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CALIFORNIA ENERGY COMMISSION

DECISION

ON THE

PACIFIC GAS & ELECTRIC COMPANY'S

APPLICATION FOR CERTIFICATION FOR GEYSERS UNIT 17

79-AFC-1

SEPT 1979

800-79-015

STATE OF CALIFORNIA

ENERGY RESOURCES CONSERVATION

AND DEVELOPMENT COMMISSION

In the Matter of:	)	
Application for Certification	)	Docket No. 79-AFC-1
of PACIFIC GAS AND ELECTRIC COMPANY)		
RE: Geysers 17.	)	DECISION

1. The additional system capacity to be added by Geysers Unit 17 is consistent with the last forecast of service area electric power demands adopted pursuant to Public Resources Code section 25309.

2. The Geysers Unit 17 geothermal facility is safe and reliable.

3. The Geysers Unit 17 geothermal facility can be constructed in conformity with all applicable federal, state, regional, and local laws and regulations.

4. All findings and conclusions, and conditions in Appendix A are incorporated by reference herein and adopted.

5. The provisions of Appendix B for monitoring compliance with applicable laws, regulations, and conditions are incorporated by reference herein and adopted.

6. The Final Environmental Impact Report is certified to have been prepared in compliance with the California Environmental Quality Act and all applicable state and Commission guidelines. The Final Environmental Impact Report has been considered in adopting this Decision.

7. For the purposes of Public Resources Code section 25530, this Decision shall be final upon filing following signature by voting members with the Commission Secretariat.

8. If any portion of this Decision shall be declared invalid or unenforceable, the entire Decision shall be invalid and void.

THEREFORE IT IS ORDERED AS FOLLOWS:

1. The Application for Certification for Pacific Gas and Electric Company's Geysers Unit 17 is granted.

2. All persons designated to perform any act by the provisions of Appendix A and/or B is ordered to perform said act in the manner specified, and where not specified, in a timely manner.

3. The Executive Director shall transmit a copy of this Decision and necessary accompanying documents to all persons and agencies as required by law.

Dated: September 20, 1979

Russell L. Schweickart, Chairman

C. Suzanne Reed

Emilio E. Varanini, III

Ronald D. Doctor

APPENDIX A

NEED

Findings

1. On December 20, 1978, the California Energy Commission adopted the following Findings with respect to the need for Geysers Unit 17:

   a. If constructed according to present schedules, Geysers Unit 17 will begin commercial operation in 1982.

   b. Geysers Unit 17 will have a net generating capacity of 110 MW.

   c. The "most likely" demand forecast adopted by the Energy Commission, with adjustments, indicates a need in 1982 for additional generating capacity in excess of approximately 110 MW for the PG&E service area.

   d. Geysers Unit 17 is included in PG&E's generation expansion plans for 1982.

   e Under the "most likely" demand forecast adopted by the Energy Commission, PG&E's reserve margin in 1982, with the addition of Unit 17, will be 15.1 percent if facilities planned and under construction are commercially available on current schedules.

   f. The policy of the California Energy Commission is to encourage the accelerated development of geothermal resources.

   g. Geysers Unit 17 will generate baseload electricity.

   h. The bus-bar cost of electricity generated at the Geysers Geothermal power plant is less than the bus-bar cost of electricity generated by other baseload resources.

2. The need for additional PG&E system capacity has not changed appreciably since analysis on the NOI was performed.

3. If Unit 17 is not built, PG&E may require approximately 1.3 million barrels of oil per year above that which would be required if Unit 17 is constructed.

4. Unit 17 is scheduled for operation in June 1982, provided that all permits are received by October 1, 1979.

5. PG&E's projected date for Units 14 and 15 have slipped due to causes beyond the control of regulatory agencies.

Conclusions

1. The additional system capacity to be added by Geysers Unit 17 is consistent with the forecast of service area electric power demands adopted by the Commission pursuant to Public Resources Code Section 25309.

2. The use of geothermal resources to generate electricity is an acceptable means of supplying 110 MW of the total capacity needs for the PG&E service area in 1982.

3. The use of geothermal resources for electric power generation will reduce the need to use oil for electric power generation, and is, therefore, consistent with stated policies of the National Energy Act.

SOCIOECONOMICS

Findings

1. Construction of the proposed power plant will require approximately 70-85 workers during the power plant's peak construction time, and will employ an average of 50 workers during this 28-month construction period.

2. The Applicant's previous operations in The Geysers area have established a resident labor force in the Sonoma-Lake County area.

3. Both Lake and Sonoma Counties will receive economic impacts from the construction and operation of the Unit 17 power plants irrespective of the origin of the workers. These impacts reflect the additional economic activity generated in the two Counties as a result of the payrolls of the personnel involved in the Unit 17 project. Sonoma County will most likely receive the greater amount of these payroll effects.

4. Sonoma County will receive property tax revenues from the assessed value of the proposed power plant and a portion of the steam field.

5. Lake County will receive no property tax revenues from the proposed power plant; however, it will derive revenue from the development of that portion of the Unit 17 steam field which lies within the County's boundaries.

6. Possible changes in the final cost of the power plant, the valuation of the steam field, and the effects of Proposition 13 make the final determination of actual tax revenues uncertain. The increase in the assessed valuation of the two counties atributable to the Geysers 17 Project should have a beneficial impact upon revenues available to local government, especially

in the case of Lake County where the geothermal tax revenues constitute a relatively larger share of government revenues than in Sonoma County.

7. None.

8. Direct and indirect costs to be borne by Sonoma and Lake County, as well as by the communities near the project, as a result of Unit 17's construction and operation will be minimal and tax revenues derived from the project should be sufficient to offset such costs.

9. Sonoma County has adopted a goal of providing for planned production of geothermal resources within geothermal areas. In this regard, an area of Sonoma County containing The Geysers geothermal area has been designed as a "primary" geothermal resource area, meaning that it is an area in which geothermal development has taken place and is a permitted use.

10. The proposed power plant is located in the Primary Geothermal Resource area, an area whose principal land use is the exploration, development, and utilization of geothermal energy and which has numerous geothermal power plants in operation.

Conclusions

1. Due to the present resident labor force in the Sonoma-Lake County area, the proposed project will not cause a significant increase in the number of construction workers who may migrate to these areas in order to work at the Geysers 17 power plant.

2. Payroll and income effects generated by the construction of the proposed power plant will occur in Sonoma and Lake Counties. Sonoma County, because

of the large proportion of geothermal-related workers residing there, will likely receive the larger share of these income effects.

3. Direct and indirect costs for Sonoma and Lake Counties as well as the local communities near the project, as a result of Unit 17's construction and operation, appear at this time to be less than the anticipated tax revenues associated with the project. Project tax revenues, as well as effects from construction payrolls appear to be of sufficient magnitude to cause a positive balance in a cost-benefit comparison.

4. The proposed power plant is located in a "primary" geothermal resource area. Accordingly, the project appears to be consistent with the conservation element of the Sonoma County General Plan.

CULTURAL RESOURCES

Findings

1. Cultural resources include paleontological, archaeological, historical, ethnographical resources and resources of educational, scientific, religious and other significance.

2. The applicable standards are:

   a. National Historic Preservation Act of 1966, 16 U.S.C. 470 et seq., and implementing regulations, 36 CFR 800.

   b. Native American Historical Culture and Sacred Sites, Public Resources Code Section 5097.9 et seq.

3. The plant site and steam field have been evaluated for archeological sites and artifacts and none were present in either area.

4. Applicant will make arrangements to have an archaeologist available should artifacts of previously unknown sites be uncovered during initial grading and trenching. If artifacts are uncovered, the Applicant shall immediately notify the archaeologist and the Commission. The consulting archaeologist shall follow standard practices in evaluating and preserving such artifacts, and all construction which may affect the newly discovered resources shall cease until such time as the archaeologist has completed the evaluation.

5. There are no resources of identified paleontological, historic, ethnological, or other cultural significance that will be affected by the proposed facility.

6. Unit 17 site is located on a hill composed of apparently nonfossiliferous chert.

7. During the excavation of foundations and site grading, Applicant's geologist will collect samples of newly exposed chert for archiving at the Sonoma State University Geology Department. At least five samples will be taken from each significant body of chert.

8. Within 30 days of trenching, filling, and grading, Applicant's geologist will submit a report of his findings. If no archaeological artifacts are uncovered, Applicant shall submit a letter to that effect within 30 days of trenching, filling and grading. If archaeological artifacts are uncovered, Applicant's archaeologist will file a report within 30 days after completing his evaluation.

Conclusions

1. The proposed facility will not adversely affect any identified significant cultural resources, provided the Applicant undertakes the monitoring measures specified in Findings 4 and 7.

2. Subject to compliance with the measures specified in Applicant's Findings 4 and 7, Applicant and Staff agree that no adjudication of this issue is necessary during the AFC proceeding.

NOISE

Findings

1. Lake and Sonoma Counties have adopted noise elements to their general plans. The intent of the Lake County noise element is to limit noise to 55 dBALdn. Certain construction activities, such as the movement of heavy equipment during daylight hours, are exempt from Lake County noise standards. The Sonoma County element does not have specified dBA limits for geothermal activities. Prior to the CEC exclusive siting authority, the noise limits were set in the Sonoma County use permits.

2. The state occupational noise limits are established in Title 8, California Administrative Code Sections 5095-5099 and are enforced by the State Division of Occupational Safety and Health (DOSH) of the Department of Industrial Relations.

3. The federal occupational noise standards are set by the Occupational Safety and Health Act of 1970 and are basically the same as CAL-DOSH standards.

4. The ambient noise levels of the site and sensitive receptors are contained in the NOI at page 66 and Appendix G, Table 9-2.1.

5. The closest identified sensitive residential receptor to Unit 17 is 1.2 miles north of the site. Based upon the estimated projected project operational noise level to this receptor, the noise of operation of the plant should be inaudible at this receptor. The projected operating noise level would be inaudible to the other identified sensitive receptors which are farther distant than 1.2 miles.

6. The third octave band noise frequency data for the cooling tower, steam jet ejector and turbine generator are contained in Appendix G, Figure 9-4.1 thru 9-4.3 of the NOI. Certain tonalities from the steam jet ejector and turbine generator are expected to be discernible at the plant, but due to molecular absorption, terrain and vegetation barrier effects, it is not expected that these tonalities will be observed at the receptors. No discernible tonalities are expected from the cooling tower.

7. The following mitigations are to be implemented by the Applicant:

   a. Path treatment will be installed on the exterior surfaces of the steam jet ejectors and will consist of mineral wool and an impervious membrane (aluminum and or lead jacket).

   b. Thermal (high-density) insulation will be installed on the exterior surfaces of the steam turbine and will reduce the noise inside the turbine building.

   c. The turbine building walls and roof will reduce noise propagating to the outside environment.

   d. A sound-proof office space will be built on the turbine-generator floor inside the building.

   e. PG&E's present purchase specifications for mechanical equipment encourage manufacturers to supply equipment that produces a sound level no greater than 80 dBA at three feet from the boundaries of the device.

   f. Steam-drain lines will be routed back into the condenser so that steam will not be discharged into the atmosphere during unit start-ups.

g. During unit outage conditions, steam will be routed through a rock muffler system installed and operated by the steam supplier.

