, NAD83) were recorded with a GPS unit and compass bearing from camera to subject (optical axis) was also recorded (declination = 15°) (Table 1). Coordinates were differentially corrected. In 2017, the monitoring points were relocated with a Trimble GeoXT global positioning system (GPS) unit with submeter accuracy. Many of the original stakes were relocated while a few located in stream channels, in active geothermal locations, or on shallow rocky substrate were not found. New stakes with tree tags were placed at photopoint locations lacking a stake in 2017. Hardcopy prints of the 2008, 2011, and 2014 photographs were used to match the viewfinder image on the camera in 2017. In some cases, new growth of trees and shrubs, or steam, blocked part of the images in 2017.

In 2017 a photopoint was added at population 8 (CNDDB occurrence 10), and designated Point 8B. This photo location shows the presence and distribution of Geysers panicum plants along the slope to the east of that shown from photo monitoring location 8. Plants shown in photos at monitoring location 8 have died or been washed downslope with eroded material since 2008 and oak trees have grown up to block much of the photo frame. The original photo at population 8 should continue to be taken through the end of the monitoring period; however, its utility in representing this population is expected to continue to be limited in future years.

Photographs taken at the permanent monitoring locations in 2008 and 2017 are provided in **Figure 1** (attached). **Figure 2** shows the location of the monitored populations, and the corresponding CNDDB occurrence number.

Table 1. Permanent Photograph Monitoring Locations

Population Number	CNDDB Occurrence	Description	Easting	Northing	Bearing (o)
1	Occ 1	Historic Geysers Resort Area	-122.805221557617	38.800277709961	122
2	Occ 2	Hot Springs Creek	-122.779258728027	38.789157867432	226
3	Occ 2	Hot Springs Creek (canyon)	-122.78211157500	38.78808059600	10
4	Occ 7	Big Sulphur Creek Rd. 0.3 mi S of Burned Mtn. Rd.	-122.774948120117	38.785301208496	92
5	Occ 4	USGS Bench Mark 2163	-122.770141601562	38.783237457275	318
6	Occ 3	Little Geysers Creek	-122.752235412597	38.772460937500	312
7	Occ 3	Little Geysers	-122.749748229980	38.773571014404	85
8	Occ 10	Sulphur Bank Drive Area (west)	-122.826438903808	38.807334899902	86
8b	Occ 10	Sulphur Bank Drive Area (west)	-122.82615775200	38.80721979500	30
9	Occ 10	Sulphur Bank Drive Area (central)	-122.822990417480	38.805946350098	280
10A	Occ 10	Sulphur Bank Drive Area (east)	-122.821418762207	38.806983947754	285
10B	Occ 10	Sulphur Bank Drive Area (far east)	-122.821418762207	38.806983947754	102

Population and Habitat Status and Trends

Precipitation during water year 2017 was unusually high at the Geysers as well as throughout the state of California. The Whispering Pines CDEC station [http://cdec.water.ca.gov] recorded 94 inches for water year 2017, which is 188 percent of normal. The water year 2016 total precipitation was 58 inches which is around 116 percent of normal; much closer to the average than water year 2017. Previous studies have shown that the amount of rainfall can strongly affect population size in Geysers panicum (Platenkamp 2005; Platenkamp and De Becker 2011) with greater population densities occurring in the year following a wet year. Seedlings were observed at many populations in 2017, and most mature plants had some green leaves. Flowers were observed only on one plant at Population 8; mature plants had dispersed their seeds earlier in the year. High levels of precipitation also affect the abundance and total biomass of annual vegetation. As evident in many of the 2017 photos, there was abundant cover of annual vegetation in 2017. It should be noted that the heavy rainfall in 2017 also appeared to have resulted in substantial erosion of hill slopes with exposed geothermally altered soils, which affected some of the populations, as described below.

In addition, three sites (Populations 5, 6, and 7) were affected by the Valley Fire that occurred in September 2015 and burned a substantial part of the Geysers area. The fire burned trees and shrubs at these sites, but no direct impacts of the fire on Geysers panicum plants was observed. No burned remnants of plants were evident. The appearance of some of the plants two years after the fire suggests that by removing trees and shrubs that shaded some plants, plants may have benefitted indirectly from the additional exposure to sun light.

The following is a summary of the assessments recorded on the CNDDB field survey forms for all known occurrences of Geysers panicum at The Geysers (Attached).

Occurrence 1 – Historic Geysers Resort Site, Population #1

This large population (50,000 plants) is in stable condition and the habitat has not substantially changed since the site visit in 2014, except that at one small area near the road a new eroded area was evident. However, most plants upslope of the road are robust. Most plants downslope of the road appear to be in good health with green leaves sprouting from the base of the plant. No dead plants were observed.

Occurrence 2 – Hot Springs Creek, Populations #2 and #3

Population 2 is in stable condition with an approximate population size of 10,000 plants. Plants downslope of Burned Mountain Road appeared very healthy and vigorous. There was some isolated mortality of plants at the active geothermal feature shown in the photo. This feature has eroded since 2014 causing some plants along the banks to loose substrate. Hot Springs Creek continues to support a diverse suite of wetland plants including many non-natives such as Bermuda grass (*Cynodon dactylon*) and watergrass (*Echinochloa* sp.). There are patches of Geysers panicum adjacent to the creek, and along the steep northwest-facing eroded banks of the slope.

Upslope of Burned Mountain Road Hot Springs Creek has been downcut on the left bank since monitoring in 2014. This did not affect Geysers panicum plants growing along the steep right bank of the creek, just upslope of the road. These plants are healthy. There are Geysers panicum plants growing in the roadside ditch upslope of Burned Mountain Road, both north and south of Hot Springs Creek. Plants in the roadside ditch are healthy and there are many seedlings. Plants grow along the roadcut above the ditch appeared quite vigorous.

Population 3 had been in decline from 2008 to 2014, but numbers have increased since 2014. In 2017 nine plants were observed on the slope shown in the photo, with an additional 14 plants on the same slope about 30 feet downstream (23 plants total). No mortality was observed and the downstream individuals are very vigorous. Only three living plants were observed in 2014 while 21 plants were observed in 2011 and 70 were observed in 2008. The increase in numbers and individual plant vigor in 2017 likely has to do with the wet conditions over the past year. Population 3 occurs on a dry rocky slope, and this population likely declined during the drought in part due to drought conditions, and may be showing recovery in response to the high rainfall of 2017.

Occurrence 3 – Little Geysers Area, Populations #6 and #7

Population 6 has been steadily increasing over the past decade, although the total number is down slightly in 2017 to 350 from the 400 plants in 2014, and approximately 25 dead individuals were observed. Two-hundred plants were observed in 2011, 180 plants in 2008, and 120 plants in 2005. The population increase could be the result of s erosion of the creek banks that provides new substrate for the Geysers panicum plants. Several years ago Calpine enlarged the culvert under the road downstream of the population. The original undersized culvert had caused substantial upstream deposition and that process has now been reversed, and apparently has benefitted the Geysers panicum.

Population 7 is the Little Geysers population that has remained in stable condition over the past several years. The total number of individuals is estimated at 100,000. The distribution has shifted slightly with some areas declining and other areas increasing, but overall the population size has remained stable. This area burned during the Valley Fire in 2015. The fire killed many of the knobcone pine, McNab cypress and manzanita at the Little Geysers and this can be seen in the 2017 photo. There is no evidence that Geysers panicum plants were burned, and some seedlings were observed on the now bare substrate under the shrubs- adjacent to existing Geysers panicum patches. The exotic grass broomsedge bluestem (*Andropogon virginicus* var. *virginicus*) has a very patchy distribution at this site and is mainly located near the streams, it also did not show any evidence of adverse effects from the file.

