State of California
AIR RESOURCES BOARD

Resolution 81-37

April 23, 1981

WHEREAS, pursuant to Health and Safety Code Section 39606, the Air Resources Board (Board) has established a statewide ambient air quality standard for hydrogen sulfide (H_2S);

WHEREAS, emissions of H_2S associated with geothermal development have degraded air quality in the Geysers Known Geothermal Resources Area (KGRA) and have caused the state ambient air quality standard for H_2S to be exceeded;

WHEREAS, Health and Safety Code Sections 39003, 39500, and 41500 authorize the Board to coordinate, encourage, and review efforts to attain and maintain state ambient air quality standards;

WHEREAS, the Lake County and Northern Sonoma County Air Pollution Control Districts have adopted or are considering amendments to their rules and regulations which will reduce H_2S emissions from new and existing geothermal operations in the Geysers;

WHEREAS, on April 22 and 23, 1981, the Board held a duly noticed public meeting to hear comments concerning the staff's proposed suggested control measure for the control of hydrogen sulfide emissions from geothermal operations in the Geysers KGRA;

WHEREAS, the Board finds that in order to permit the development of the Geysers KGRA to its full electrical generating potential and at the same time improve air quality in the Geysers KGRA so as to achieve and maintain the state H_2S standard, reductions in H_2S emissions from existing geothermal operations as well as the application of state-of-the-art advanced control technology on new geothermal operations will be necessary;

WHEREAS, the technology for reducing H_2S emissions from existing and new geothermal power plants and stacking to the emission levels set forth in the proposed suggested control measure is technically feasible and economically achievable;

WHEREAS, the Board finds that the air quality impacts of geothermal operations may be more severe in areas near the operations and that the districts may find that requirements more stringent than those in the proposed suggested control measure are necessary and appropriate for geothermal operations close to populated areas;

WHEREAS, the Board finds that the slight potential decrease in total electrical generating capacity in the Geysers by the power required to operate H_2S control systems is not significant when compared to total generating capacity, and that the operation of advanced H_2S control systems will significantly improve air quality at the Geysers;

WHEREAS, the Board finds that if the H_2S emissions from new and existing geothermal operations in the Geysers are reduced, the total amount of solid waste potentially generated from the operation of H_2S control systems or geothermal operations in the Geysers is not expected to increase and may decrease;

WHEREAS, the Board finds that power plant operators and steam suppliers in the Geysers area are undertaking research projects to improve existing H_2S control systems and to develop new, efficient and cost-effective H_2S control systems;

WHEREAS, an adequate ambient air quality monitoring network does not now exist and should be established in the Geysers to assess H_2S emissions from new and existing geothermal operations and to take into account the complex terrain and meteorological conditions in the Geysers;

WHEREAS, the California Environmental Quality Act and Board regulations require that a proposed action may not be adopted as proposed if mitigation measures or alternatives exist which would substantially reduce any significant adverse environmental effects of the proposed action, and further require that the Board respond in writing to significant environmental issues raised; and

WHEREAS, the Board finds that the environmental issues associated with the concepts contained in the staff's suggested control measure have been adequately addressed and the Board concurs in the staff's findings that no significant adverse environmental effects are likely to result from the adoption and implementation of those concepts.

NOW THEREFORE BE IT RESOLVED that:

1. The Air Resources Board approves the following concepts as necessary to control H_2S emissions from geothermal operations at the Geysers:

   (a) for new power plants at the Geysers, an H_2S emission limit of 5 pounds/hour, 50 gr/GMW/hr, 5 pounds per million pounds of steam or equivalent as proposed by the staff and the Air Pollution Control Officers of Northern Sonoma County and Lake County Air Pollution Control Districts;

   (b) for existing power plants, H_2S emissions limits as set forth in Appendix A, Table I of the Suggested Control Measure For The Control Of Hydrogen Sulfide Emissions From Geothermal Operations at the Geysers Known Geothermal Resources Area, Staff Report No. 81-6-1, dated April 22, 1981, and as proposed by the Northern Sonoma County Air Pollution Control Officer;

(c) for stacking from new and existing geothermal power plants, an H_2S emission limit which approximates the H_2S emission limit for power plants and shall be achieved within the shortest practicable time after the power plant outage, as proposed by the staff and the Air Pollution Control Officers of Northern Sonoma County and Lake County Air Pollution Control Districts;

(d) appropriate criteria for more stringent H_2S emission limits applicable to new geothermal operations located close to populated areas or close to other geothermal operations analogous to the proposal of the Lake County Air Pollution Control Officer.