8. The loudest plant construction noises will be caused by large earth-moving equipment. The noise associated with this equipment will be discernible to some of the closest receptors. The activity will be temporary in nature and performed during daylight hours whenever possible.

9. PG&E will require its employees to comply with the requirements of CAL-DOSH for hearing conservation through administrative controls and/or the use of hearing protectors, wherever necessary.

10. The complete list of noise sources and levels associated with steam supply activities is set forth in the Environmental Impact Report for Union Oil, Unit 17 (December 1977) and Union Oil simplified noise model, Unit 17 geothermal development area (March 1978).

11. The projected noise levels for production well testing with portable test mufflers, steam transmission lines start-up, unmuffled venting, and well head master valve changes will be significant noise sources and will be discernible to local receptors. However, these four events occur infrequently. The noises other than the above four associated with the steam field development production would not be discernible to Lake County receptors. They would not be audible to any of the receptors in Sonoma County.

12. The noise effects from the steam field development generally exceed plant construction and operation noise levels. The cumulative impacts of these two noise sources will not increase the impact on the receptors over the noise levels associated with the well development operation noise levels.

13. In order to monitor compliance with the Lake and Sonoma Counties Noise Elements, the Applicant has agreed to undertake the following measures:

    a. Within 90 days after the plant achieves a steady state operational condition, the Applicant shall conduct noise surveys at 500 feet from the generating station and the nearest sensitive receptor:

        1. The survey should cover a 24-hour period during which the plant is operating.

        2. Results of the survey should be reported in terms of L_x, L_{eq}, and L_{dn} levels.

        3. The Applicant should provide a report of the survey to the Energy Commission and Lake and Sonoma Counties. If the report indicates that the Counties standard is being exceeded, the report shall contain a mitigation plan and schedule to correct the noncompliance.

        4. The Applicant need not provide any additional noise surveys or reports of the off-site operational noise of the project unless the public registers complaints or the noise from the project is suspected of increasing due to change in the operation of the facility.

14. To verify compliance with standards for the protection of employees from noise impacts, a noise evaluation as required by Title 8, California Administrative Code, Article 105, should be performed to determine the magnitude of employee noise exposure. The results of the evaluation shall be forwarded to the Commission within 90 days of the time the facility has

attained its anticipated capacity factor. The results of the noise survey shall be maintained by the Applicant and shall be made available to DOSH upon request.

15. The provisions of CAL-OSHA are enforced by the Division of Occupational Safety and Health (DOSH) of the Department of Industrial Relations, insofar as said provisions relate to construction and operational employee noise hazards. The procedures and sanctions specified in Chapter 3.2 of Title 8 of the California Administrative Code shall apply to violations of the provisions of Title 8, California Administrative Code, Sections 5095-5099.

16. In the event that the Applicant receives public complaints on the noise due to construction of the facility, the Applicant shall take the following actions:

    a. Conduct noise surveys at the sensitive receptors registering the complaints and at the facility property line nearest the complaining receptors. Surveys shall be taken for the period of the construction working day and under similar circumstances that the complaints were registered. Survey should be reported in terms of the L_x and L_{eq} levels.

    b. Prepare and submit a report to the Counties and to the CEC of the results of the surveys, a record of the public complaints, mitigations which the Applicant has applied to resolve the impact, and the results of mitigation plans.

Conclusions

1. The Applicant shall undertake the noise impacts mitigation measures specified in Finding 7.

2. With the implementation of the noise impacts mitigation measures specified in Finding 7, the power plant noises during normal operations should be inaudible to the closest receptor to the power plant site.

3. With the implementation of the noise impacts mitigation measures specified in Finding 7, power plant noises during normal operations will be in compliance with Lake and Sonoma County noise standards and with the requirements of CAL-DOSH and with federal standards.

4. With the implementation of the noise impacts mitigation measures specified in Finding 7, noises during periods of steam stacking will be inaudible to the closest receptors to the powerplant site.

5. With the implementation of the noise impacts mitigation measures specified in Finding 7, noises during periods of steam stacking will be in compliance with Lake and Sonoma County noise standards and with the requirements of CAL-DOSH and with federal standards.

6. Noises caused by steam field operations will be generally discernible to the local receptors, but such noises are within the tolerable range.

7. Noises caused by construction of the power plant and related facilities will be discernible to some of the receptors closest to the power plant site but will be in compliance with Lake and Sonoma County noise standards and CAL-DOSH requirements and federal standards.

8. The Applicant shall limit the use of heavy earth moving equipment to daylight hours whenever possible. If the Applicant limits the use of earth moving equipment to daylight hours, the noises caused by plant construction will be tolerable to local receptors.

9. The Applicant shall monitor noise levels and report to the Commission and appropriate county agency as specified in Findings 13, 14 and 16.

10. The State Division of Occupational Safety and Health has the regulatory authority to enforce its regulations.

11. No adjudication of issues related to the impacts of noises caused by power plant construction and operation is anticipated at the AFC for Unit 17.

HYDROLOGY AND WATER RESOURCES

Findings

1. The Applicant proposes to utilize condensed geothermal steam for plant cooling.

2. The total plant needs for fresh inland waters will be minimal and should total approximately one acre foot of water per year.

3. Necessary fresh water will be supplied by either trucking water from existing water sources, utilizing the turbine building roof for collection of rain water or drilling of a water well nearby. Regardless of source, the impacts on water resources would be minimal.

4. Location of the site on a ridge line is such that there is little surrounding watershed upon which to generate overland flows.

5. The plant site is located 400 feet above Squaw Creek. Even under the worst case conditions, the flows of Squaw Creek will not flood the plant site.

Conclusions

1. Sufficient cooling water for the proposed power plant will be available from condensed steam.

2. The construction and operation of the proposed plant would not adversely affect the availability of fresh water resources.

3. The chance of the plant site being flooded by overland flow from the nearest surface water (Squaw Creek) is virtually nonexistent.

WATER QUALITY

Findings

1. The Stretford effluent, secondary abatement process sludge and steam condensate cooling tower sludge contain substances which are classified as toxic and hazardous.

2. The Stretford effluent consists of elemental sulfur and the Stretford purge stream. The latter will be pumped into the base of the cooling tower for reinjection. The former will be temporarily stored at the site in an enclosed container, and either sold for use or disposed of at an approved site.

3. The secondary abatement process sludge and cooling tower condensate sludge will be temporarily stored at the site and disposed of at an approved disposal site.

4. The capacity of the Class II-1 disposal site near Middleton is adequate for disposal of the waste from Geysers Unit 17.

5. The steam condensate will be utilized for cooling water and the excess will be reinjected. In the event of a spill, the retention basin would be adequate to prohibit escape of any reasonably expectable spill.

6. The cooling tower will emit droplets which contain certain toxic chemicals. Some of these chemicals are known to accumulate. These droplets would not be deposited or otherwise reach surface waters in measurable quantities.

7. The water quality standards potentially applicable to the project include:

a. Clean Water Act (December 1977);

b. U.S. Environmental Protection Agency Water Quality Criteria (1976);

c. Water Quality Control Plan; North Coastal Basin 1B;

d. Porter-Cologne Water Quality Control Act;

e. Title 23 California Administrative Code, Chapter 3, subchapters 13 and 15;

f. California Health and Safety Code, Chapter 6.5; and

g. Title 22 California Administrative Code, Division 4, Chapters 1 and 2.

8. Some domestic wastes will be generated at the proposed facilities. The Applicant has proposed to dispose of such wastes either through the use of a leech field or by reinjection.

9. There does not appear to be a sufficient layer of acceptable soil to use a leech field. Applicant should, therefore, reinject domestic wastes.

10. The Applicant has proposed to implement the following mitigation measures to control and preserve water quality:

a. A retention barrier will surround the entire plant to contain any spills of condensate or Stretford effluent. The barrier and the retention basin it surrounds will be impermeable and have a volume of at least 170,000 gallons. The lowest point in the barrier will contain a catch basin with pump facilities and alarm devices as described on page 3-1 of the Unit 17 NOI.

b. The Applicant has been informed by Union Oil Company that the reinjection pond will be impermeably lined and hold 225,000 gallons. The pond will have a free-board of 2 feet and will be equipped with high and low level alarms. This reinjection pond, as described, is adequate for its intended use.

11. PG&E has proposed to conduct the programs listed in Table 1 (attached).

Conclusions

1. There will be no intentional discharge of any toxic or hazardous material into surface waters in quantities sufficient to affect water quality.

2. Plume drift deposition should not measurably affect water quality.

3. For the protection of water quality, Applicant shall implement the mitigation measures specified in Findings 9, 10a and 10b and those specified in the findings and conclusions on soils.

4. The probability for water quality impacts due to the construction and/or operation of the proposed Unit 17 power plant is very small.

5. Any impacts due to the proposed development should be insignificant.

6. The proposed mitigation and protection measures appear adequate at this time for the protection and preservation of water quality.

7. The programs described in Table 1 are adequate at this time with respect to Geysers Unit 17.

Table 1

Summary of Proposed or Existing Programs
Which Monitor or Measure Effects of Soil Erosion,
Drift Deposition, or Spills of Liquid Wastes

Subject	Program Description	Reference
Soil erosion	A sedimentation study was initiated in 1976 to determine effects of construction on trout spawning beds in Squaw Creek.	Geysers Unit 17 NOI, Appendix C, Section IV
Soil erosion	PGandE will monitor the sedimentation yield by measuring the amount of sediments removed from the sedimentation pond.	PGandE's Proposed Findings and Conclusions, Soils, Conclusion 2
Drift deposition	PGandE has proposed to conduct a drift study program which will include leaf tissue analysis of boron, sulfate, and other selected elements.	PGandE's Proposed Findings and Conclusions, Biological Resources Finding 32
Liquid wastes	PGandE is monitoring accidental spills in accordance with the accidental spill monitoring requirements specified by the NCRWQCB for The Geysers area.	CRWQCB order Nos. 79-150 and 78-16
General	PGandE has collected monthly data at five stations in the Big Sulphur Creek drainage since 1968. In November 1977, another station in Squaw Creek was added. This data is submitted to the NCRWQCB on a regular basis.	EII G17-161

SOILS

Findings

1. The soils series surrounding the plant site will be highly erosive when disturbed by earth moving activities.

2. The estimated erosion rates and sediment transport for the project area are contained in The Geysers 17 NOI, Section 7.1.

3. The standards applicable to the project regarding soils are:

   a. The requirements contained in the Waste Discharge Requirements for Non-Sewerable Waste Disposal to Land-Disposal Site Design and Operation Information (January 1978) by the California State Water Resources Control Board (steam field).

   b. Sonoma County Water Agency and Flood Control District Ordinances (power plant).

