

**APPENDIX D:
AIR PERMITS
FOR WELL PS-31**



**NORTHERN
SONOMA COUNTY**
AIR POLLUTION CONTROL DISTRICT

150 Matheson Street, Healdsburg, CA 95448 • PH: (707) 433-5911 • FX: (707) 433-4823

September 21, 2009

**Geysers Power Company, LLC
c/o Calpine Corporation
10350 Socrates Mine Road
Middletown, CA 95461**

ATTENTION: Brian Berndt

SUBJECT: Application # 09-26A and B; Prati State 31 Well

Dear Mr. Berndt:

Attached is your Authority to Construct/Temporary Permit to Operate, 09-26A and B. Please review the Authorities to Construct/Temporary Permits to Operate for any omissions or errors. Per Rule 250, the applicant may appeal the decision of the Air Pollution Control Officer within ten (10) days of issuance of the Authority to Construct/Temporary Permit to Operate.

A copy of the Authority to Construct/Temporary Permit to Operate must be displayed near the source. In the event that the Authority to Construct cannot be so placed, the Authority to Construct shall be maintained readily available at all times on the operating premises.

Please notify the District by letter at least three (3) days before initial operation of the equipment is to take place so that we may observe the equipment in operation and verify compliance with the Authority to Construct.

If you have any questions regarding this matter please call the District at (707) 433-5911.

Sincerely,

A handwritten signature in blue ink that reads "Alex V. Saschin".

Alex V. Saschin
Air Quality Engineer

NORTHERN SONOMA COUNTY AIR POLLUTION CONTROL DISTRICT
150 Matheson Street Healdsburg CA 95448
Telephone (707) 433-5911

Authority to Construct/Temporary Permit to Operate 09-26A

COMPANY: Geysers Power Company, LLC
c/o Calpine Corporation
10350 Socrates Mine Road
Middletown CA 95461

EQUIPMENT DESCRIPTION:

Air Pollution Control System for Geothermal Well, Prati State 31, consisting of:

- S-1 Blooic line
- S-2 Tangential muffler/separator (cyclone), 14' in diameter with an 8' diameter stack, 19' in height.
- S-3 Tangential muffler/separator (cyclone), 12' in diameter, 10' in height with an 8' diameter stack, 16' in height.
- S-4 Tangential muffler/separator (cyclone), 12' in Diameter, 15' in height with a 6' diameter stack, 15' in height.
- S-5 Tangential muffler/separator (cyclone), 12' in Diameter, 15' in height with a 6' diameter stack, 15' in height.

LOCATED AT: 1046' East and 3,921' South of the of the Northwest corner of Section 35, Township 12 North Range 9 West, M.D. B&M, Sonoma Co. California

Whereas application for an Authority to Construct and temporary Permit to Operate has been made by the Geysers Power Corporation, LLC (hereinafter called the permit holder) pursuant to Regulation 1 of the Rules and Regulations of the Northern Sonoma County Air Pollution Control District (hereinafter call the District), and said application has been reviewed and considered by the Air Pollution Control Officer of said District (hereinafter referred to as the Control Officer), an Authority to Construct and temporary Permit to Operate is hereby granted to the following terms and conditions:

This shall be your Authority to Construct and temporary Permit to Operate once construction is complete. The permit holder shall allow District representatives to enter upon the premises in order to perform testing and inspections as is necessary to determine compliance with the rules and regulations of the District and the conditions of this Authority to Construct and temporary Permit to Operate.

Permit Conditions

A. Emissions Limits

1. S-1; Blooie line: the permit holder shall limit H₂S emissions from this geothermal well to an average hourly mass emission rate not to exceed 5.5 lbs/hr, except as allowed in Condition Number A.2.
2. During a hot installation of a perforated or slotted liner total H₂S emissions shall not exceed 1,493 pounds over the duration of the installation. If the concentration of H₂S and steam flowrate result in projected H₂S emissions greater than 1,007 pounds for the installation of a perforated or slotted liner, the well shall first be killed with water prior to installing the liner.
3. S-2, S-3; Tangential muffler/separator (cyclone): Visible emissions shall not exceed Ringlemann 2 for an aggregated total of three minutes in any hour.