Occurrence 4 – USGS Bench Mark 2163, Population #5

Geysers panicum plants at population 5 appeared to be mostly dormant at the time of monitoring in 2017, and they could be in slow decline due to increased geothermal activity in this area. Mudpots, fumaroles, and vents were very active during monitoring in 2017. Although few plants were observed to be dead, most plants had little green foliage and much dead above-ground material. The total number of plants in 2017 is estimated at 4,000, just somewhat lower than the 4,100 plants observed in 2014 and lower than population numbers in 2008 and 2005 (4,500 plants).

Occurrence 7 – Big Sulphur Creek Rd., Population #4

Population 4 has been increasing in recent years. Approximately 500 plants were observed in 2017, up from 435 in 2014, 300 in 2011, and 200 in 2008. Plants at the drier upstream site (shown in photo) are difficult to see due to the dense annual vegetation; however, many seedlings were observed (25 seedlings) and mature plants (50 individuals) persist. A portion of the slope shown in the photo has eroded since 2014 and Geysers panicum plants either washed down the slope where they remained rooted in the eroded material or died. Overall, the population size estimate was not affected by this event because of substantial recruitment, which increased the overall

population size. Downstream patches along the creek have expanded. Mature plants are robust with many green leaves, and seedlings are dispersed throughout the area.

Occurrence 10 – Sulphur Bank Drive Area, Populations #8, #9, and #10

Populations 8, 9, and 10 collectively remain stable with approximately 2,000 plants. There was some mortality of plants on the west end of population 8 just upslope of the road while vigorous young plants and many seedlings are spreading in the abandoned roadbed. This population shift is evident in the site photo (Figure 1); most of the plants present along the slope in the photo foreground have either died or slid downslope with eroded material. Due to this population shift, along with two growing oak trees that now obscure part of the photo, ESA established another photo location: 8b. Photo 8b faces the same slope and is located further to the east.

Population 9 is considered stable. Most plants appear to be healthy and have green leaves at the base. No mortality was observed and the population extent does not appear to have decreased. Plants of population 10 (photo 10A) are healthy and this patch appears to have expanded during the past two years. Several seedlings were observed on the slope and mature plants are green and vigorous. Population 10B appears stable; most plants have green leaves at the base, and no change in population extent was evident. The dense annual vegetation and growth of trees downslope make this population difficult to see in the photo.

Conclusion

Average and well above-average precipitation over the past several years has helped maintain healthy populations at all locations. Very little mortality was observed in 2017, with dead plants only in small areas of shifting geothermal activity (Population 5) or recent erosion (Population 8). The Valley Fire of 2015 did not negatively affect populations of Geysers panicum at the Little Geysers (Population 7) Little Geysers Creek (Population 6), or USGS Bench Mark 2163 (Population 5). All other sites were outside of the burned area. Seedlings were observed at many populations and nearly all mature plants had at least some green leaves. Overall, population numbers have remained relatively stable in 2017 when compared with previous monitoring events (2014, 2011 and 2008).

References

Pavlik, B. M. 2001. Developing an ecosystem perspective from experimental monitoring programs: II. Ecophysiological responses of a rare geothermal grass to soil water. Environmental Management 28: 243–253.

Pavlik, B. M, and A. Enberg. 2001. Developing an ecosystem perspective from experimental monitoring programs: I. Demographic responses of a rare geothermal grass to soil temperature. Environmental Management 28: 225–242.

Platenkamp, G. 2005. Monitoring Geysers Dichanthelium (*Dichanthelium acuminatum* subsp. *thermale*) 2001-2005 Final Report. Prepared for Calpine by Moore Iacofano Goltsman, Inc. Davis, CA.

Platenkamp, G.A.J and S. De Becker. 2011. Monitoring Demography and Population Dynamics of Geysers Dichanthelium (*Dichanthelium acuminatum* subsp. *thermale*). Pp. 256–263 In: J.W. Willoughby, B.K. Orr,

K.A. Schierenbeck, and N.J. Jensen [eds.], Proceedings of the CNPS Conservation Conference: Strategies and Solutions, 17–19 Jan 2009, California Native Plant Society, Sacramento, CA.

Sincerely,

Rachel Brownsey, Project Manager Gerrit Platenkamp, Ph.D., Senior Ecologist

Attachments: Figure 1 (photographs)
Figure 2 (Known Occurrences of Geysers Dichanthelium)
California Native Species Field Survey Forms
Memorandum of Understanding (MOU)

CC: Bill King, Calpine
Bruce Carlsen, Calpine
Eric Veerkamp, California Energy Commission
Andrea Stroud, California Energy Commission

Population 1- Occurrence 1 – Historic Geysers Resort Area

2008

2017

Population 2- Occurrence 2 – Hot Springs Creek

2008

2017

Population 3 Occurrence 2 – Hot Springs Creek

2008

2017

Population 4 Occurrence 7 – Big Sulphur Creek Road

0.3 miles south of Burned Mountain Road

2008

2017

Population 5 Occurrence 4 – USGS Bench Mark 2163

2008

2017

Population 6 Occurrence 3 – Little Geysers Creek

2008

2017

Population 7 Occurrence 3 – Little Geysers

2008

2017

Population 8 Occurrence 10 – Sulphur Bank Drive Area

2008

2017

Population 8 Occurrence 10 – Sulphur Bank Drive Area
New Photo Point 8B

2017

Population 9 Occurrence 10 – Sulphur Bank Drive Area

2008

2017

Population 9 Occurrence 10 – Sulphur Bank Drive Area (zoomed in)