4. The temporary and permanent mitigation measures to be utilized to control soil loss and erosion are outlined in The Geysers 17 NOI at pages 113-118.

5. Applicant has been informed that the mitigation measures that will be utilized for the steam field to control soil loss and erosion are as follows:

   a. "Earthwork and Construction Specifications, Geysers Area of Sonoma County," Union Geothermal Division, Union Oil Company of California.

b. The requirements contained in the Waste Discharge Requirements for Nonsewerable Waste Disposal to Land-Disposal Site Design and Operation Information (January 1978) by the California Water Resources Control Board.

6. The design basis for the sedimentation basin is outlined in the AFC, Section 7.5.1.2. and Appendix G.

7. Sedimentation monitoring programs conducted to date have not detected any measurable sedimentation yield due to geothermal development in the KGRA.

7a. Sedimentation monitoring programs conducted to date have not detected any measurable sedimentation yield due to geothermal development.

8. The sedimentation yield should be quantified by monitoring the amount of sediment removed from the sedimentation pond.

Conclusions

1. The estimated amount of erosion and sediment transport, coupled with the mitigation measures, indicates that there is a limited potential for high erosion and sediment transport.

2. The Applicant shall monitor the sedimentation yield through measuring the amount of sediments removed from the sedimentation pond. This information shall be submitted to the NCRWQCB and the California Energy Commission.

3. The Applicant shall implement the mitigation measures outlined in Finding 3 above.

BIOLOGICAL RESOURCES

Findings

1. The following laws and standards govern the preservation and protection of biological resources:

   - o Endangered Species Act of 1973 and implementing regulations.
   - o Ecological Reserve Act of 1970 and implementing regulations.
   - o Endangered Species Act of 1970 and implementing regulations.
   - o California Fish and Game Code Sections 3511, 4700, 5000, 5050, 5515, and implementing regulations.

2. The American Peregrine Falcon is an endangered species by designation of California and Federal law.

3. The American Peregrine Falcon has been observed in The Geysers-Calistoga Known Geothermal Resources Area.

4. No active breeding sites for the American Peregrine Falcon are known to exist at the Unit 17 site.

5. The proposed Critical Habitat Zone for the American Peregrine Falcon on Cobb Mountain was withdrawn by the U.S. Fish and Wildlife Service. The eastern corner of the leasehold, but not the Unit 17 site, was within that zone.

6. There are no rare, threatened, or endangered wildlife species known to exist at the Unit 17 site.

4. If the mitigation measures in proposed Finding 3 above are implemented, this project will comply with the applicable standards.

5. Applicant has been informed that Union Oil will implement the measures outlined in Finding 5a in order to comply with the permit conditions of Lake and Sonoma Counties. The North Coast Regional Water Quality Control Board requires implementation of Finding 5b as part of its discharge permit.

7. The Golden Eagle and the Ringtail are fully protected species by designation of California law.

8. The Golden Eagle and the Ringtail have been observed in The Geysers-Calistoga Known Geothermal Resources Area.

9. The Unit 17 site is not known to be a significant breeding or feeding area for either the Golden Eagle or the Ringtail.

10. No rare or endangered plant species are known to exist at the Unit 17 site.

11. Areas of critical concern which may contain unique habitats or species of special concern and which, therefore, may need special protection are known to exist at or near the Unit 17 site.

12. Mitigation measures proposed by the Applicant in the NOI at pages 113 (IX.B.1), 116 (IX.B."), 117 (IX.C), and 119 (IX.E) are adequate to protect areas of critical concern at or near the Unit 17 site.

13. Species of recreational value are known to exist in or near the Unit 17 site.

14. Mitigation measures proposed by the Applicant in the NOI are adequate to protect species of recreational value in or near the Unit 17 site.

15. Construction and operation of the Unit 17 steam field and power plant will result in the loss of approximately 66 acres of vegetation and wildlife habitat.

16. Applicant has proposed a Wildlife Mitigation Plan to compensate for loss of wildlife habitat from the construction of Unit 17. This plan contains four elements. They are:

a. Wildlife Food Plantings;

b. Wildlife Water Impoundment;

c. Wildlife Cover; and

d. Brush Conversion.

The Applicant will monitor the effectiveness of the Wildlife Mitigation Plan. A report documenting the effectiveness of the plan will be issued two to four years after implementation. The report will describe the plan in detail, discuss the implementation of the plan, assess the effectiveness of each mitigation measure, and present recommendations for future mitigation measures. The Applicant will provide CEC Staff with a description of the monitoring plan described above by December 31, 1979. If the Applicant and Staff are unable to agree to the proposed program, the Applicant may request the Commission to convene a hearing to mediate the dispute.

17. Additional proposed mitigation measures are as follows:

a. The Wildlife Water Impoundment/Sedimentation Basin will be started during the initial phase of site preparation and completed as soon as possible.

b. Construction involving earthmoving at the site and related facilities will be suspended during periods of continuous rainfall.

c. Temporary erosion control measures will be used during the rainy season. The contractor will submit detailed plants to PG&E showing proposed measures to be taken to control erosion. These plans will be available at the PG&E project office for review.

d. Construction involving earthmoving at the site and related facilities will not be planned for the months of December, January and February. However, if weather conditions are favorable PG&E will notify the Sonoma County Building Department and receive its concurrence prior to undertaking earthmoving operations during November, December, January, February or March. In addition, the Applicant will notify the CEC and CDF&G of such activities.

e. Revegetation to control erosion, including punched straw seed bed preparation, hydroseeding, slope stepping, and, if necessary, establishment of an irrigation system, will be implemented to cut and fill slopes. Native species of shrubs and trees will be used whenever possible.

f. A monitoring program will be implemented to provide data on the success of the revegetation planting program and subsequent establishment of natural vegetation.

18. Recommended monitoring for aquatic biology is contained in the Water Quality portion of this statement.

19. Vegetation stress due to cooling tower drift has occurred at The Geysers.

20. Applicant has submitted and Staff has reviewed summary reports of studies of vegetation damage from cooling tower drifts from Units 1-11.

21. Studies to date indicate that boron and sulfate constituents of the cooling tower drift are the principal agents of vegetation stress.

22. Most vegetation damage has occurred within 1,000 feet of the cooling towers.

23. Vegetation stress has been observed within one year of the start-up of the last three units.

24. The area of vegetation stress around Units 3-8 has increased 60-70 percent over the last 6 years.

25. In most units, boron concentrations in cooling tower circulating water have significantly increased over the last five years.

26. Unit 17 has been designed for a specified drift rate of .002 percent and for a reduction in the fraction of large drift droplets. This is a reduction in the drift rate and droplet size from older units.

27. Unit 11 has a measured drift rate of 3.9 gpm and Unit 17 has a designed maximum drift rate of 3.4 gpm. The measured drift rate at Unit 11 is significantly lower than the designed maximum drift rate at Unit 11, although Unit 17 has a greater condensate circulating flow than Unit 11.

28. Assuming that boron concentrations at Units 11 and 17 are similar, there is a potential for vegetation damage in the vicinity of Unit 17 similar to that experienced at Unit 11.

29. The Staff does not believe that there is sufficient information from which to determine the extent of significance of localized vegetation stress from the Unit 17 cooling tower drift.

30. At present, it is unknown if there has been any accumulation of boron in the soils in the vicinity of The Geysers Units.

31. At present, it is unknown whether there has been, or will be, any low level effects of boron and sulfate upon more distant vegetation due to the combined effects of The Geysers Units.

32. Applicant has proposed to conduct studies to monitor the effect of cooling tower drift from Unit 17 which will include quantitative measurements of:

- o observable vegetation damage;
- o growth of herbaceous and wood revegetation species;
- o growth of native woody vegetation; and
- o Leaf tissue analysis for boron, sulfate, and other selected elements. Sampling intensity for sulfates and other selected elements will be of a lower level than boron.

The drift study program will commence one year prior to start-up in order to collect baseline data.

33. The Applicant agrees to include in the Drift Monitoring Program:

- o Analysis of boron concentrations in cooling tower circulating water for the purpose of determining the cause of boron accumulation.
- o A continuation of annual infrared aerial photogrammetry.
- o Soil analysis for boron accumulation.

- o Details of sampling techniques, frequencies, locations, and species.
- o Methods of data analysis.
- o Examination and monitoring of areas at a distance from Unit 17 for cumulative effects.
- o Monitoring of drift at operating units will be evaluated annually, terminated if appropriate, and in any event, terminated at the end of three years.

34. Applicant agrees to provide CEC staff with a description of the monitoring program outlined above by December 31, 1979. If the Applicant and staff are unable to agree to the proposed program, they may request that the Commission convene a hearing to mediate disputes.

35. With regard to the drift monitoring mentioned in Finding 33, if Staff believes that additional monitoring after three years is necessary and PG&E does not concur, Staff shall bring the issue to the attention of the Commission for resolution.

Conclusions

1. Applicant shall undertake the mitigation measures specified in Applicant's Findings 12, 14, 16, 17, 32 and 33.

2. With the implementation of the measures specified in Conclusion No. 1, the Unit 17 power plant and related facilities can be constructed and operated in compliance with applicable standards for the protection and preservation of biological resources.

CIVIL ENGINEERING

Findings - General

1. Cut slopes at the Unit 17 plant site will be sloped no steeper than 1-1/2 (horizontal) to 1 (vertical). The slopes will be benched with ditches placed on the up-slope side of the bench and around the perimeter of the slope.

2. Fill slopes will be sloped no steeper than 2:1. Fill slopes will be benched with ditches on each bench and around the perimeter of the slope. A subdrain system will be placed under each fill slope to collect seepage.

3. Construction of cut and fill slopes as described in Findings 1 and 2 should be adequate to protect against failure or earthquake loading.

4. Construction of cut and fill slopes as described in Findings 1 and 2 should comply with applicable provisions of the Uniform Building Code (1976).

5. The dike surrounding the Stretford Unit will be paved with concrete.

6. The capacity of the basin within the Stetford Unit berm is approximately 23,000 gallons. The 23,000 gallon capacity of the Stretford Unit berm is greater than the maximum expected spill from the Stretford Unit.

7. The measures specified by the Applicant in its AFC demonstrate that the design of the Stretford Unit berm will comply with applicable provisions of the Uniform Building Code (1976).

8. The Applicant proposes to construct a berm containment with a volume of at least 170,000 gallons around the plant site.

9. The measures specified by the Applicant in its AFC and in its answers to interrogatories demonstrate that the design of the berm containment will comply with applicable provisions of the Uniform Building Code (1976).

10. The Applicant proposes to construct a wildlife/sedimentation pond which will serve as a watering source for wildlife and as a collection pond for eroded soils.

11. The measures specified by the Applicant in its AFC and in its responses to interrogatories demonstrate that the embankment surrounding the pond will be designed in conformance with applicable provisions of the Uniform Building Code (1976).