B. Operational Requirements

1. S-1; Blooie line: Emissions of H₂S from the line shall be limited by the injection of hydrogen peroxide and caustic into the blooie line. A mole ratio of 6.0 moles of hydrogen peroxide for each mole of H₂S over the calculated 5.5 lbs/hr limit shall be maintained. A mole ratio of 4.0 moles of caustic for each mole of H₂S over the calculated 5.5 lbs/hr limit shall be maintained. The minimum caustic mole ratio may be reduced in accordance with the Hydrogen Sulfide Abatement Plan outlined in Section 4 as long as a minimum of 4 moles of hydroxide from the injection water and caustic is maintained for every mole of H₂S over the calculated 5.5 lb/hr limit.
2. During a hot installation of a perforated or slotted liner, the steam that travels outside the liner and through the abatement system shall be treated to the maximum extent possible to reduce overall H₂S emissions.
3. Each hot installation of a perforated or slotted liner shall be limited to a period not to exceed 18 hours. The permit holder may, in the event of difficulties, and with prior approval of the Control Officer, extend this limit to a maximum of 24 hours.
4. Beginning 48 hours prior to a hot installation of a perforated or slotted liner, the permit holder shall obtain a meteorological forecast by a meteorological consultant acceptable to the District if H₂S emissions are calculated to be greater than 15 pounds per hour. The forecast shall be forwarded to the District for evaluation and updated daily. The installation of the perforated liner shall only proceed after approval by the District.

5. Beginning 48 hours prior and updated 24 hours prior to a hot installation of a perforated or slotted liner, the permit holder shall provide updated H₂S emission estimates to the District if calculations indicate emissions of H₂S are to exceed 15 pounds per hour. The updates shall be based on the most recent steam flows and H₂S concentrations obtained during the workover.
6. S-1; Blooie line: Total suspended solids in the injection water shall not exceed 0.1 lbs/gal unless the permit holder can demonstrate the point source limit of rule 420(e) would not be exceeded.
7. S-1; Blooie line: The line shall have a calibrated flowmeter installed in the water supply line. Any method equivalent to a flowmeter must be first approved by the Control Officer. The draw down method of flow determination is approved by the Control Officer as an equivalent method of measurement. A calibration curve (if applicable to the type of meter) must be available on site, as well as a statement of calibration showing meter serial number, date of calibration, results of calibration and the person's name and signature who performed the calibration.
8. S-1; Blooie line: The line shall be equipped with a water injection system with a minimum water injection rate of 30 gal/min. at steam flow rates less than 80,000 lbs/hr, and a minimum water injection rate of 60 gal/min. at steam flow rates greater than 80,000 lbs/hr. Special exemption from these injection rates may be obtained in advance from the Control Officer. These exemptions are restricted to specific cases and are subject to additional conditions as determined by the Control Officer.
9. The permit holder shall maintain the well pad area in such a manner as to prevent excess fugitive dust emissions. If the District deems fugitive dust emissions to be a problem at the site, the permit holder may be required to submit a Fugitive Dust Control Plan, install a sprinkler system, have a water truck on site, and/or any other controls needed to eliminate the problem.
10. All engines and compressors used in conjunction with this permit shall be registered with the California Air Resources Board (CARB) Portable Engine Registration program unless this permit is modified to include such equipment.

C. Monitoring and Recordkeeping

1. S-1; Blooie line: The following points will be required of the permit holder with regards to the H₂S Abatement Plan as submitted to the NSCAPCD.

A. Calibration

1. The permit holder shall see that its employees or contractors provide on site calibration data as requested below:
 - a. Chemical injection pumps: date of calibration, and calibration graphs (feed rate vs. stroke count setting).
 - b. Air compressor meter: a certificate stating, meter serial number, date of calibration, place of calibration, and the technician's name and signature who performed the calibration.
2. The permit holder shall see that its contractor or employees perform daily zero and span checks and a weekly multipoint calibration on any continuous monitor used to detect H₂S concentrations in association with the blooie line/muffler. The fact that these calibrations were performed is to be so noted in the log at the time of calibration.

B. H₂S Concentration Confirmation Upon Steam Production

1. The permit holder shall see that its contractor or employees perform wet chemical tests upon steam entry and at least once per day following, or upon any subsequent steam entry. For District purposes, significant entry shall be defined as "an entry which would yield an increase of 1 (one) pound per hour H₂S (based upon the most recent H₂S analysis)." The frequency of this testing may not be reduced unless the permit holder can demonstrate the point source limit of rule 455(b) would not be exceeded.

C. Analysis of Steam Constituents

1. The permit holder shall ensure that its contractor or employees obtain a representative sample of the well steam after the drilling is completed and shall have the sample analyzed to determine operational flow concentrations of: H₂S, ammonia, methane, total VOC, benzene, toluene, ethyl benzene, and xylene, toxic metals and radon. Results of this testing shall be submitted to the District within 30 days of completion of the liner installation.