2008

2017

Population 10A Occurrence 10 – Sulphur Bank Drive Area

2008

2017

Population 10B Occurrence 10 – Sulphur Bank Drive Area

2008

2017

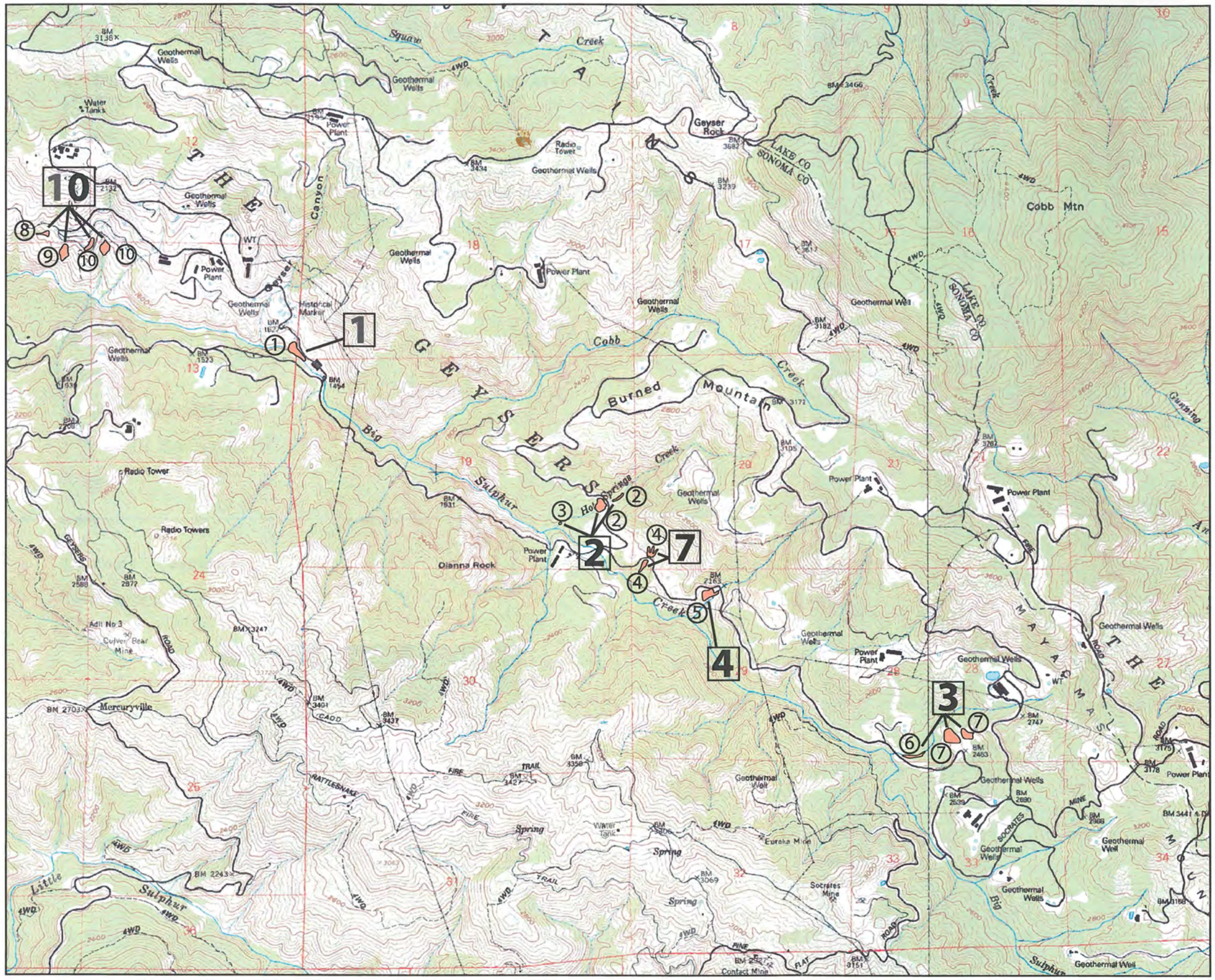

Figure 2.
Known Occurrences of Geysers Dichanthelium

Legend

- Geysers Dichanthelium
- 4 CNDDB Occurrence Number
- (7) Population Number

Moore Iacofano Goltsman Inc.

Mail to:
California Natural Diversity Database
California Dept. of Fish & Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: (916) 324-0475 email: CNDDB@wildlife.ca.gov

Date of Field Work (mm/dd/yyyy): 11/01/2017

For Office Use Only
Source Code: _____ Quad Code: _____
Elm Code: _____ Occ No.: _____
EO Index: _____ Map Index: _____

Clear Form

California Native Species Field Survey Form

Print Form

Scientific Name: *Panicum acuminatum var. thermale*

Common Name: Geysers panicum

Species Found? (●) Yes ( ) No _____ If not found, why?

Total No. Individuals: 50,000 Subsequent Visit? (●) Yes ( ) No

Is this an existing NDDB occurrence? 1 Yes, Occ. # ☐ No ☐ Unk.

Collection? If yes: no Number _____ Museum / Herbarium

Reporter: Gerrit Platenkamp, Rachel Brownsey
Address: ESA 2600 Capitol Ave, suite 200
Sacramento, CA 95816
E-mail Address: rbrownsey@esassoc.com
Phone: 916.564.4500

Plant Information

Phenology:
100 % vegetative _____ % flowering _____ % fruiting

Animal Information

_____ # adults _____ # juveniles _____ # larvae _____ # egg masses _____ # unknown

☐ wintering ☐ breeding ☐ nesting ☐ rookery ☐ burrow site ☐ lek ☐ other

Location Description (please attach map AND/OR fill out your choice of coordinates, below)

County: Sonoma Landowner / Mgr: Private
Quad Name: The Geysers Elevation: 1600'
T___ R___ Sec___, ___¼ of ___¼, Meridian: H ( ) M ( ) S ( ) Source of Coordinates (GPS, topo. map & type): GPS
T___ R___ Sec___, ___¼ of ___¼, Meridian: H ( ) M ( ) S ( ) GPS Make & Model: Trimble GeoXT
DATUM: **NAD27** ( ) **NAD83** (●) **WGS84** ( ) Horizontal Accuracy: 1 m meters/feet
Coordinate System: UTM Zone 10 ( ) UTM Zone 11 ( ) ***OR*** Geographic (Latitude & Longitude) (●)
Coordinates: Photo monitoring point 38.80027771, -122.8052216

Habitat Description (plants & animals) *plant communities, dominants, associates, substrates/soils, aspects/slope:*
Animal Behavior *(Describe observed behavior, such as territoriality, foraging, singing, calling, copulating, perching, roosting, etc., especially for avifauna):*

Annual grassland and bare, steep eroded slope on geothermally altered soil, mostly facing south.

Please fill out separate form for other rare taxa seen at this site.

Site Information

Overall site/occurrence quality/viability (site + population): (●) Excellent ( ) Good ( ) Fair ( ) Poor
Immediate AND surrounding land use: Geothermal development
Visible disturbances: some natural erosion on slope above the road; no new erosion since 2014.
Threats: _____
Comments: This occurrence is in stable condition. Plants appear to be in good health with green leaves sprouting from the base of the plants.

Determination: *(check one or more, and fill in blanks)*

☐ Keyed (cite reference): _____
☐ Compared with specimen housed at: _____
☐ Compared with photo / drawing in: _____
☐ By another person (name): _____
☒ Other: previous identification

Photographs: *(check one or more)*

	Slide	Print	Digital
Plant / animal	☐	☐	☐
Habitat	☐	☐	☒
Diagnostic feature	☐	☐	☐

May we obtain duplicates at our expense? (●) yes ( ) no

Mail to:
California Natural Diversity Database
California Dept. of Fish & Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: (916) 324-0475 email: CNDDB@wildlife.ca.gov

Date of Field Work (mm/dd/yyyy): 11/01/2017

For Office Use Only
Source Code: _____ Quad Code: _____
Elm Code: _____ Occ No.: _____
EO Index: _____ Map Index: _____

Clear Form

California Native Species Field Survey Form

Print Form

Scientific Name: *Panicum acuminatum var. thermale*

Common Name: Geysers panicum

Species Found? (●) Yes ( ) No _____ If not found, why?

Total No. Individuals: 10,023 Subsequent Visit? (●) Yes ( ) No

Is this an existing NDDB occurrence? 2 Yes, Occ. # ☐ No ☐ Unk.