Conclusions

1. Cut and fill slopes will comply with the Uniform Building Code requirements and are adequate to protect against failure or earthquake loading.

2. The Stretford Unit berm and the berm containment around the power plant site are in compliance with the Uniform Building Code.

3. The wildlife/sedimentation pond is in compliance with the Uniform Building Code (1976).

Findings - Monitoring and Compliance

1. The grading plans and building plans shall be stamped by a registered Civil Engineer as required by the Uniform Building Code.

2. Applicant shall submit the grading plans to the Sonoma County Chief Building Official for review prior to construction in accordance with

Chapter 70, Section 7006 of the Uniform Building Code (1976 edition). Applicant shall make in-lieu payments to Sonoma County equivalent to the fees listed in Chapter 70, Section 7007 of the UBC (1976 edition) for review of the grading plans and permit. The Chief Building Official shall check the plans and specifications in accordance with the County's plan check procedures. He shall notify the Energy Commission and the Applicant when the work described in the plans and specifications conforms to the requirements of UBC and pertinent laws and ordinances. The Chief Building Official shall return one copy of the approved grading plans and calculations to the Applicant after submission pursuant to the requirements of UBC Section 7006.

3. The Applicant shall submit building plans (as defined in UBC) to the Sonoma County Chief Building Official. He will review the plans in accordance with the County's plan check procedures. Applicant shall make in-lieu payments to Sonoma County equivalent to the fees listed in Chapter 3, Section 303 of the UBC (1976 edition) for review of the building plans. The Chief Building Official shall notify the Energy Commission and the Applicant when the work described in the plans and specifications conforms to the requirements of UBC and pertinent laws and ordinances. The Chief Building Official shall return one copy of the approved building plans and calculations to the Applicant.

4. PG&E shall require in contract specifications that all contractors conform to the requirements of Cal/OSHA for construction safety. Cal/DOSH generally inspects sites during construction.

5. Inspections shall be performed in accordance with Chapter 3 and 70 of the UBC (1976 edition). The Sonoma County Chief Building Official may delegate

responsibility for special and continuous inspections to PG&E as provided in Section 305, Chapter 3 of the UBC.

6. PG&E shall ensure quality control of the project by providing, through the General Construction Department, a staff of field engineers and inspectors to monitor conformance with all contract specifications. Field engineers and/or inspectors will be present on-site at all times to monitor construction activities. The Sonoma County Chief Building Official, his agent, or the CEC Staff may, upon reasonable notice, inspect the site at any time. Upon completion, PG&E will prepare and submit to Sonoma County and the CEC Staff the following:

   a. Summary of soils compaction tests;

   b. "As-built" grading drawings;

   c. Summary of concrete strength tests;

   d. Copies of concrete pour sign-off sheets;

   e. Bolt torque inspection reports;

   f. Weld (field) inspection sheets;

   g. "As-built" drawings for the construction of civil and architectural work (changes approved by the Building Official shall be identified on the "As-Built" drawings); and

   h. A monthly summary of construction progress.

7. Upon request by PG&E's responsible engineer, select fabricated materials shall be inspected for compliance with contract specifications, either in

the suppliers' shops or on-site, by PG&E's Engineering Quality Control Inspection Group. The test requirements shall be described in the contract specifications or referenced standards.

8. Construction equipment is required to meet the regulations of Cal/DOSH and the Motor Vehicle Code.

9. The Applicant will notify the Sonoma County Chief Building Official and the Energy Commission of substantial design changes to the plans as required by UBC Sections 7014, 7015, and 302. The changes shall be deemed approved unless the Applicant is notified otherwise within five days. Upon receipt of such notification, the Applicant may appeal such decision to the Commission, which must hear such appeal within seven days of notification and must render a decision within three days of said hearing.

10. After completion of the work, the Applicant shall submit to the Commission and, if requested, to Sonoma County, final reports and site approvals by the responsible civil engineer, soil engineer, and engineering geologist.

Findings - Solid Waste Management

1. Title 14, Division 7, Chapter 3, Government Code, Sections 66700 et seq. are applicable to this proposed facility. The provisions of California Health and Safety Code, Division 20, Chapter 6.5 are applicable to this facility. The provisions of 22 Cal. Admin. Code, Division 4, Chapter 30 are also applicable to this facility.

2. Pending authorization by the appropriate state agency, solid wastes generated by the proposed facility shall be transported in registered waste haulers (Health and Safety Code) to a Class II-1 disposal site which has been approved for such wastes.

3. Applicant shall inform CEC and Solid Waste Management Board of the disposal option selected for construction wastes generated.

Conclusions

1. The proposed Geysers Unit 17 Geothermal power plant has a significant likelihood of complying with all applicable laws, ordinances, regulations and standards relating to Civil Engineering.

2. Staff and Applicant believe that no adjudication of this issue is necessary for the purpose of the AFC.

SAFETY

A. Fire Safety

Findings

1. The National Fire Protection Association (NFPA) has established guidelines for fire protection systems for various types of structures.

2. The principal sources of combustion at Unit 17 are the wooden cooling tower structure, generator coolant (hydrogen gas), lube oil reservoir, seal oil tank, lube oil purifier, the main transformer, and the hydrogen peroxide in the storage tanks.

3. The Applicant has proposed to provide automatic sprinkler systems for the cooling tower, lube oil reservoir and purifier, seal oil tank, and the main transformer. The Applicant has also proposed to install a manual spray wetting system on the cooling tower to be operated during shutdown periods to reduce the flammability of wooden members. Additional mitigation measures are specified in the AFC at pages 4-11, 12.

4. Implementation of the measures described in Finding 3 above should ensure that reasonable on-site fire protection will be provided and that the facility will reasonably comply with applicable NFPA guidelines.

5. A registered fire protection engineer shall certify, prior to the commencement of commercial operation of Unit 17, that its design and construction are in reasonable conformance with the following applicable fire safety codes and standards:

California Administrative Code

Title 8, Chapter 4.7, Groups 20 and 27

Uniform Building Code (1976 edition)

Chapters 5, 20, 32, 33

National Fire Protection Association

Standards 10, 13, 14 (Class II Service) 19B, 194, 196, 20, 30, 70, 214, 198, 26, 27, 231A

6. The Applicant shall make the Unit 17 facility available for inspection by CEC safety personnel. CEC Staff shall give notice of a fire inspection not less than 24-hours prior to such inspection.

7. The City of Cloverdale and the California Department of Forestry have responsibility for the provisions of structural and off-site fire protection.

Conclusions

1. Applicant shall undertake the measures for on-site fire protection specified in Finding 3 above and at pages 4-11, 12 of the AFC.

2. Applicant shall comply with the provisions of Findings 5 and 6 above.

3. With the implementation of the requirements of Conclusions 1 and 2 above, reasonable compliance with standards for on-site fire protection will be assured.

B. Hazardous, Toxic, and Flammable Materials

Findings

1. The Applicant will utilize and store on-site the following hazardous, toxic, or flammable materials for the operation of Unit 17:

a. Anthraquinone disulfonic acid (ADA);

b. Vanasol (38.5 percent vanadium);

c. Caustic Soda (Sodium Hydroxide);

d. Hydrogen peroxide;

e. Lubricating oil; and

f. Hydrogen gas.

2. Storage for hazardous, toxic, and flammable materials will be provided as follows:

a. Stretford system pressure vessels will be designed to the ASME Code, Section VIII, Division I;

b. Stretford system tanks will be designed to API standard 650;

c. the hydrogen peroxide storage tank will be designed in accordance with the "Manufacturing Chemists Association" Chemical Safety Data Sheet SD-53;

d. lube oil storage tanks will be designed to API standard 650;

e. hydrogen will be stored in standard DOT approved industrial high pressure cylinders as defined in Title 49 of the Code of Federal Regulations; and

f. all other materials will be stored in standard drums and tanks.

3. All storage vessels containing hazardous toxic or flammable materials will be anchored to prevent overturning. Anchors will be designed in accordance with ATC 3-06.

4. The Applicant has proposed to provide all persons handling hazardous and toxic materials with eye protection, rubber gloves, and rubber aprons, and to provide emergency eye wash and shower stations adjacent to chemical work stations.

5. If Applicant designs storage facilities for hazardous toxic and flammable materials, as specified in Finding B2 above, and undertakes the safety precautions identified in Finding B4 above, plant personnel and the general public will be protected from the attendant hazards associated with the storage of such materials.

6. The Applicant shall submit to the Commission, no later than 30-days prior to the first turbine roll, copies of Certified Code papers for all pressure vessels designed to ASME standards.

7. Within 90-days after first turbine roll, the Applicant shall allow the CEC or its agent to review final construction drawings, stamped and executed by a registered professional engineer familiar with the design and construction of Unit 17, for compliance with the standards specified in Finding 2 above. Either the CEC or the appropriate state agency may inspect the storage vessels for compliance with the standards specified in Finding 2.

Conclusions

1. Applicant shall comply with the provisions of Findings 2, 3, 4, 6 and 7 above.

2. With the implementation of the measures specified in Conclusions 1 above, plant personnel and the general public will be protected from undue hazards from the handling and storage of hazardous, toxic, and flammable materials.

C. Worker Safety

Findings

1. Industrial facilities are required to have accident prevention programs pursuant to 8 Cal. Admin. Code Section 3203.

2. The Applicant shall request the State Division of Occupational Safety and Health's (CAL-OSHA) Consultation Service to review its accident prevention program for compliance with the requirements of 8 Cal. Admin. Code Section 3203.

3. The CAL-OSHA Consultation Service has agreed to review the accident prevention program proposed by the Applicant.

4. The Applicant shall submit to the Commission, not later than 150-days prior to the operation of Unit 17, a letter for the CAL-OSHA Consultation Service or CAL-DOSH verifying compliance with the requirements of Section 3203 of Title 8 of the California Administrative Code.

5. If the CAL-OSHA Consultation Service, or CAL-DOSH verifies the accident prevention program, compliance with the provisions of Title 8 of the California Administrative Code will be assured.

Conclusions

1. Applicant shall comply with the provisions of Title 8 of the California Administrative Code Section 3203, and shall ensure such compliance by performing the acts specified in Findings 2 and 4 above.