D. Permanent Records

1. The permit holder shall see that its contractor or employees maintain a permanent hardbound log book at the location during drilling. All entries are to be legible and made in ink. Records must be maintained in good condition for at least 5 years following the last date of entry in the log. Records must be accessible by District personnel within the same working day of the inspection of the location.
2. The following measurements and determinations shall be made, and records maintained, when steam flow is initiated through the separator/muffler, and subsequently, at least once per day or upon each subsequent steam entry.
 - a. Operator shall measure the H₂S concentration in the steam exiting the well using the wet chemistry methods outlined in the Abatement Plan submitted with the permit application. Method is specified in Section 3.1 of the Plan, (H₂S Concentration Determination). The H₂S concentration, including all measured values used to determine the H₂S concentration shall be recorded in a District-approved log.
 - b. Operator shall determine the flow rate of the steam exiting the well during the H₂S concentration sampling using the methods outlined in Section 3.2 (Steam Flow Determination) of the Abatement Plan submitted with the permit application. The calculated flow rate, including all measured values used to determine the flow rate shall be recorded in a District-approved log.
 - c. Operator shall determine the unabated mass emission rate of H₂S (lbs/hr) using the measured and calculated values from (a) and (b) above. The calculated unabated mass emission rate of H₂S shall be recorded in a District-approved log.
 - d. Operator shall determine the excess unabated mass emission rate of H₂S (lbs/hr) from the steam well using the value calculated in (c) above. The calculated excess unabated mass emission rate shall be recorded in a District-approved log.

3. The following data is to be recorded at the start of each shift. The same data shall be logged upon new steam entries and include steam entry size as recorded by the air compressor meter (e.g. 25 lb. entry).
 - a. H₂S ppm(wt) upstream of chemical injection.
 - b. Air injection rate, lbs/hr.
 - c. Steam flow rate, lbs/hr.
 - d. Injection rates of caustic and hydrogen peroxide
 - e. pH of injection water
 - f. H₂S emission rate
 - g. rig status at time of log entry
 4. Daily wet chemical tests results and results of tests performed subsequent to significant entries are to be entered as a part of the permanent log. These log entries will also note the rig status at the time of testing.
 5. Any breakdown of abatement equipment shall be recorded. This entry shall state time of breakdown, duration, cause, and the estimated emission rate during this outage. This recording shall not relieve the permit holder from the reporting requirements of Rule 540.
2. The following data shall be forwarded to the District within 30 days of completion of the well drilling operation:
- a. final production H₂S concentration in ppm(wt).
 - b. total rig engine hours used during the well drilling activity.
 - c. total compressor engine hours used during the well drilling activity.
 - d. total pounds of total organic gas (including methane) emitted during the well drilling activity (including flow test)
 - e. final production steam flow from the well.
 - f. the total mass of H₂S and particulate matter released during the well drilling activity.

E. Administrative Requirements

1. The permit holder shall notify the District at least 24 hours prior to drilling on air.
2. The permit holder shall notify the District at least 48 hours prior to the beginning of any hot installation of a perforated or slotted liner.
3. Facilities Operation
 - a. Operation under this permit 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. This permit must be posted in a conspicuous place nearby or, as per rule 240.
 - b. All equipment of this PERMIT shall at all times be maintained in good working order and be operated as efficiently as possible so as to minimize air pollutant emissions.

NSCAPCD Rule 240.d

4. Permit Expiration

This Authority to Construct/Temporary Permit to Operate is valid for one year and may be extended by an additional year with the payment of the annual renewal fee. [NSCAPCD Rule 300.5.1]

5. Severability

The provisions of this PERMIT are severable, and, if any provision of this PERMIT is held invalid, the remainder of this PERMIT shall not be affected.

6. Reporting Requirements

Within thirty (30) days of a request by the District, the Operator shall furnish an annual summary report in a form acceptable to the District.

7. Notification Requirements

- a. Upsets and Breakdowns - In the event of any failure of process or abatement equipment to operate in a normal manner which results in an increase in emissions above any allowable emissions limit stated in District Rules or in conditions to this PERMIT the Operator may notify the District as provided by Rule 540 regarding upset breakdown conditions to petition for shelter from enforcement actions. In order to qualify for such shelter an initial notification of the equipment failure must be reported to the District Office no later than one (1) hour after its detection during normal office hours (8:00 am to 4:30 pm) or one (1) hour after the start of the next regular business day, whichever is sooner. [NSCAPCD Rule 540];
- b. Transfer of Ownership - In the event of any changes in control or ownership of facilities to be constructed, modified or operated, this PERMIT together with its terms and conditions 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. [NSCAPCD Rule 240.j.]