2. The Board directs the Executive Officer to forward this resolution to the Northern Sonoma County Air Pollution Control District and Lake County Air Pollution Control District for their consideration and direct the staff to support the districts' efforts to adopt regulations consistent within the findings of this resolution;

3. The Board also directs the Executive Officer to forward this resolution and the proposed suggested control measure to the Geothermal Policy Committee of the California Air Pollution Control Officers' Association for their consideration;

4. In view of the current research and development projects of power plant operators and steam suppliers on H_2S emissions control systems, the Board recommends that the Lake County Air Pollution Control District and the Northern Sonoma County Air Pollution Control District, or the Air Resources Board at the request of either district, hold a public meeting in 1985 to review H_2S control system improvements, air quality data, and the need for additional control of H_2S emissions in the Geysers;

5. The Board directs the Executive Officer to work with and provide assistance to the local air pollution control districts in the Geysers area to design and establish a comprehensive network to monitor H_2S in the Geysers;

6. If, within 120 days from the date of adoption of this resolution, the Lake County Air Pollution Control District and the Northern Sonoma County Air Pollution Control District have not adopted provisions for the control of H_2S emissions from geothermal operations in the Geysers which are at least as effective as the concepts outlined in this resolution, the Executive Officer shall schedule a public hearing to consider adopting for these districts appropriate rules to control H_2S emissions from geothermal operations at the Geysers.

I certify that the above is a true and correct copy of Resolution 81-37 as adopted by the Air Resources Board.

Sally Rump

Sally Rump, Board Secretary

PROPOSED

State of California
AIR RESOURCES BOARD

April 22, 1981

SUGGESTED CONTROL MEASURE FOR THE CONTROL OF HYDROGEN SULFIDE EMISSIONS FROM GEOTHERMAL OPERATIONS AT THE GEYSERS KNOWN GEOTHERMAL RESOURCES AREA

I. Applicability

This rule shall apply to hydrogen sulfide emissions in the Geysers Known Geothermal Resources Area from existing geothermal power plants, new geothermal power plants, and stacking.

For the purposes of this rule, power plants which receive a permit to construct from an Air Pollution Control District or a certificate from the California Energy Conservation and Development Commission on or after July 1, 1981, are deemed new power plants.

II. Definitions

A. Geothermal power plant means any thermal power plant which uses geothermal resources as the principal energy source for the generation of electrical power.

B. Gross megawatt (GMWe) means the total rated electrical generating capacity of a geothermal power plant as specified on the name plate of the turbine.

C. Stacking means the venting of steam into the atmosphere during power plant shutdowns or outages, both scheduled and unscheduled.

D. Dual units means two or more electrical power generating turbines which are located within or part of the same structure and which may be operated independently.

E. Single unit means all electrical power generating turbines not defined as dual units.

III. Emissions Limitations

No person shall cause or allow the discharge into the atmosphere of hydrogen sulfide (H_2S) from new geothermal power plants, existing geothermal power plants, or stacking at a rate which exceeds those set forth in Table I of this rule.

IV. Exemption from New Source Review Rule

H_2S emissions from new geothermal power plants, including stacking, which comply with the emissions limitations specified in Section III of this rule shall be exempt from those sections of the district's new source review rule which require offsets, best available control technology, and air quality impact analyses.

V. Operating Protocol

Each permit to operate shall include an operating protocol which specifies the manner in which the power plant and related facilities will be operated to meet the emissions limitations set forth in Table I of this rule.

A. General Requirements

1. Each operating protocol shall include a requirement that a log be kept indicating for each power plant outage the date, the duration, and the estimated amount of H_2S emissions. This log shall be made available, upon request, to the district or the Air Resources Board.

III. Emissions Limitations

No person shall cause or allow the discharge into the atmosphere of hydrogen sulfide (H_2S) from new geothermal power plants, existing geothermal power plants, or stacking at a rate which exceeds those set forth in Table I of this rule.

IV. Exemption from New Source Review Rule

H_2S emissions from new geothermal power plants, including stacking, which comply with the emissions limitations specified in Section III of this rule shall be exempt from those sections of the district's new source review rule which require offsets, best available control technology, and air quality impact analyses.

V. Operating Protocol

Each permit to operate shall include an operating protocol which specifies the manner in which the power plant and related facilities will be operated to meet the emissions limitations set forth in Table I of this rule.

A. General Requirements

1. Each operating protocol shall include a requirement that a log be kept indicating for each power plant outage the date, the duration, and the estimated amount of H_2S emissions. This log shall be made available, upon request, to the district or the Air Resources Board.