TRANSMISSION LINES

Findings

The following laws, standards, and criteria apply to the 1.1 mile transmission line proposed in the Unit 17 AFC.

a. Safety: CPUC GO-95. Electrical Safety. (NOI page 76).

b. Safety: Cal/OSHA, 8 California Administrative Code (Work Procedures) Article 85, Section 2940 et seq., Article 87 Section 2950 et seq., and general Construction Safety Orders Title 8, Subchapter 4.

c. Safety: (Interference with Navigable Airspace) FAA, 49 USCA 1348, 14 CFR, Part 77.

d. Safety: (Interference with Navigable Airspace) Department of Transportation, Division of Aeronautics, Public Utilities Code Section 21655 et seq., 21 California Administrative Code Section 3500 et seq.

e. Nuisance: (Radio Interference) Federal Communications Commission rules and regulations, 47 CFR Parts 15.25 (Incidental radiation devices).

f. Air Quality: National Ambient Air Quality Standards for ozone and NOx 40 CFR, Part 50 (AFC page 11-1 NSCAPCD Rule 160 [includes ozone and NOx for Federal and State.]).

g. Air Quality: California Standards for Ozone and NOx, Health and Safety Code Section 39500 et seq., 17 California Administrative Code

Section 70200 et seq., AFC page 11-1, NSCAPCD Rule 160 (includes ozone and NOx for Federal and State).

h. Electrical Clearance: Public Resources Code Sections 4292-4296, State Lands Fire Protection (PG&E Line Construction Department Foreman's Guide Section 400).

i. Noise: Federal Occupational Safety and Health Act of 1970, 29 USCA 655 et seq., 29 CFR 1910 et seq.

j. PG&E agrees to adhere to the grounding criteria adopted in The Geysers Unit 16 proceeding.

k. If radio interference/television interference (RI/TvI) complaints are received, PG&E agrees to locate and correct, on a case-by-case basis, all RI/TVI caused by the Unit 17 transmission facilities, including, if necessary, the modification of receivers and/or the furnishing and installation of antennas.

l. Cal/OSHA, 50-95 to 50-99, covering construction noise.

m. Sonoma County General Plan Noise Element.

Conclusion

The proposed transmission line shall be designed and constructed to comply with the laws, standards, and criteria listed above.

NEW PAGE

TRANSMISSION LINE ENGINEERING

Findings

1. The Applicant proposes to construct a 1.1 mile transmission line from Unit 17 to Unit 11. At Unit 11, power generated by Unit 17 would join PG&E's existing transmission system and be carried out of The Geysers to the Fulton substation.

2. PG&E's existing transmission system has sufficient capacity to carry power generated by Unit 17 out of The Geysers and into the interconnected system.

3. The proposed 1.1 mile tap line will be a single-circuit line with 1113 kcmil all-aluminum conductors supported by 6 single-circuit towers.

4. The proposed 1.1 mile tap line will have a capacity of 317 MVA under normal conditions and 386 MVA under emergency conditions.

5. The power output from Unit 17 is approximately 122 MVA.

Conclusions

1. PG&E's existing transmission system out of The Geysers is sufficient to carry the capacity which would be generated by Geysers Unit 17.

2. The proposed 1.1 mile tap line to Unit 11 is sufficient to carry the capacity which would be generated by Unit 17 to PG&E's existing transmission system out of The Geysers.

GEOTECHNICAL

Findings - General

1. A potential exists for minimal damage to the power plant site due to gully erosion.

2. The Applicant has proposed to undertake certain short-term and long range erosion control measures as specified on pages 113-118 of the NOI.

3. The Applicant will employ additional mitigation measures of the types specified on page III-61 and in Appendix A of a document entitled "Environmental Impact Report, Castle Rock Springs Geothermal Area," Atlantic Scientific Company, August 22, 1975.

4. Any breach of the berm containment surrounding the power plant site caused by gullying could be quickly and easily repaired.

5. A portion of the cooling tower structure will be located over a shear zone.

6. The rocks within the shear zone are weaker and less stable than rocks which are not located in the shear zone, and are, thus, susceptible to differential settlement, rebound, and related geological phenomena.

7. The depth of weathered shear zone materials extends to 20-30 feet below the present ground surface.

8. The Applicant has proposed to locate the cooling tower foundation 45-60 feet below the present ground surface where it encounters shear zone materials.

9. The cooling tower foundation bearing pressure is approximately 1,000 lbs/ft^2.

10. The bearing pressure of the rock and soil to be excavated is approximately 6,000 lbs/ft^2.

11. The measures necessary to mimimize hazards to the cooling tower foundation due to differential settlement, rebound, and related phenomena cannot be determined until the precise conditions encountered during excavation are known.

12. The Applicant has proposed to undertake mitigation measures appropriate to the actual conditions encountered during excavation. The mitigation measures include over-excavation and placement of engineered fill or lean concrete, redesign of foundations, and pressurized injection of grout.

13. The Applicant has proposed to install survey markers on major foundations to monitor lateral and/or vertical movements.

14. The Applicant shall install survey markers when excavation reaches plant grade in order to monitor lateral and/or vertical movement which may occur prior to construction.

Conclusions

1. The Applicant shall undertake the erosion control measures specified in Findings 2 and 3.

2. With the implementation of erosion control measures as specified in Findings 2 and 3, the potential hazard to the power plant site due to gullying is minimal and acceptable.

3. The Applicant shall undertake the erosion control measures specified in Findings 2 and 3.

4. No adjudication of issues related to hazards to the power plant site caused by gullying is necessary during AFC.

5. The Applicant shall undertake the measures specified in Findings 8, 12, 13 and 14.

6. With the implementation of the measures specified in Findings 8, 12, 13 and 14, the location of the cooling tower is acceptable from a geotechnical standpoint.

7. Adjudication of issues related to the location of the cooling tower over a shear zone is unnecessary during the AFC.

Findings - Analysis

1. Unforeseen potential geologic hazards at Geysers power plant units may result in costly, time-consuming and unexpected mitigation measures.

2. There is currently no reason to predict the existence of any hazardous or adverse geologic conditions at The Geysers 17 site which cannot be acceptably mitigated. However, the nature and potential effects of actual site conditions will be better understood on the basis of new information obtained during and following site preparation. Furthermore, the alteration of site characteristics by both human and natural agents may result in the development of problematic geologic conditions even after facility construction.

3. Potentially hazardous or adverse geologic conditions evaluated during NOI proceedings include gully erosion and differential settlement or rebound in

shear zone rocks beneath the proposed cooling tower location (Final Report, pages 69-70).

4. Based on present predictions of site geologic conditions at plant grade, these hazardous or adverse geologic conditions can probably be acceptably mitigated by the typical engineering measures agreed to by the Applicant (Final Report, pages 69-70).

5. However, the specific measures necessary to mitigate the potentially adverse conditions associated with the shear zone rocks cannot be determined until the precise conditions encountered during site excavation are known (Final Report, page 70, Geotechnical Finding 11).

6. Survey markers to monitor lateral and/or vertical movements will be installed by PG&E:

   a. when excavation reaches plant grade; and

   b. in major structural foundations (Final Report, page 70, Geotechnical Findings 13 and 14).

   PG&E (responses to June 15, 1979, workshop interrogatories) proposed to survey these markers according to the following schedule:

   a. once a week during first month after reaching plant grade;

   b. once a month thereafter until start of foundation construction;

   c. every three months thereafter until completion of facility construction; and

   d. once a year thereafter.

This monitoring schedule should provide adequate identification of rebound and/or differential settlement provided that the survey markers are appropriately placed to provide meaningful information.

7. The appropriate placement of initial markers shall be determined at least seven days prior to completion of final grading. At that time, PG&E shall notify the Commission of proposed survey marker locations. Unless the Commission indicates otherwise, Applicant's proposal will be deemed adequate within seven (7) days after providing notification to the Commission. In any event, the Applicant need not halt construction activities pending resolution of any differences in marker placement.

8. When specific plans to mitigate any adverse geologic conditions associated with the shear zone rocks are developed, the Applicant should submit such plans to the Commission for determination of their acceptability. Unless the Executive Director indicates otherwise within three (3) working days of notification, the Applicant's plans will be deemed adequate. Upon receipt of such notification, Applicant will halt construction on the affected area only, with the exception of that necessary for safety, pending resolution of the dispute before the Commission, which shall take place within seven (7) days of receipt of such notification by the Applicant.

9. If operational testing indicates that an additional cooling tower cell is needed, the Applicant proposes to place it on a pad of engineered fill at the northern end of the proposed tower. The toe of this fill would be on inferred Quaternary landslide deposits which may not provide a suitably stable base for the fill. Failure of landslide deposits and fill would probably result in damage to the cooling tower cell and in environmental degradation.

10. This potential hazard can probably be acceptably mitigated by following the recommendations in "Supplementary Geotechnical Report Geyser Power Plant, Unit 17" (Earth Science Associates, October, 1977). However, as indicated in this report, geologic conditions will not be known in detail until after excavation of a base for the fill.

11. If geologic conditions encountered during excavation for the fill base for the possible additional cooling tower cell differ from those predicted in the Earth Science Associates report enough to warrant substantial modifications of their design and construction recommendations, the Applicant should submit revised mitigation plans (and the information on which they are based) to the Commission for determination of their acceptability. Unless the Executive Director indicates otherwise within three (3) working days of notification, Applicant's plans will be deemed adequate. Upon receipt of such notification, Applicant will halt construction on the affected area only, with the exception of that necessary for safety, pending resolution of the dispute before the Commission, which shall take place within seven (7) days of receipt of such notification by Applicant.

12. The Staff agrees with PG&E (May 14, 1979 responses to Staff geotechnical interrogatories) that as soon as possible after the Applicant confirms the existence of an imminent geologic hazard at the site and within a maximum of 24 hours, the Applicant's Geotechnical Engineer (or Civil Engineer) will notify the Commission by telephone.

13. PG&E has indicated (responses to June 15, 1979 workshop interrogatories) that if adverse geologic conditions are encountered during site preparation

and foundation excavation which differ sufficiently to warrant substantial* mitigation measures, the PG&E geotechnical engineer will notify the Commission promptly after the conditions have been evaluated by the Applicant's Civil Engineering department and the new site geotechnical information will be submitted to the Commission by the responsible geotechnical engineer. On the other hand, new site geotechnical information that warrants only minor changes in design or other mitigation measures will be reflected in the "As-Built" or "As-Graded" drawings. The Staff believes this procedure is acceptable.

14. Section 7835 of the Business and Professions Code requires that all geologic plans, specifications, reports, or documents (such as those provided for in Sections 7006 and 7015 of the Uniform Building Code) be prepared by a registered geologist or registered certified specialty geologist. The only certified specialty geologist classification recognized to date is an engineering geologist. In addition, such documents shall be signed or sealed by the registered professional indicating his responsibility for them.

15. PG&E has indicated (Response to EIIG16-104(3) and public workshop on June 15, 1979) that a company geotechnical engineer is assigned to The Geysers to provide consultation during the design and construction of geothermal projects, to make professional geotechnical judgements related to actual

*"Substantial" changes in facility design would include all changes which required an alteration in design concept and consequently, the preparation of new design calculations. For example, if newly discovered geologic conditions were encountered which would require the cooling tower basin foundation to be thickened by one foot, this condition would be reflected in the As-Built drawings since the facility design change will be considered minor. However, if newly discovered geologic conditions were encountered which required the foundation to be deepened by ten feet or redesigned as a network of pier foundations, these conditions would be promptly brought to the attention of the Commission.

site design conditions, to recommend field changes to the Design Engineer and the Construction Department and to monitor compliance with design intent in geotechnical matters. The proposed responsibilities of the Geotechnical Engineer (or a qualified designee) include, but are not limited to:

a. collection during site excavation and grading of information relative to site geology and geologic safety, including inspection and monitoring of drill logs and drill cores;

b. preparation of a detailed permanent geologic map or log of all final excavated surfaces (including walls and floors of the foundations of the turbine generator building, cooling tower and other permanent structures);

c. reporting to the responsible Civil Engineer any geologic conditions which differ from those reported in the site Soil and Geology Investigation (Earth Science Associates, September, 1976) and Supplementary Geotechnical Report (Earth Science Associates, October, 1977);

d. review of earth work quality control tests (including compaction tests); and

e. collection of on-site or near-site groundwater level information.