Collection? If yes: no Number _____ Museum / Herbarium

Reporter: Gerrit Platenkamp, Rachel Brownsey
Address: ESA 2600 Capitol Ave, suite 200
Sacramento, CA 95816
E-mail Address: rbrownsey@esassoc.com
Phone: 916.564.4500

Plant Information

Phenology:
100 % vegetative _____ % flowering _____ % fruiting

Animal Information

_____ # adults _____ # juveniles _____ # larvae _____ # egg masses _____ # unknown

☐ wintering ☐ breeding ☐ nesting ☐ rookery ☐ burrow site ☐ lek ☐ other

Location Description (please attach map AND/OR fill out your choice of coordinates, below)

County: Sonoma Landowner / Mgr: Private
Quad Name: The Geysers Elevation: 1900'
T___ R___ Sec___, ___¼ of ___¼, Meridian: H ( ) M ( ) S ( ) Source of Coordinates (GPS, topo. map & type): GPS
T___ R___ Sec___, ___¼ of ___¼, Meridian: H ( ) M ( ) S ( ) GPS Make & Model: Trimble GeoXT
DATUM: **NAD27** ( ) **NAD83** (●) **WGS84** ( ) Horizontal Accuracy: 1 m meters/feet
Coordinate System: UTM Zone 10 ( ) UTM Zone 11 ( ) ***OR*** Geographic (Latitude & Longitude) (●)
Coordinates: Photo monitoring point for population #2: 38.78915787, -122.7792587
Photo monitoring point for population #3: 38.788080596, -122.782111575

Habitat Description (plants & animals) *plant communities, dominants, associates, substrates/soils, aspects/slope:*
Animal Behavior *(Describe observed behavior, such as territoriality, foraging, singing, calling, copulating, perching, roosting, etc., especially for avifauna):*

Population #2: Growing along stream in annual grassland, with diverse wetland vegetation, including non-natives such as Bermuda grass (Cynodon dactylon) and watergrass (Echinochloa sp.). Area is highly geothermally active.
Population #3: Plants are growing on the dry, rocky slope of a stream bank in the shade of riparian trees and exotic fig (Ficus carica).

Please fill out separate form for other rare taxa seen at this site.

Site Information

Overall site/occurrence quality/viability (site + population): ( ) Excellent (●) Good ( ) Fair ( ) Poor
Immediate AND surrounding land use: Geothermal development
Visible disturbances: Erosion of active geothermal feature (population #2)
Threats: Erosion and competition with Bermuda Grass (population #2)
Comments: This occurrence is comprised of populations #2 and #3. Population #2 is stable with approximately 10,000 plants. Population #3 has steadily declined over the past several years, though numbers have increased since 2014, with 23 plants observed in 2017. Increase in vigor likely due to wet conditions over the past year.

Determination: *(check one or more, and fill in blanks)*

☐ Keyed (cite reference): _____
☐ Compared with specimen housed at: _____
☐ Compared with photo / drawing in: _____
☐ By another person (name): _____
☒ Other: previous identification

Photographs: *(check one or more)*

	Slide	Print	Digital
Plant / animal	☐	☐	☐
Habitat	☐	☐	☒
Diagnostic feature	☐	☐	☐

May we obtain duplicates at our expense? (●) yes ( ) no

Mail to:
California Natural Diversity Database
California Dept. of Fish & Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: (916) 324-0475 email: CNDDB@wildlife.ca.gov

Date of Field Work (mm/dd/yyyy): 11/01/2017

For Office Use Only
Source Code: _____ Quad Code: _____
Elm Code: _____ Occ No.: _____
EO Index: _____ Map Index: _____

Clear Form

California Native Species Field Survey Form

Print Form

Scientific Name: *Panicum acuminatum var. thermale*

Common Name: Geysers panicum

Species Found? (●) Yes ( ) No _____ If not found, why?

Total No. Individuals: 100,350 Subsequent Visit? (●) Yes ( ) No

Is this an existing NDDB occurrence? 3 Yes, Occ. # ☐ No ☐ Unk.

Collection? If yes: no Number _____ Museum / Herbarium

Reporter: Gerrit Platenkamp, Rachel Brownsey
Address: ESA 2600 Capitol Ave, suite 200
Sacramento, CA 95816
E-mail Address: rbrownsey@esassoc.com
Phone: 916.564.4500

Plant Information

Phenology:
100 % vegetative _____ % flowering _____ % fruiting

Animal Information

_____ # adults _____ # juveniles _____ # larvae _____ # egg masses _____ # unknown

☐ wintering ☐ breeding ☐ nesting ☐ rookery ☐ burrow site ☐ lek ☐ other

Location Description (please attach map AND/OR fill out your choice of coordinates, below)

County: Sonoma Landowner / Mgr: Private
Quad Name: The Geysers Elevation: 2700'
T___ R___ Sec___, ___¼ of ___ ¼, Meridian: H ( ) M ( ) S ( ) Source of Coordinates (GPS, topo. map & type): GPS
T___ R___ Sec___, ___¼ of ___ ¼, Meridian: H ( ) M ( ) S ( ) GPS Make & Model: Trimble Geo XT
DATUM: **NAD27** ( ) **NAD83** (●) **WGS84** ( ) Horizontal Accuracy: 1 m meters/feet
Coordinate System: UTM Zone 10 ( ) UTM Zone 11 ( ) ***OR*** Geographic (Latitude & Longitude) (●)
Coordinates: Photo monitoring point for population #6: 38.772.16093750, -122.752235412597
Photo monitoring point for population #7: 38.77357101, -122.7497482

Habitat Description (plants & animals) *plant communities, dominants, associates, substrates/soils, aspects/slope:*
Animal Behavior *(Describe observed behavior, such as territoriality, foraging, singing, calling, copulating, perching, roosting, etc., especially for avifauna):*

Plants growing in a variety of geothermally altered habitats, along streams, on slopes of various exposures. Surrounded by annual grassland. A 2016 fire killed many of the McNab cypress (Hesperocyparis macnabiana) and manzanita shrubs (Arctostaphylos sp.). The exotic grass broomsedge bluestem (Andropogon virginicus var. virginicus) has a very patchy distribution at this site and is mainly located near the stream.

Please fill out separate form for other rare taxa seen at this site.

Site Information

Overall site/occurrence quality/viability (site + population): ( ) Excellent (●) Good ( ) Fair ( ) Poor
Immediate AND surrounding land use: Geothermal development
Visible disturbances: Flooding of Little Geysers Creek causes some erosion and deposition of geothermal materials (population #6).
Threats: _____
Comments: Population #6 is steadily increasing, although the number is slightly down in 2017 to 350, with approximately 25 dead individuals observed. Population #7 has remained stable, with the total number of individuals estimated at 100,000, although distribution has shifted slightly in some areas.

Determination: *(check one or more, and fill in blanks)*

☐ Keyed (cite reference): _____
☐ Compared with specimen housed at: _____
☐ Compared with photo / drawing in: _____
☐ By another person (name): _____
☒ Other: previous identification

Photographs: *(check one or more)*

	Slide	Print	Digital
Plant / animal	☐	☐	☐
Habitat	☐	☐	☒
Diagnostic feature	☐	☐	☐

May we obtain duplicates at our expense? (●) yes ( ) no

Mail to:
California Natural Diversity Database
California Dept. of Fish & Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: (916) 324-0475 email: CNDDB@wildlife.ca.gov

Date of Field Work (mm/dd/yyyy): 11/01/2017

For Office Use Only
Source Code: _____ Quad Code: _____
Elm Code: _____ Occ No.: _____
EO Index: _____ Map Index: _____

Clear Form

California Native Species Field Survey Form

Print Form

Scientific Name: *Panicum acuminatum var. thermale*

Common Name: Geysers panicum

Species Found? (●) Yes ( ) No _____ If not found, why?

Total No. Individuals: 4,000 Subsequent Visit? (●) Yes ( ) No

Is this an existing NDDB occurrence? 4 Yes, Occ. # ☐ No ☐ Unk.