8. Right to Entry

The Control Officer, The Chairman of the California Air Resources Board, The Regional Administrator of USEPA, 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 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.
[NSCAPCD Rule 240.c]

THIS PERMIT BECOMES VOID UPON ANY ALTERATION OF EQUIPMENT

This permit does not authorize the emission 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. This permit cannot be considered as permission to violate existing laws, ordinances, regulation or statutes of other governmental agencies. The violation of any of these terms and conditions shall be grounds for revocation of this PERMIT, and shall be a violation of District Rules and Regulations under Rule 240. This permit can be reviewed annually and can be amended by the District as allowed by Rule 240(h).

DATE: 9/21/09

Permit Number 09-26A

BY: 

Barbara A. Lee

Air Pollution Control Officer

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NORTHERN SONOMA COUNTY AIR POLLUTION CONTROL DISTRICT
150 Matheson Street Healdsburg CA 95448
Telephone (707) 433-5911

Authority to Construct/Temporary Permit to Operate 09-26B

COMPANY: Geysers Power Company, LLC
c/o Calpine Corporation
10350 Socrates Mine Road
Middletown CA 95461

EQUIPMENT DESCRIPTION:

Geothermal Well, Designated Prati State 31

LOCATED AT: 1046' East and 3,921' South of the of the Northwest corner of Section 35,
Township 12 North Range 9 West, M.D. B&M, Sonoma Co. California

Whereas application for an Authority to Construct and temporary Permit to Operate has been made by the Geysers Power Corporation, LLC (hereinafter called the permit holder) pursuant to Regulation 1 of the Rules and Regulations of the Northern Sonoma County Air Pollution Control District (hereinafter call the District), and said application has been reviewed and considered by the Air Pollution Control Officer of said District (hereinafter referred to as the Control Officer), an Authority to Construct and temporary Permit to Operate is hereby granted to the following terms and conditions:

This shall be your Authority to Construct and temporary Permit to Operate once construction is complete. The permit holder shall allow District representatives to enter upon the premises in order to perform testing and inspections as is necessary to determine compliance with the rules and regulations of the District and the conditions of this Authority to Construct and temporary Permit to Operate.

Permit Conditions

A. Emission Limits

1. Wellhead H₂S emissions are not to exceed the limitations of Rule 455 (a), no person shall discharge into the atmosphere from any geothermal operation sulfur compounds, calculated as sulfur dioxide, in excess of 1,000 ppmv.
2. Wellhead H₂S emissions are not to exceed the limitations of Rule 455 (b), H₂S emissions shall not exceed 0.5 kilograms per hour (1.1 pounds per hour), except as allowed under B.1.
3. Fugitive dust emissions from this well pad and access roads under the Permit holders responsibility are to be controlled to meet the requirements of Rule 430 and 410(a).

B. Operational Requirements

1. The permit holder shall notify the District prior to initiating any planned venting operation of this geothermal well which is associated with testing, power plant outages, wellhead or wellbore maintenance. The permit holder shall also present to the Control Officer, and receive approval of, an emissions release protocol governing emissions and notifications for such operations. Until such time as this protocol is approved the Permit holder shall obtain permission from the District for each venting operation at least 24 hours prior to starting the venting operation. Operations resulting in an excess of 15 pounds per hour of H₂S shall be subject to a meteorological forecast, by a meteorological consultant acceptable to the District and shall only proceed after approval by the Control Officer.
2. The permit holder shall apply for and receive an Authority to Construct/Temporary Permit to Operate for an air pollution control device prior to reworking or redrilling this well unless the permit holder holds a valid wellfield maintenance permit.
3. The permit holder shall properly maintain the wellhead, its associated valves, flanges, fittings, liquid lines and other components including the wellhead blowie line muffler so as to eliminate leakage of steam, condensate and non-condensable gases as noted below:

- 3a. Liquid leak rate shall not exceed 20 ml in 3 minutes. Liquid leak rates in excess of 20 ml in 3 minutes shall be identified and be repaired within 15 calendar days.
 - 3b. Non-condensable gas leaks shall not (i) exceed (as measured within 1 cm of such leak) 1000 ppm(vol) H₂S nor 10,000 ppm(vol) TOG (expressed as methane) nor (ii) exceed emission limits of Rule 455. Non-condensable gas leak rates in excess of 1000 ppm (vol) H₂S or 10,000 ppm (vol) TOG shall be repaired with 24 hrs.
4. All wells shall be identified in a manner acceptable to the Control Officer.