To fulfill these responsibilities, PG&E has proposed that the Geotechnical Engineer or engineering geologist (or an appropriately qualified representative) be present as required during all phases of site excavation and placement of structral earth work.

16. If the PG&E geotechnical engineer is a certified engineering geologist, he may undertake all of the responsibilities outlined above. However, if he is other than a certified engineering geologist, a certified engineering geologist shall be assigned direct responsibility for items (a) through (c) in Finding 15 above.

17. In addition, at final completion of site excavation and grading, the responsible engineering geologist shall prepare and submit, in accordance with provisions of UBC Section 7015, a Geologic Grading Report with his approval that the site is adequate for the intended use as affected by geologic factors.

18. The PG&E geotechnical engineer or a qualified subordinate shall be responsible for preparation and submittal, in accordance with provisions of UBC Section 7015, of a Soils Grading Report with approval that the site is adequate for the intended use.

Conclusions

1. The Applicant shall undertake the measures specified in Findings 6-18.

2. The implementation of the measures as specified in Findings 6-18 will acceptably provide for the ability to identify and mitigate any geologic hazard or condition unforeseen until excavation.

AIR QUALITY

Findings - Emissions Limitations - Normal Power Plant Operation

1. The Applicant has stated that Unit 17 is scheduled to begin operation in 1982.

2. Unit 17 will have a guaranteed gross generating capacity of 120 MW.

3. At the time Unit 17 is scheduled to begin operation, the hydrogen sulfide (H_2S) emissions limitation during normal power plant operation is expected to be 100 grams/gross MWhr (26.4 lb/hr) pursuant to Northern Somoma County Air Pollution Control District (NSCAPCD) Rule 455(b).

4. Beginning January 1, 1985, Unit 17 is expected to be limited by Rule 455(b) to H_2S emissions of 50 grams/gross MWhr (13.2 lb/hr), subject to review by the NSCAPCD before January 1, 1984.

5a. The steam supply for Unit 17 will be approximately 2,100,000 lb/hr.

5b. Applicant has been informed by Union Oil that the steam supply for Unit 17 will have an H_2S content of 350$\pm$ 100 ppm. At a flow rate of 2,100,000 lb/hr, this results in a total flow rate of 520-950 lb/hr.

6. The Applicant has proposed to meet the applicable H_2S emissions limitations by employing a surface condenser and Stretford H_2S abatement system, supplemented by secondary treatment if necessary.

7. A Stretford system, if correctly sized, will remove all but 10 ppm of that H_2S which reaches the system in the gas stream.

8. With worst case steam quality and 100 percent partitioning up to 950 lb/hr of H_2S could enter the Stretford treatment plant. The Applicant has submitted a letter and technical explanation from R. M. Parsons Company stating that the actual continuous capacity of the system is about 1,020 lbs/hr of H_2S.

9. The amount of H_2S which reaches the Stretford system is dependent on the amount of H_2S which the surface condenser is able to "partition" out of the steam and into the gas stream.

10. If the surface condenser partitions less than 95-98 percent of the H_2S into the gas stream (depending on the H_2S concentration in the steam supply for Unit 17), some of the H_2S remaining in the steam condensate must be oxidized if the plant is to meet the 100 grams/gross MWh emissions limitation.

11. The partitioning efficiency has been estimated at 80-98 percent. Applicant states that, based upon preliminary test information at Unit 15, the partitioning efficiency at Unit 17 should be at least 65 percent. Supporting data for this preliminary result was submitted by Applicant on July 20, 1979. The data was accompanied by a discussion showing its relevance to Unit 17.

12. Unit 15 is the first Geysers power plant utilizing a surface condenser scheduled to begin operation. Unit 15 began commercial operation on June 17, 1979. Final partitioning data from Geysers Unit 15 was not available in time to be considered in The Geysers Unit 17 AFC decision to determine compliance with Rule 455(b).

13. Since the Applicant was unable to provide sufficient data from Geysers Unit 15 on the partitioning efficiency of the surface condenser to allow the Commission to make a finding that Unit 17 will comply with NSCAPCD Rule 455(b), such a finding can be based on preliminary process design criteria and bench scale test data on a hydrogen peroxide/catalyst condensate treatment system which is expected to be capable of achieving the abatement needed to comply with the 100 grams/gross MWh limitation.

13a. The Applicant has agreed to provide the NSCAPCD and the Commission all testing data on the partitioning efficiency of the surface condenser at Unit 15. This data shall be submitted as soon as possible.

13b. The Applicant has provided preliminary process design criteria for an H_2O_2 secondary treatment system capable of treating 35 percent of the total H_2S in the incoming steam.

13c. The Applicant has submitted a detailed description of its intended peroxide and air oxidation testing program at Unit 15 and also provided the current secondary abatement test program schedule. The Applicant shall submit to the NSCAPCD, the ARB, and Commission Staff quarterly reports providing the results of the Abatement Testing Program described in the document entitled "Composite Schedule of The Secondary Abatement." The report shall include updates of the testing schedule made by the Applicant.

13d. Although Unit 17 may be licensed on the basis of a modified hydrogen peroxide/catalyst system, the Applicant may use other means to comply with Rule 455(b). The Applicant will submit, no later than two years

prior to the scheduled commercial operation date of Unit 17, the conceptual design of the Secondary Abatement System, including data demonstrating that compliance with Rule 455(b) of the NSCAPCD can be achieved. Such data shall be submitted to the Staff, the ARB, and the NSCAPCD. The Applicant may, not sooner than 30 days after submission of the data, proceed with construction of the proposed system unless otherwise notified by the Executive Director within 30 days. In this event, the Commission shall hold a hearing within 10 days and issue a decision within 20 days of the hearing.

13e. PG&E approved-for-construction drawings of the Secondary Abatement System shall be submitted to the Staff, the ARB, and NSCAPCD prior to the start of construction of the Secondary Abatement System. Applicant may proceed with the construction of this system unless otherwise notified by the Executive Director within 30 days. In the event of this notification, the Commission shall conduct a hearing within 10 days and issue a decision within 20 days of the hearing.

14. The Applicant has agreed to consider the need to achieve the 50 grams H_2S/gMWhr limitation of Rule 455(b), tentatively scheduled to take effect on January 1, 1985, subject to review by NSCAPCD before January 1, 1984, in selecting any secondary treatment system installed to meet the 100 g/gMWhr limit.

15. NSCAPCD Rule 455(a) limits geothermal power plant emissions of sulfur compounds, calculated as sulfur dioxide, to 1000 ppm or less.

16. Unit 17, as proposed in the AFC, will emit less than 1,000 ppm of sulfur compounds, calculated as SO_2.

17. NSCAPCD Rule 420(d) limits geothermal power plant emissions of particulate matter to whichever is lesser of:

    a. 0.20 grains per actual cubic foot (acf), or

    b. for a source with a process weight rate of 60,000 lb/hr or more, 40 lb hr.

18. Unit 17 will emit approximately 0.00007 grains/acf, or 9.4 lbs/hr, of particulate matter, based on a worst case partitioning of 65 percent and the other worst case assumptions in the AFC.

19. Federal Prevention of Significant Deterioration (PSD) requirements may apply to Unit 17. EPA may require Unit 17 to employ Best Available Control Technology (BACT) for H_2S.

20a. On June 18, 1979, the United States Court of Appeal for the District of Columbia tentatively ruled* that federal PSD provisions apply to pollutants other than criteria pollutants. The Court also held that a facility is a major emitting facility for PSD purposed if, considering abatement equipment designed into the facility, it has a potential to emit 250 tons/year of any air pollutant.

20. If Unit 17 can be operated in compliance with the H_2S emissions limitations of NSCAPCD Rule 455, Unit 17 is expected to satisfy federal BACT requirements.

21. The Environmental Protection Agency has prescribed PSD increments for SO_2 and for Total Suspended Particulates (TSP).

*Alabama Power Company v. Douglas M. Costle, Administrator, Environmental Protection Agency.

22. Emissions of SO_2 from Unit 17 during normal plant operation are not sufficient to require PSD review for SO_2.

23. Emissions of TSP during normal plant operation are not sufficient to require PSD review for TSP.

Emissions Limitations - Steam Stacking

24. The Steam Supplier states that during powerplant outages of less than 4 days, the steam supplying Unit 17 will be "stacked" (vented) at the steam release valve through a bank of rock mufflers. Stacking at the steam supplier's muffler falls under the jurisdiction of the Northern Sonoma County Air Pollution Control District.

25. A portion of NSCAPCD Rule 455(b), subject to review on or before January 1, 1981, limits the H_2S emissions during steam stacking as follows:

    a. for an unscheduled outage of a power plant, H_2S emissions must be limited to 10 percent or less of the H_2S contained in the steam supply at full power plant load within 4 hours of the outage:

    b. for an unscheduled outage of a power plant utilizing twin turbines, H_2S emissions must be limited to 50 percent of the H_2S contained in the steam supply at full power plant load within 4 hours of simultaneous outage of both units;

    c. the emission reductions specified in (a) and (b) must be attained within one hour of a scheduled outage.

    d. Rule 455 states that these percentage reductions need not be attained if stacking emissions do not exceed 15 kg/hr.

26. The steam supplier has advised the APCD that the steam supplier has a system by which the steam transmission lines for Unit 17 will be connected to existing Geysers Unit 11 and 12 in a 'cross-over' arrangement which, in part, will enable the steam field and transmission lines for the proposed facility to comply with the portion of Rule 455(b) which is applicable during periods of steam stacking. The APCD has not yet established that this proposed system with potential solutions will prove successful. However, the APCO and the steam supplier are working towards a mutually acceptable solution of unresolved questions pertaining to compliance with air quality requirement during periods of steam stacking.

26a. In the event of any unscheduled plant outage at Unit 17 once it is operational, the Applicant shall immediately notify the steam supplier for Unit 17.

27. NSCAPCD Rule 455(a) limits emission of sulfur compounds, calculated as SO_2, to 1000 ppm or less during periods of steam stacking.

28. Emissions of sulfur compounds, calculated as SO_2, will be substantially less than 1,000 ppm during periods of steam stacking.