Collection? If yes: no Number _____ Museum / Herbarium

Reporter: Gerrit Platenkamp, Rachel Brownsey
Address: ESA 2600 Capitol Ave, suite 200
Sacramento, CA 95816
E-mail Address: rbrownsey@esassoc.com
Phone: 916.564.4500

Plant Information

Phenology:
100 % vegetative _____ % flowering _____ % fruiting

Animal Information

_____ # adults _____ # juveniles _____ # larvae _____ # egg masses _____ # unknown

☐ wintering ☐ breeding ☐ nesting ☐ rookery ☐ burrow site ☐ lek ☐ other

Location Description *(please attach map AND/OR fill out your choice of coordinates, below)*

County: Sonoma Landowner / Mgr: Private
Quad Name: The Geysers Elevation: 2054'
T___ R___ Sec___, ___¼ of ___ ¼, Meridian: H ( ) M ( ) S ( ) Source of Coordinates (GPS, topo. map & type): GPS
T___ R___ Sec___, ___¼ of ___ ¼, Meridian: H ( ) M ( ) S ( ) GPS Make & Model: Trimble GeoXT
DATUM: **NAD27** ( ) **NAD83** (●) **WGS84** ( ) Horizontal Accuracy: 1 m meters/feet
Coordinate System: UTM Zone 10 ( ) UTM Zone 11 ( ) ***OR*** Geographic (Latitude & Longitude) ( )
Coordinates: Photo monitoring point for population #5: 38.78323746, -122.7701416

Habitat Description (plants & animals) *plant communities, dominants, associates, substrates/soils, aspects/slope:*
Animal Behavior *(Describe observed behavior, such as territoriality, foraging, singing, calling, copulating, perching, roosting, etc., especially for avifauna):*

On geothermally altered soil surrounded by annual grassland. Mostly on south-facing slope 5-15% in full sun. Extremely active mudpots, fumaroles, and vents.

Please fill out separate form for other rare taxa seen at this site.

Site Information

Overall site/occurrence quality/viability (site + population): ( ) Excellent (●) Good ( ) Fair ( ) Poor
Immediate AND surrounding land use: Geothermal development
Visible disturbances: _____
Threats: Increased natural geothermal activity
Comments: Population #5 appeared to be mostly dormant at time of monitoring, and may be affected by increased natural geothermal activity in the area.

Determination: *(check one or more, and fill in blanks)*

☐ Keyed (cite reference): _____
☐ Compared with specimen housed at: _____
☐ Compared with photo / drawing in: _____
☐ By another person (name): _____
☒ Other: previous identification

Photographs: *(check one or more)*

	Slide	Print	Digital
Plant / animal	☐	☐	☐
Habitat	☐	☐	☒
Diagnostic feature	☐	☐	☐

May we obtain duplicates at our expense? (●) yes ( ) no

Mail to:
California Natural Diversity Database
California Dept. of Fish & Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: (916) 324-0475 email: CNDDB@wildlife.ca.gov

Date of Field Work (mm/dd/yyyy): 11/01/2017

For Office Use Only
Source Code: _____ Quad Code: _____
Elm Code: _____ Occ No.: _____
EO Index: _____ Map Index: _____

Clear Form

California Native Species Field Survey Form

Print Form

Scientific Name: *Panicum acuminatum var. thermale*

Common Name: Geysers panicum

Species Found? (●) Yes ( ) No _____ If not found, why?

Total No. Individuals: 500 Subsequent Visit? (●) Yes ( ) No

Is this an existing NDDB occurrence? 7 Yes, Occ. # ☐ No ☐ Unk.

Collection? If yes: no Number _____ Museum / Herbarium

Reporter: Gerrit Platenkamp, Rachel Brownsey
Address: ESA 2600 Capitol Ave, suite 200
Sacramento, CA 95816
E-mail Address: rbrownsey@esassoc.com
Phone: 916.564.4500

Plant Information

Phenology:
100 % vegetative _____ % flowering _____ % fruiting

Animal Information

_____ # adults _____ # juveniles _____ # larvae _____ # egg masses _____ # unknown

☐ wintering ☐ breeding ☐ nesting ☐ rookery ☐ burrow site ☐ lek ☐ other

Location Description (please attach map AND/OR fill out your choice of coordinates, below)

County: Sonoma Landowner / Mgr: Private
Quad Name: The Geysers Elevation: 1900'
T___ R___ Sec___, ___¼ of ___ ¼, Meridian: H ( ) M ( ) S ( ) Source of Coordinates (GPS, topo. map & type): GPS
T___ R___ Sec___, ___¼ of ___ ¼, Meridian: H ( ) M ( ) S ( ) GPS Make & Model: Trimble GeoXT
DATUM: **NAD27** ( ) **NAD83** (●) **WGS84** ( ) Horizontal Accuracy: 1 m meters/feet
Coordinate System: UTM Zone 10 ( ) UTM Zone 11 ( ) ***OR*** Geographic (Latitude & Longitude) (●)
Coordinates: Photo monitoring point for population #4: 38.78530121, -122.7749481

Habitat Description (plants & animals) *plant communities, dominants, associates, substrates/soils, aspects/slope:*
Animal Behavior *(Describe observed behavior, such as territoriality, foraging, singing, calling, copulating, perching, roosting, etc., especially for avifauna):*

On geothermally altered soil near thermal hot springs along creek. Associated species include broomsedge, yerba santa (Eriodictyon californicum), and monkeyflower. Plants also grow on bare soil. Area burned in 1991. Plants are also growing on bare soil on eroding banks.

Please fill out separate form for other rare taxa seen at this site.

Site Information

Overall site/occurrence quality/viability (site + population): ( ) Excellent (●) Good ( ) Fair ( ) Poor
Immediate AND surrounding land use: Geothermal development
Visible disturbances: Natural erosion at upstream location in 2017
Threats: _____
Comments: Population #4 has been increasing in recent years. Plants at drier upstream site are difficult to see due to dense annual vegetation. Slumping of bank in this area does not appear to have affected plants. Downstream patches along the creek have expanded.

Determination: *(check one or more, and fill in blanks)*

☐ Keyed (cite reference): _____
☐ Compared with specimen housed at: _____
☐ Compared with photo / drawing in: _____
☐ By another person (name): _____
☒ Other: previous identification

Photographs: *(check one or more)*

	Slide	Print	Digital
Plant / animal	☐	☐	☐
Habitat	☐	☐	☒
Diagnostic feature	☐	☐	☐

May we obtain duplicates at our expense? (●) yes ( ) no

Mail to:
California Natural Diversity Database
California Dept. of Fish & Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: (916) 324-0475 email: CNDDB@wildlife.ca.gov

Date of Field Work (mm/dd/yyyy): 11/01/2017

For Office Use Only
Source Code: _____ Quad Code: _____
Elm Code: _____ Occ No.: _____
EO Index: _____ Map Index: _____

Clear Form

California Native Species Field Survey Form

Print Form

Scientific Name: *Panicum acuminatum var. thermale*

Common Name: Geysers panicum

Species Found? (●) Yes ( ) No _____ If not found, why?

Total No. Individuals: 2,000 Subsequent Visit? (●) Yes ( ) No

Is this an existing NDDB occurrence? 10 Yes, Occ. # ☐ No ☐ Unk.