Effective Date	New Geothermal Power Plants		Existing Geothermal Power Plants		Stacking	
	Less than 50 GMWe	50 GMWe or greater	Direct Contact Condenser	Surface Condenser	New Power Plants	Existing Power Plants
July 1, 1981	50 grams/ gross mega-watt-hour	five (5) pounds per hour or 40 grams/gross megawatt-hour, whichever is greater	Units 3,4, & 11: 90% reduction of the H_2S in the incoming steam to each unit. Units 5,6, & 12: 200 grams/gross megawatt-hour for each unit.		Same emis-sions limit-ations as power plant, at all times	
July 1, 1985		five (5) pounds per hour	Units 1 & 2: 50% reduction of the H_2S in the incom-ing steam to each unit. Units 3,4,5,6,7, 8,9,10,11, &12: 200 grams/gross megawatt-hour for each unit.	Units 13,14, 15,17 & NCPA #2: 50 grams/ gross mega-watt-hour		Same emissions limit-ations as the power plant, within two hours of the outage
July 1, 1990			Units 1 & 2: 50% reduction of the incoming steam to each unit. Units 3,4,5,6,7, 8,9,10,11, & 12: 100 grams/gross megawatt-hour for each unit.			

Table I

2. The operating protocol for each power plant shall specify the frequency and method of source tests, the frequency and method of sampling the H_2S concentration in the incoming steam, the predicted relationship between hydrogen sulfide emissions and chemical feed rates, the location of the record of all source tests, and a requirement that source tests will be performed with the power plant operating at a minimum of 80 percent of rated capacity.

3. The operating protocol for stacking emissions controls shall specify the steam flow rates, chemical feed rates, and all other parameters which determine the degree of H_2S control.

B. Procedures

1. New Facilities: Each applicant for a permit to operate for a new power plant shall submit an operating protocol. The steam supplier for a new power plant shall submit an operating protocol for stacking emissions from facilities it operates.

2. Existing Facilities: Each operator of an existing power plant shall submit an operating protocol for each unit, including all facilities operated by the same person, to the Air Pollution Control Officer within 60 days after the adoption of this rule. The steam supplier for each existing power plant shall submit an operating protocol for stacking emissions from all facilities it operates within 60 days after the adoption of this rule. The Air Pollution Control Officer shall approve, disapprove, or modify the operating protocols.

2. The operating protocol for each power plant shall specify the frequency and method of source tests, the frequency and method of sampling the H_2S concentration in the incoming steam, the predicted relationship between hydrogen sulfide emissions and chemical feed rates, the location of the record of all source tests, and a requirement that source tests will be performed with the power plant operating at a minimum of 80 percent of rated capacity.

3. The operating protocol for stacking emissions controls shall specify the steam flow rates, chemical feed rates, and all other parameters which determine the degree of H_2S control.

B. Procedures

1. New Facilities: Each applicant for a permit to operate for a new power plant shall submit an operating protocol. The steam supplier for a new power plant shall submit an operating protocol for stacking emissions from facilities it operates.

2. Existing Facilities: Each operator of an existing power plant shall submit an operating protocol for each unit, including all facilities operated by the same person, to the Air Pollution Control Officer within 60 days after the adoption of this rule. The steam supplier for each existing power plant shall submit an operating protocol for stacking emissions from all facilities it operates within 60 days after the adoption of this rule. The Air Pollution Control Officer shall approve, disapprove, or modify the operating protocols.

State of California
AIR RESOURCES BOARD

Response to Significant Environmental Issues

Item: Public Meeting to Consider Suggested Control Measure for the Control of Hydrogen Sulfide Emissions from Geothermal Operations at the Geysers Known Geothermal Resources Area.

Agenda Item No: 81-6-1

Public Meeting Date: April 22, 1981

Response Date: April 22, 1981

Issuing Authority: Air Resources Board

Comment: No comments were received identifying any significant environmental issues pertaining to this item. The staff report identified no adverse environmental effects.

Response: N/A

CERTIFIED: Sally Rump
Board Secretary

Date: 5/28/81

State of California

Memorandum

To : Huey D. Johnson
Secretary
Resources Agency
1416 9th Street

Date : May 28, 1981

Subject : Filing of Notice of Decision of the Air Resources Board

From : Air Resources Board

Pursuant to Title 17, Section 60007(b), and in compliance with Air Resources Board certification under section 21080.5 of the Public Resources Code, the Air Resources Board hereby forwards for posting the attached notice of decision and response to environmental comments raised during the comment period.

Sally Rump
Board Secretary

Attachments