29. NSCAPCD Rule 420(d) limits emissions of particulate matter during stacking to whichever is lesser of:

    a. 0.20 grains per actual cubic foot (acf), or

    b. 40 pounds per hour

30. Emissions of particulate matter during stacking will be significantly less than either:

a. 0.20 grains per actual cubic foot (acf) or

b. 40 pounds per hour.

31. If federal PSD requirements require BACT for H_2S, and the steam supplier complies with the emissions limitations of Rule 455(b), the federal BACT requirements should be satisfied.

32. The Environmental Protection Agency has prescribed PSD increments for SO_2 and for TSP.

33. Emissions of SO_2 from the Unit 17 steam release valve during periods of steam stacking will be substantially less than that required for PSD review.

34. Emission of TSP during periods of steam stacking will be substantially less than that required for PSD review.

New Source Review

35. Rule 220(b)(1) of the Northern Sonoma County Air Pollution Control District requires an air quality analysis for any new source which will emit more than 25 lb/hr or 250 lb/day of any pollutant for which there is a state or national ambient air quality standard.

36. Unit 17 will emit more than 250 lb/day of H_2S during normal power plant operation.

37. The Unit 17 steam release valve is expected to emit more than 250 lb/day of H_2S during periods of steam stacking.

38. The state ambient air quality standard for H_2S is 0.03 ppm averaged over one hour. This standard may not be equalled or exceeded.

39. The model rules adopted by the California Air Resources Board (CARB) for consideration by the APCDs would require H_2S emissions from Units 1, 2, 7, 8, 9 and 10 to be reduced to a maximum of 200 g/gMWh for each unit by January 1, 1984.

40. NSCAPCD Rule 455 requires the Control Officer to promulgate emissions limitations for Units 1, 2, 7, 8, 9 and 10 on or before January 1, 1980. For purposes of the analysis specified below, it is presumed that the emissions limitations adopted by the NSCAPCD for these units will be at least as stringent as the emissions limitations prescribed by the CARB model rule.

41. The Applicant has submitted air quality analyses of the impacts of H_2S emissions from Unit 17 (during normal power plant operation) on the ambient H_2S concentrations which indicate that Unit 17 will not by itself or in conjunction with controlled emissions from existing units cause the state ambient air quality standard for H_2S to be equalled or exceeded in populated areas of Lake County.

42. The Applicant has participated in a joint air quality and meteorological study to provide data to substantiate the analyses specified in Finding 41.

43. The staff of the CEC, CARB and the NSCAPCD agree that the joint air quality and meteorological study specified in Finding 42 provides sufficient data for the analyses which will be performed by the agencies.

44. A review of the Applicant's air quality analysis and of the available data from the study mentioned in Finding 42 indicates that Unit 17 during normal

power plant operation, as proposed in the AFC, will not prevent the attainment, interfere with the maintenance, or cause a violation of any applicable ambient air quality standard in populated areas of Lake County by itself or in conjunction with controlled emissions from existing units.

45. The determination contained in Finding 44 above has been confirmed by the final version of the Joint Tracer Study.

46. At the time Unit 17 is scheduled to begin operation, Units 3, 4, 5, 6, 11 and 12 will be allowed to emit no more than an average of 200 grams per gross megawatt hour (g/gMWhr) or no more than 10 percent of the H_2S in the supplied steam at full power plant load.

47. NSCAPCD Rule 455 requires emissions limitations for Units 1, 2, 7, 8, 9 and 10 to be adopted on or before January 1, 1980.

48. Based upon the Tracer Study, emissions from Unit 17 at the emissions limits of Rule 455(b) will not affect the ability of NCPA-RFL and DWR Bottlerock to be judged on their own merits pursuant to Lake County APCD rules.

49. Applicant shall install and operate on Unit 17 a source testing method equivalent to that eventually used on Geysers Unit 15.

Since the concentration of H_2S in the off-gas stream is in excess of 1,000 ppm, the following conditions are required in order to ensure compliance with NSCAPCD Rule 455(a):

a. the H_2S control system shall be operated to preclude the release of untreated off gases to the atmosphere or the cooling tower during normal power plant operation, plant start-up, and plant shut-down;

b. Applicant shall install and operate a continuous H_2S monitoring device in the off-gas vent to the atmosphere and the off-gas vent to the cooling tower. The gas analyzer shall have an accuracy of ±10 percent of full scale accuracy for the 1,000-5,000 ppm range. The flowmeter shall have an accuracy of ±10 percent of full sale for the range of 500-2,000 cfm range. Data shall be logged on a strip chart or other similar device which will be available for inspection on site upon request.

c. By September 1, 1980, Applicant shall determine the feasibility of a continuous condensate monitoring system for H_2S, including estimated costs, which is capable of ± 20 percent accuracy and which requires less than 10 hours per month maintenance. The Applicant shall also provide test data substantiating the proper system to ensure compliance with Rule 455. The Applicant shall submit quarterly reports to the APCD and the CEC on its efforts toward these determinations.

50. During periods of steam stacking, the steam field and steam transmission lines which will serve Unit 17 could, under certain adverse meteorological conditions, cause a violation of the state ambient air quality standard for H_2S in populated areas of Lake County. However, the APCO and the steam supplier are working towards a mutually acceptable solution of unresolved questions pertaining to compliance with air quality requirements during periods of steam stacking.

51. (none.)

52. Applicant shall operate an ambient H_2S monitoring station at the location of SRI #4 for the first three years of plant operation unless an alternative method of ambient monitoring mutually agreed upon by the Applicant,

that this operation will comply with the requirements for NSCAPCD Rule 455 (b).

4. Emissions from the steam release valve are expected to comply with federal PSD requirements during periods of steam stacking.

5. According to the final results of the Joint Tracer Study, Unit 17 will comply with applicable New Source Review requirements during normal power plant operation.

6. During periods of steam stacking, and under particular adverse meteorological conditions, emissions from the steam release valve may not comply with applicable New Source Review requirements. The NSCAPCD has indicated that the steam supplier has proposed a method of stam stacking which will not cause a violation of New Source Review requirements. The steam supplier has committed itself to develop a method for steam stacking that will comply with applicable air quality regulations.

7. The Applicant shall comply with the provisions specified in Findings 13-13e, 14, 26a, 49-49c, 52-52a, and 53.

the CEC and the Northern Sonoma County APCD is implemented, or monitoring at SR #4 is performed by another party.

52a. The Applicant shall, at a location which has been approved by the APCD, undertake ambient monitoring for TSP and sulfates every six (6) days for a 24 hour period. The Applicant shall commence such monitoring no later than 3 months prior to commercial operation and should continue until 6 months after commercial operation.

53. The Applicant has submitted information required for a Permit to Operate by NSCAPCD Rules to the NSCAPCD and the Commission. The Applicant, within 60 days of commercial operation, agrees to demonstrate that the applicable emissions limitations of NSCAPCD rules are being maintained during normal operations. Failure to completely and accurately make such demonstrations may be cause for Commission action to shut-down or curtail the operation of Unit 17 until remedial action can be taken after proper notice and public hearing.

For purposes of these Findings and Conclusions, "normal" operation is defined as operation of the facility with all abatement equipment installed and operating to specifications enumerated herein.

Conclusions

1. Unit 17 will comply with all applicable emission limitations during normal power plant operation.

2. Unit 17, as proposed in the AFC, is expected to comply with federal PSD requirements during normal power plant operation.

3. The steam supplier has stated that the operation of the steam release valve will comply with applicable emissions limitations for pollutants during periods of steam stacking, although the APCO not yet finally determined

PUBLIC HEALTH

Findings - General

1. Applicant and Staff agree that a quarterly steam analysis for ammonia (NH3), arsenic (As), mercury (Hg) and boron (B) shall commence within 45 days of commercial operation of Unit 17.

2. Applicant shall report the results of the quarterly steam analysis within 30 days of the analysis.

3. The quarterly steam sampling program will run for one year. At the end of one year the results will be analyzed to determine future monitoring requirements, if any.

4. Applicant and Staff agree that continuation of the quarterly steam analysis depends on:

   a. The variation of the steam concentrations of each pollutant.

   b. The rate of emission of each pollutant.

   c. The development or status of ambient or emission regulations for each pollutant.

5. Applicant and Staff agree that if pollutant concentrations do not vary more than ±20 percent, and rates of emission are low, monitoring will be terminated for specific pollutants unless new regulations have been adopted requiring monitoring. Not later than 120 days prior to commencement of commercial operation, Applicant and Staff will agree on levels of emissions for each pollutant that shall be considered significant, considering

ambient concentrations. The Executive Director shall inform the Commission as to the nature of this agreement. If Applicant and Staff are unable to reach agreement, the Staff shall request the Commission to convene a hearing for the purpose of resolving disputes with respect to an adequate monitoring program. The Commission shall convene a hearing within 30 days of receipt of a request from Staff, and shall issue a decision within 30 days thereafter.

6. If new wells are added to supply steam to Unit 17, additional steam analyses may be required to guarantee that pollutant emissions do not change significantly (±20 percent). The Applicant shall inform the Staff if a new well, which has not been tested, is supplying steam to Unit 17.

7. Applicant and Staff agree that the California Department of Health Services will be consulted in the measurement and review of all pollutant measurements in the program specified above.

8. Applicant shall not initiate an ambient monitoring for any pollutant unless plant emissions are great enough to cause significant ambient concentrations. Significant ambient concentrations would be 33 percent of any standard or 50 percent of any standard when the plant contribution is added to the existing background. This Finding shall not be construed to affect the right or authority of the Northern Sonoma County Air Pollution Control District to require any monitoring it deems appropriate nor to waive any rights which the Applicant may have to contest any such requirement.

9. Since there are no ambient air quality standards for NH3, As, or Hg, it will be difficult to define significance. Not later than 120 days prior to

commercial operation, Applicant and Staff will agree upon ambient concentrations for NH3, As, and Hg that shall be considered significant. Disputes between Applicant and Staff shall be resolved as specified in Finding 5.

10. Applicant will consider the emissions of all present and planned geothermal power plant and will predict maximum ground-level impacts in Cobb Valley. Applicant agrees to evaluate existing baseline concentrations of mercury, arsenic and ammonia in ambient air in the vicinity of The Geysers power plant. Ambient boron monitoring will not be conducted at this time.

This evaluation for mercury and arsenic will include:

a. review of pervious ambient monitoring results;

b. analysis of several of the most recent hi-vol samples collected in The Geysers area;

c. conduct vapor phase ambient monitoring at locations representative of population exposure. Final details will be agreed upon by Applicant and Staff. Monitoring will be conducted not later than 120 days prior to commercial operation to confirm this methodology prior to commencement of Unit 17 operation.

This evaluation for ammonia will include:

a. review of previous ambient monitoring results;

b. ambient ammonia concentrations will be extrapolated using the emissions ratio of hydrogen sulfide and ammonia, and ambient H_2S data.

Spot field measurements will be used to confirm this methodology prior to commencement of Unit 17 operation. If a significant and/or measureable concentration, as defined in Findings 8 and 9, of any pollutant from geothermal development is predicted, Applicant will initiate a monitoring program. The extent of the monitoring program will be determined by Staff and Applicant at that time.