Collection? If yes: no Number _____ Museum / Herbarium

Reporter: Gerrit Platenkamp, Rachel Brownsey
Address: ESA 2600 Capitol Ave, suite 200
Sacramento, CA 95816
E-mail Address: rbrownsey@esassoc.com
Phone: 916.564.4500

Plant Information

Phenology:
99 % vegetative | _____ % flowering | 1 % fruiting

Animal Information

_____ # adults | _____ # juveniles | _____ # larvae | _____ # egg masses | _____ # unknown

☐ wintering ☐ breeding ☐ nesting ☐ rookery ☐ burrow site ☐ lek ☐ other

Location Description (please attach map AND/OR fill out your choice of coordinates, below)

County: Sonoma Landowner / Mgr: Private
Quad Name: The Geysers Elevation: 1650'
T___ R___ Sec___, ___¼ of ___¼, Meridian: H ( ) M ( ) S ( ) Source of Coordinates (GPS, topo. map & type): GPS
T___ R___ Sec___, ___¼ of ___¼, Meridian: H ( ) M ( ) S ( ) GPS Make & Model: Trimble GeoXT
DATUM: **NAD27** ( ) **NAD83** (●) **WGS84** ( ) Horizontal Accuracy: 1 m meters/feet
Coordinate System: UTM Zone 10 ( ) UTM Zone 11 ( ) ***OR*** Geographic (Latitude & Longitude) (●)
Coordinates: Photo monitoring point for population #8: 38.8073349, -122.8264389; population #9: 38.80594635, -122.8229904; population #10: 38.80698395, -122.8214188

Habitat Description (plants & animals) *plant communities, dominants, associates, substrates/soils, aspects/slope:*
Animal Behavior *(Describe observed behavior, such as territoriality, foraging, singing, calling, copulating, perching, roosting, etc., especially for avifauna):*

Annual grassland around bare geothermally active areas with steam vents. Associated with typical grassland species, e.g., Italian ryegrass (Festuca perennis) and soft chess (Bromus hordeaceus), and non-native perennial Bermuda grass.

Please fill out separate form for other rare taxa seen at this site.

Site Information

Overall site/occurrence quality/viability (site + population): (●) Excellent ( ) Good ( ) Fair ( ) Poor
Immediate AND surrounding land use: Geothermal development
Visible disturbances: natural erosion
Threats: _____
Comments: Population #8, 9 and 10 remain stable, with some mortality on the west end of population #8, while new plants were observed in the abandoned roadbed. Population #10 may have expanded. A few flowering individuals were observed in population #8 but not in other populations.

Determination: *(check one or more, and fill in blanks)*

☐ Keyed (cite reference): _____
☐ Compared with specimen housed at: _____
☐ Compared with photo / drawing in: _____
☐ By another person (name): _____
☒ Other: previous identification

Photographs: *(check one or more)*

	Slide	Print	Digital
Plant / animal	☐	☐	☐
Habitat	☐	☐	☒
Diagnostic feature	☐	☐	☐

May we obtain duplicates at our expense? (●) yes ( ) no

State of California -The Natural Resources Agency
DEPARTMENT OF FISH AND GAME
Habitat Conservation Planning Branch
1416 9th Street, 12th Floor
Sacramento, CA 95814
http://www.dfg.ca.gov

EDMUND G. BROWN JR., Governor
CHARLTON H. BONHAM, Director

November 20, 2012

Mr. Bruce Carlsen
Environmental Health and Safety Manager
Geysers Power Company, LLC
10350 Socrates Mine Road
Middletown, CA 95461

Dear Mr. Carlsen:

Enclosed please find a fully-signed copy of the Memorandum of Understanding between the Geysers Power Company, LLC and the Department of Fish and Game, for monitoring of Geysers dichanthelium (*Dichanthelium lanuginosum* var. *thermale*), a State-listed plant species, at Geysers Geothermal Power Plant Unit 20. This MOU authorizes monitoring activities through 2021.

If you have any questions, please contact Cherilyn Burton at (916) 651-6508, or by e-mail at cburton@dfg.ca.gov.

Sincerely,

Cherilyn Burton

for Susan R. Ellis, Program Manager
Native Plant Program
Habitat Conservation Planning Branch

Enclosures

MEMORANDUM OF UNDERSTANDING

BY AND BETWEEN

GEYSERS POWER COMPANY, LLC

AND

CALIFORNIA DEPARTMENT OF FISH AND GAME

This Memorandum of Understanding ("MOU") is made and entered into by and between Geysers Power Company, LLC and the California Department of Fish and Game ("Department").

The purpose of this MOU is to provide for the continued monitoring of Geysers dichanthelium (*Dichanthelium lanuginosum* var. *thermale* = *Dichanthelium acuminatum* ssp. *thermale*) ("*Dichanthelium*"), a State-designated Endangered plant. The California Energy Commission ("CEC") required this monitoring as part of the licensing conditions for Geyser's Unit 20. Results of the monitoring and research which is authorized by this MOU will expand our understanding of the habitat requirements of the taxon.

WITNESSETH:

WHEREAS, Geysers Power Company has submitted a proposal to continue their monitoring and research on the *Dichanthelium* which is classified as an endangered plant by the California Fish and Game Commission; AND

WHEREAS, the Department desires to encourage monitoring and research that will further our knowledge of rare plant species and their conservation; AND

WHEREAS, the parties hereto desire to cooperate in a project as above by means of this MOU.

NOW, THEREFORE, it is mutually agreed and understood as follows:

1. The attached Monitoring Plan (Exhibit 1) details the specific nature of the research that is governed by this Memorandum of Understanding, including the purpose, location, schedule of work, methods, products to be provided to the Department, and impacts to the species of concern.

2. Exceptions and additional conditions are as follows:

    a. Geysers Power Company shall invite staff of the CEC, and the Department's Native Plant Program and Bay Delta Region office to visit the site during at

least one season of the monitoring program, in order to demonstrate the locations, methods, and results of the monitoring and research activities.

b. If, as a result of Geysers Power Company activities, significant changes in land use or habitat quality occur, or substantial decreases are seen in population size (i.e., 30% lower than lowest known levels), the Department may request that additional monitoring surveys be conducted.

3. This MOU does not authorize the investigators to conduct field activities on private land without written landowner permission, nor to conduct activities on other lands covered by other agency permits.

4. The Department recognizes Bruce Carlsen, Environmental Health and Safety Manager, as the Principal Investigator. A list of additional investigators will be supplied to the Department within two months of the beginning of fieldwork. No other person may handle *Dichanthelium* plants or plant parts without prior approval of the Department.

5. An Annual Report shall be provided to the Department by December 31 of each year that monitoring is conducted, beginning in 2014, which shall include:

a. A description of the population size and status, a habitat assessment, and an evaluation of land use changes and potential threats to *Dichanthelium* at each occurrence using California Natural Diversity Data base (CNDDB) field survey forms;

b. Photographs from photo points at each occurrence; and

c. A 1- to 2-page letter report discussing implications of the results of this study for the protection and management of the *Dichanthelium*.

The last Annual Report shall also be the Final Report and shall be provided to the Department within 30 days of the conclusion of the study or within 30 days of the termination of the MOU, whichever date is sooner. The Final Report shall include an assessment of trends in the plant populations and habitat of the occurrences, as well as implications of the results of this study for the protection and management of the *Dichanthelium.*

6. The Department reserves the right to terminate this MOU if at any time it deems that the Investigators have not complied with its terms and conditions.

7. The Department shall incur no fiscal obligation under this MOU.

8. A Copy of this MOU shall be in the possession of the Investigators whenever activities authorized by this MOU are being conducted.