C. Monitoring

1. At the request of the Control Officer and per Rule 240, the Permit holder will perform, or have performed, source test(s) for air contaminants as specified. District concurrence with test procedure and method(s) is to be obtained prior to testing. The permit holder shall provide the District 48 hours notification prior to any sampling requested by the Control Officer. The Permit holder shall provide adequate facilities for District sampling.
2. If this well employs an aspirator as allowed under rule 455(aa) and operates for greater than 24 consecutive hours it shall be source tested annually to determine H₂S mass emissions and exit concentration. If an aspirator is utilized for less than 24 consecutive hours the well shall be source tested for H₂S once every 5 years.
3. Any instrument used for the measurement of H₂S or Total Organic Gases (TOG) shall be approved by the Control Officer.

D. Recordkeeping and Reporting

1. A quarterly report shall be submitted to the District which contains the following information:

Well Bleeds

- a. Source name.
- b. Hours of bleed emissions.
- c. Amount of H₂S, ammonia and total organic gases (expressed as methane) released during bleed.
- d. Reason for bleed.

Wells employing an aspirator

- e. Hours of bleed through an aspirator.
- f. H₂S emission rate expressed as lb/hr, H₂S exit concentration and date tested.

Wellbore maintenance (blowdowns)

- g. Time and date of event.
- h. Duration of event.
- i. Emissions rate during event, steam and H₂S, expressed as pounds per hour.
- j. Total mass of H₂S, ammonia and TOG (expressed as methane) released during event.
- k. Reason for event.

The quarterly report shall be submitted to the District within 30 days of the end of each calendar quarter.

E. ADMINISTRATIVE REQUIREMENTS

1. Facilities Operation

- a. Operation under this permit must be conducted in compliance with all data and specifications included in the application which attest to the permit holder's ability to comply with District Rules and Regulations. This permit must be posted in a conspicuous place nearby or, as per rule 240.
- b. All equipment of this PERMIT shall at all times be maintained in good working order and be operated as efficiently as possible so as to minimize air pollutant emissions.

NSCAPCD Rule 240.d

2. Permit Expiration

This Authority to Construct/Temporary Permit to Operate is valid for one year and may be extended by an additional year with the payment of the annual renewal fee. [NSCAPCD Rule 300.5.1]

3. Severability

The provisions of this PERMIT are severable, and, if any provision of this PERMIT is held invalid, the remainder of this PERMIT shall not be affected.

4. Notification Requirements

- a. Upsets and Breakdowns - In the event of any failure of process or abatement equipment to operate in a normal manner which results in an increase in emissions above any allowable emissions limit stated in District Rules or in conditions to this PERMIT the Permit holder may notify the District as provided by Rule 540 regarding upset breakdown conditions to petition for shelter from enforcement actions. In order to qualify for such shelter an initial notification of the equipment failure must be reported to the District Office no later than one (1) hour after its detection during normal office hours (8:00 am to 4:30 pm) or one (1) hour after the start of the next regular business day, whichever is sooner. [NSCAPCD Rule 540]:
- b. Transfer of Ownership - In the event of any changes in control or ownership of facilities to be constructed, modified or operated, this PERMIT together with its terms and conditions 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. [NSCAPCD Rule 240.j.]

5. Right to Entry

The Control Officer, the Executive Officer of the California Air Resources Board, the Regional Administrator of USEPA, and/or their authorized representatives, upon the presentation of credentials, shall be permitted:

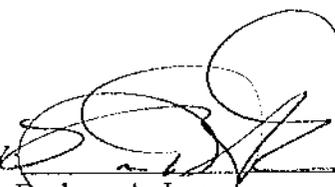
- a. To enter upon the premises where the source is located or in which any records are required to be kept under the terms and conditions of this PERMIT; and
- b. At reasonable times to have access to and copy any records required to be kept under the terms and conditions of this PERMIT; and
- c. To inspect any equipment, operation, or method required in this PERMIT; and
- d. To sample emissions from the source.
[NSCAPCD Rule 240.e]

THIS PERMIT BECOMES VOID UPON ANY ALTERATION OF EQUIPMENT

This permit does not authorize the emission 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. This permit cannot be considered as permission to violate existing laws, ordinances, regulation or statutes of other governmental agencies. The violation of any of these terms and conditions shall be grounds for revocation of this PERMIT, and shall be a violation of District Rules and Regulations under Rule 240. This permit can be reviewed annually and can be amended by the District as allowed by Rule 240(h).

DATE: 9/21/09

Permit Number 09-26B

BY: 
Barbara A. Lee
Air Pollution Control Officer

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