9. Unless terminated sooner by either party giving 30 days notice of such termination, this MOU shall commence on the date of the final signing below and terminate on January 31, 2022, subject to renewal with the approval of both parties prior to the termination date.

This MOU has been executed by and on behalf of the parties hereto, as of the last date signed below:

GEYSERS POWER COMPANY, LLC

Bruce Carlsen
Environmental Health and Safety Manager
Geysers Power Company, LLC
Middletown, California

Date: 11/12/2012

DEPARTMENT OF FISH AND GAME

for Susan R. Ellis
Environmental Program Manager
Habitat Conservation Planning Branch
Department of Fish and Game
Sacramento, California

Date: 11/20/2012

Exhibit 1

Monitoring Plan for Geysers Dichanthelium (*Dichanthelium acuminatum* subsp. *thermale*)

Purpose

This monitoring plan describes the procedures that will be followed by Geysers Power Company to monitor the State-listed endangered plant Geysers dichanthelium (*Dichanthelium acuminatum* subsp. *thermale* = *D. lanuginosum* var. *thermale*) in the Sulphur Creek watershed of Sonoma County, California, as a continuation of the ongoing Geysers dichanthelium monitoring work. The methods in this plan are similar to those incorporated in the 2006 "Memorandum of Understanding by and between Geysers Power Company, LLC. and California Department of Fish and Game (...) to provide for the continued monitoring of Geysers dichanthelium", dated January 2008, and the therein referenced "*Monitoring Plan for Geysers Dichanthelium (Dichanthelium acuminatum* subsp. *thermale)*" dated July 29, 2006.

Background

In 1982, the California Energy Commission (CEC) and California Department of Fish and Game (DFG) were concerned that the construction and operation of Geysers Geothermal Power Plant Unit 20 (Unit 20) could adversely affect the Little Geysers population of Geysers dichanthelium. Geysers dichanthelium is listed as endangered under the California Endangered Species Act and is considered a species of concern by the U.S. Fish and Wildlife Service. Pacific Gas & Electric Company (PG&E) agreed to monitor the grass as part of the licensing agreement for Unit 20 (Condition Bio 5-3). The Little Geysers population of Geysers dichanthelium has been monitored since 1982, and the results of the annual monitoring indicate that fluctuations in population size are affected by variations in annual rainfall and not by geothermal development activities (Pacific Gas and Electric Company 2000, Platenkamp and De Becker 2011). However, CEC and DFG remain concerned that populations of this plant are vulnerable to unintentional habitat degradation or destruction because they are accessible and/or located near roads. The monitoring activities described in this plan address these concerns.

Geysers Power Company intends to implement this monitoring plan to achieve continued protection of Geysers dichanthelium.

Monitoring Program

Population and Habitat Assessment

At 3-year intervals, beginning in 2014, a qualified biologist with experience in identifying Geysers dichanthelium and assessing its habitat will visit all occurrences of Geysers dichanthelium (see Figure1).

The field visits will be made at the end of the growing season, in August or September, to be consistent with previously collected data. The biologist will make the following assessments and report them using the standard Field Survey Forms of the California Natural Diversity Database (CNDDB):

- habitat assessment, including extent and activity of surface geothermal features,
- apparent threats to the Geysers dichanthelium population, if any,
- occurrence of significant land use changes or incidents in the vicinity of the population that could have an effect on the plant's habitat, and
- general status of the Geysers dichanthelium population.

The CNDDB field survey forms will be submitted to DFG within 2 months of the field visit.

The forms will also be included in Geysers Power Company's annual compliance report to CEC.

Photographic Documentation

Permanent photographic documentation locations (photo points) will be established at the following six occurrences of Geysers dichanthelium:

- Historic Geysers Resort Area (CNDDB Occurrence #1; Population #1) – the large type locality, from where the plant was first described
- Hot Springs Creek (CNDDB Occurrence #2; Populations #2 and #3) – Population #2 is along Burned Mountain Road with Bermuda grass (*Cynodon dactylon*) and Population #3 is along a canyon wall in the shade of riparian trees
- Little Geysers *Creek (CNDDB O*ccurrence #3; Populations #6 and #7) – Population #6 is along creek between forested area and foot bridge and Population #7 is at Little Geysers studied since 1982
- At USGS Bench Mark 2163 (CNDDB Occurrence #4; Population #5) – on intermittent tributary to Big Sulphur Creek

- Along Big Sulphur Creek Road 0.3 Miles South of Big Sulphur Creek Road (CNDDB Occurrence #7; Population #4) – population with abundant broom sedge (*Andropogon virginicus*)
- Sulphur Bank Drive Area (CNDDB Occurrence #10; Populations #8, #9, and #10) – three populations near Sulphur Bank Drive (west, central, and east)

Table 1. Permanent Photograph Monitoring Locations

Population Number	CNDDB Occurrence	Description	Easting	Northing	Bearing (o)
1	Occ 1	Historic Geysers Resort Area	-122.805221557617	38.800277709961	122
2	Occ 2	Hot Springs Creek	-122.779258728027	38.789157867432	226
3*	Occ 2	Hot Springs Creek (canyon)	-122.781865000000	38.788423000000	10
4	Occ 7	Big Sulphur Creek Rd. 0.3 mi S of Burned Mtn. Rd.	-122.774948120117	38.785301208496	92
5	Occ 4	USGS Bench Mark 2163	-122.770141601562	38.783237457275	318
6	Occ 3	Little Geysers Creek	-122.752235412597	38.772460937500	312
7	Occ 3	Little Geysers	-122.749748229980	38.773571014404	85
8	Occ 10	Sulphur Bank Drive Area (west)	-122.826438903808	38.807334899902	86
9	Occ 10	Sulphur Bank Drive Area (central)	-122.822990417480	38.805946350098	280
10A	Occ 10	Sulphur Bank Drive Area (east)	-122.821418762207	38.806983947754	285
10B	Occ 10	Sulphur Bank Drive Area (far east)	-122.821418762207	38.806983947754	102

Note:

* In steep canyon: no GPS reading possible, coordinates based on aerial image (Google Earth)

The photo points were established in 2008 and were marked with a permanent marker. The location of the marker was recorded with GPS coordinates (Table 1). During each 3-year monitoring visit a photograph will be taken that is representative of the occurrence at a standard height of 5 feet, and in a standard compass direction and using a standard focal length lens setting. The photographs will be sent to the CNDDB accompanying the Field Data Forms. The photographs will also be included in Geysers Power Company's annual report to the CEC.

References

Pacific Gas and Electric Company. 2000. Monitoring Geyser's Panicum (*Dichanthelium lanuginosum* var. *thermale*) at Little Geysers, 1995-1999. Final Report. Technical and Ecological Services. (Report No.:417-00.12). San Ramon, CA.

Platenkamp, G.A.J and S. De Becker. 2011. Monitoring Demography and Population Dynamics of Geysers Dichanthelium (*Dichanthelium acuminatum* subsp. *thermale*). Pp. 256–263 In: J.W. Willoughby, B.K. Orr, K.A. Schierenbeck, and N.J. Jensen [eds.], Proceedings of the CNPS Conservation Conference: Strategies and Solutions, 17–19 Jan 2009, California Native Plant Society, Sacramento, CA.

Exhibit 1

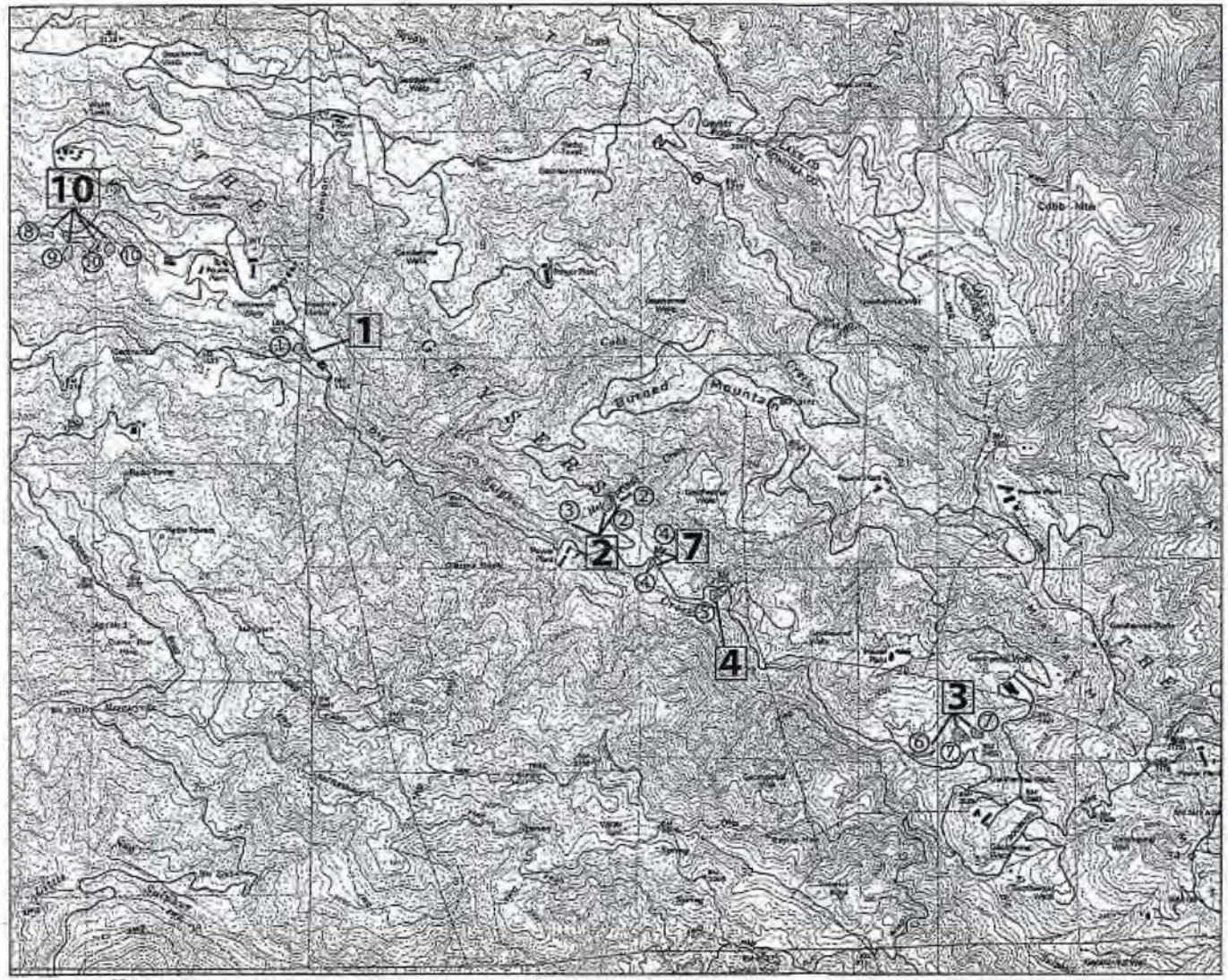

Figure 1
Known Occurrences of Geysers Dichanthelium

CONDITION OF CERTIFICATION
PUBLIC HEALTH 2-1

Attachment PH 2-1: Table of Quarterly Radon-222 Concentration Analysis in Non-Condensable Gases for 2020

Geysers Grant Plant (Unit 20) 82-AFC-01C
2020 Annual Compliance Report to the California Energy Commission
January 2020-December 2020

	1Q20	2Q20	3Q20	4Q20	Grant 20	
Date	03/10/20	06/30/20	07/28/20	12/2/20		
Unit	20	20	20	20	20	
[Rn-222] Main Steam Sample (pCi/Kg)	**18988**	**19426**	**18248**	**19026**		
Unit gross load (MW)	**40.8**	**38**	**39.3**	**39.2**		
Supply steam flow rate (klb/hr)	**605**	**590**	**621**	**630**		
Supply Steam Flow Rate (Mg/hr)	274	268	282	286		
Steam Rate (lb/kwhr)	**15.55**	**15.21**	**15.58**	**15.98**		
Steam Rate Derived Supply Steam Flow Rate (Mg/hr)	288	262	278	284		
100% Service Cool. Tower Air flow Rate, S.T.P. (GL/hr)	23.60	23.60	23.60	23.60		
Number of Fans in Service	**11**	**9**	**11**	**11**		
Number of Fans	11	11	11	11		
Cool. Tower fract. (cells oper. /cells design)	1.00	0.82	1.00	1.00		
Cooling Tower air flow rate, S.T.P. (GL/hr)	23.60	19.31	23.60	23.60		
Unit daily Cooling Tower air flow (L/day)	5.664E+11	4.63418E+11	5.664E+11	5.664E+11		
Unit Rn222 Release Rate (Ci/day)	0.13	0.12	0.12	0.13		
Unit Rn222, Emission Concentration (pCi/L)	**0.22**	**0.27**	**0.22**	**0.23**		
Notes on Color Codes:						
Data from Sample Collection Sheet						
Data from Analytical Laboratory Results						
Data From Annual Criteria Pollutant Inventory (see *updated Generation Summary* tab)						

CONDITION OF CERTIFICATION
WQ 6-17

Attachment WQ 6-17: 2020 Geysers Power Plant Units Recycled Water Use Report

Geysers Grant Plant (Unit 20) 82-AFC-01C
2020 Annual Compliance Report to the California Energy Commission
January 2020-December 2020

GEYSERS POWER COMPANY, LLC
10350 Socrates Mine Road
Middletown, CA 95461
707.431.6000

GWQ-21-024

February 11, 2021

Janice Oakley, P.E.
District Engineer
State WRCB – Division of Drinking Water
50 D Street, Suite 200
Santa Rosa, CA 95404

Subject: 2020 Geysers Power Plant Units Recycled Water Use Report

Dear Ms. Oakley:

Use of Santa Rosa recycled water first began at Unit 17 on July 22, 2004 where it supports cooling tower basin levels by replacing blowdown water at a rate of 400-500 gpm. When tower basin water levels are sufficiently high, recycled water bypasses the tower and enters the onsite sediment pond, where it mixes with condensate then gravity feeds to the Unit 11 sediment pond prior to reinjection at the OS-16 well. Tabulated below are various uses of recycled water during 2020.

2020 Total	U17 Tower	U20 Tower	Unit 7/8 Sediment Pond	Aidlin Injection and/or Burner
Gallons	144,809,847	109,083,331	188,903,650	69,621,026

Minor amounts of recycled water were used for incidental purposes as identified in Section 3.2 of the Engineering Report. These uses may consist of dust control, construction, fire-fighting and industrial process water. Additionally, recycled water was used for various drilling activities in Sonoma County during 2020. Appropriate signage and labeling was directed by the User Supervisor for these activities.

If you have any questions, please contact me at (707) 431-6097.

Sincerely,

Bill King
Calpine-Geysers EHS