11. The NSCAPCD may require monitoring of pollutants other than those addressed in Findings 1-10. Nothing contained herein shall limit or increase the authority of the NSCAPCD to require monitoring of pollutants other than those addressed in Findings 1-10.

Conclusions - General

1. A quarterly steam analysis for ammonia (NH3), arsenic (As), mercury (Hg), and boron (B) will be conducted for Unit 17 for one year.

2. Continuation of the quarterly steam analysis will depend upon the results as qualified in Findings 4, 5 and 6.

3. An ambient monitoring program for any pollutant will not be initiated unless plant emissions are great enough to cause significant ambient concentrations as defined in Findings 8 and 9.

4. Emissions of all existing and future units will be considered, and maximum ground-level ambient concentrations will be predicted. If a significant and/or measurable concentration of any pollutant is present, a monitoring program will be initiated.

Findings - H_2S

1. Unit 17 will emit hydrogen sulfide (H_2S) in the cooling tower exhaust during normal plant operation and in the steam supply during periods of steam stacking.

2. The available existing data on health effects is insufficient to permit experts to reach a uniformly accepted position regarding the human health effects of chronic low-level exposure to H_2S.

3. (None)

4. (None)

5. Hydrogen sulfide has an odor which can be detected at concentrations less than 0.03 ppm.

6. The state ambient air quality standard for H_2S is 0.03 ppm (1 hour average).

7. The state ambient air quality standard for H_2S is based on a nuisance odor threshold.

8. A review of the Applicant's air quality analysis and of the available data from the study mentioned in Finding 42 on Air Quality and available data in the Unit 17 NOI and AFC indicates that Unit 17 during normal power plant operation, as proposed in the AFC, will not prevent the attainment, interfere with the maintenance, or cause a violation of any applicable ambient air quality standard in populated areas of Lake County by itself or in conjunction with controlled emissions from existing units.

9. Preliminary analysis show that the impact of H_2S emissions from the steam release valve for Unit 17 on ambient H_2S concentrations at receptors in The Geysers is predicted, based on the tracer study, to be as high as 0.4 ppm during 100 percent steam stacking and downwash meteorological conditions. Also based on the tracer study, steam stacking reduced to 10 percent full flow during downwash conditions would also result in a violation of the California ambient air quality standard. The Northern Sonoma County Air Pollution Control District will prescribe a program to be implemented in connection with its consideration of a permit for the steam release valve.

10. Applicant will operate an ambient H_2S monitoring station at the location of SRI #4 for the first three years of plant operation unless an alternative method or site of ambient monitoring mutually agreed upon by the Applicant, the CEC, and the NSCAPCD is implemented, or monitoring at SRI #4 is performed by another party.

Conclusions

1. The health effects of continuous exposure to H_2S in concentrations less than 0.08 ppm are not known.

2. Analysis show that the impact of H_2S emissions from Unit 17 during normal operation pursuant to Rule 455(b) on ambient H_2S concentrations at receptor areas in The Geysers is predicted to not cause or contribute to violations of the H_2S ambient air quality standard in populated areas.

3. The measures outlined in Finding 10 are sufficient to meet the ambient air quality monitoring requirements for Unit 17.

Findings - Radiouclides

1. The noncondensible gas fraction of geothermal steam originating from natural fumaroles and developed wells contains the noble radioactive gas, radon-222 (^{222}Rn).

2. Radium-226 is a parent radionuclide of ^{222}Rn, and occurs naturally in the soil in varying concentrations at The Geysers.

3. Inhalation of short-lived daughter products of ^{222}Rn can cause adverse health effects.

4. The maximum rate of release of ^{222}Rn in emissions from the 11 operating power plants at The Geysers in approximately 1.43 Ci/day.

5. The results of The Geysers Radiological Measurement Program conducted by Lawrence Livermore Laboratory indicate that the highest recorded ^{222}Rn concentrations in the air, with the operation of 11 power plants, were 0.5 pCi/1 at Unit 1-2 and 1.4 pCi/1 at SRI Station 7 (Sawmill Flat) in an area of elevated ^{226}Ra in the soil.

6. It is not anticipated that the ^{222}Rn content in the steam supply for Unit 17 will be substantially different than the average ^{222}Rn content in the steam supply for Units 1-11.

7. The California standards for ^{222}Rn are 100 pCi/1 in air for a controlled area and 3pCi/1 in air, above natural background, in an uncontrolled area.

8. PG&E will conduct quarterly monitoring of the steam of Unit 17 to verify that effluent concentrations of Radon 222 have remained below applicable

standards. Results will be reported to the California Department of Health Services on a yearly basis.

9. Upon confirmation of sample results, PG&E will notify the California Department of Health Services (1) within 24 hours if the ^{222}Rn concentration in the cooling tower exhaust exceeds 6.0 pCi/1 and (2) within 30 days if the ^{222}Rn concentration in the cooling tower exhaust exceeds 3.0 pCi/1.

10. Wet cooling towers have shown a generic tendency to scrub particulates, including radioactive particulates from ambient air. These particulates accumulate in the sludge that collects in the cooling tower basin. Thus, the resulting radioactivity in this sludge is the result of the scrubbing of radioactivity in this sludge is the result of the scrubbing of radioactive particulates from ambient air.

Conclusions

1. If ^{222}Rn content in the steam supply for Unit 17 is similar to that for Units 1-11, the resultant ambient concentrations from Unit 17 will not exceed ^{222}Rn standards for both controlled and uncontrolled areas and should not cause an adverse public health impact.

2. Pending authorization otherwise by the appropriate State agencies, Applicant shall dispose of cooling tower sludge at a Class II-1 disposal site.

3. The Applicant shall monitor ^{222}Rn concentrations in the Unit 17 steam supply as specified in Findings 8 and 9.

Findings - Ammonia, Ammonium Compounds, Sulfates

1. Unit 17 will emit ammonia in the cooling tower exhaust drift during normal operation and in the steam supply during periods of steam stacking.

2. Inhalation of ammonia in sufficient quantities can cause adverse health effects.

3. There is no applicable ambient air quality standard for ammonia. The California Occupational Safety and Health Standard is 25 ppm (8 hour average).

4. Ammonia concentrations in steam from 61 producing wells at The Geysers have averaged 0.0194 percent (194 ppm) by weight. Unit 17 steam is estimated to contain 100 ppm ammonia by weight.

5. Based on Unit 17's estimated ammonia concentrations, the Unit 17 cooling tower as proposed in the NOI will emit ammonia in concentrations less than 25 ppm.

6. Ammonia released to the atmosphere in the cooling tower exhaust and in the steam supply during steam stacking will be substantially diluted before reaching the nearest receptor.

7. Periodic monitoring during 1976 and 1977 at a number of locations in The Geysers reported one-hour-average concentrations ranging from 0 to 0.263 ppm. Unit 17 emissions are not expected to increase reported background concentrations above suggested guidelines.

8. Sulfates will be emitted in the Unit 17 cooling tower drift and can form through atmospheric oxidation of H_2S.

9. Sulfates can be toxic to humans when inhaled in sufficient quantities.

10. The California ambient air quality standard for suspended sulfates is 25 ug/m^3 (24 hour average).

11. The ambient air quality standard for sulfates will not be exceeded as a result of normal powerplant operation or the stacking of the steam supply for Unit 17.

12. Ambient temperatures and concentrations of percursors at The Geysers do not facilitate the formation of ammonium bisulfide.

Conclusions

1. Emissions of ammonia from the cooling tower and from the steam supply during periods of steam stacking are not expected to result in adverse public health impacts.

2. Ammonium bisulfide formed by atmospheric reaction of ammonia emissions will not be present in sufficient quantities to cause adverse health effects.

3. Since the state ambient air quality standards for sulfates will not be exceeded, adverse health impacts will not occur from sulfate formations resulting from operation of Unit 17.

Findings - Mercury

1. Elemental mercury vapor and other mercury forms will be emitted from the cooling tower during normal power plant operation and at the steam release valve during periods of steam stacking.

2. Mercury is toxic to humans when inhaled or ingested in sufficient quantities.

3. There is no adopted ambient air quality standard for mercury, although The World Health Organization has suggested a standard of 0.8 ug/m^3 for all forms of mercury. In addition, a target ambient level of 1.0 ug/m^3 (30-day) average) has been suggested pursuant to the Clean Air Act of 1970 as a basis for a National Emissions Standard for Hazardous Air Pollutants.

4. The estimated mercury content in the steam supply for Unit 17 is less than 0.001 ppm by weight.

5. The maximum emission rate of mercury from Unit 17 is 0.9 grams per hour based on estimated steam concentration.

6. Mercury is diluted in the atmosphere during transport to nearby populated areas.

7. Ambient mercury concentrations in The Geysers monitored by Battelle Northwest laboratories ranged from 0.001 to 0.018 ug/m^3. The ambient concentrations were monitored while 11 geothermal power plants were operating.

8. Ambient mercury concentrations resulting from the addition of Unit 17 emissions at the cooling tower and at the steam release valve to reported background concentrations will not exceed recommended standards.

9. Mercury cycles between land, water, air, plants and animals.

10. Mercury in the food chain can adversely impact public health if present in sufficient quantities.

11. The additions of mercury from Unit 17 emissions to the food chain as a result of normal powerplant operation and steam release valve during periods of steam stacking will not be significant.

Conclusion

1. Emissions of mercury during normal operation of Unit 17 and during periods of steam stacking will comply with recommended ambient standards for mercury and should not cause adverse public health impacts.

Findings - Arsenic

1. Unit 17 will emit some form of arsenic from the cooling tower into the ambient air. Arsenic detected in geothermal steam may be present as suspended particulates, arsenic trioxide vapor or possible arsine.

2. All forms of arsenic are known to be toxic at some concentration, and some forms are potentially carcinogenic.

3. The World Health Organization has proposed a safe ambient air quality level for arsenic of 5.9 ug/m^3 average over a 24-hour period. NIOSH suggests an occupational standard of 2.0 ug/m^3 per 15 minute sampling for arsenic trioxide to protect workers against carcinogenic effects.

4. The expected arsenic emissions from the cooling tower will be 3 lb/yr.

5. Ambient arsenic concentrations at three sites near Unit 11 in 1977 were reported by PG&E to range from less than o.01 u/m^3 to 0.044 ug/m^3.

6. The expected arsenic emissions from Unit 17 should not increase reported background concentrations above suggested standards and guidelines.

Conclusion

1. Available data indicates that arsenic emissions from Unit 17 and resulting ambient concentrations at The Geysers are below the suggested standards and guidelines designed to protect public health.

Findings - Boron

1. Boron is contained in the steam supply for Unit 17, and will be emitted from the cooling tower during normal power plant operation and from the steam release valve during periods of steam stacking.

2. Atmospheric reactions could result in the formation of boron compounds which can be toxic to humans.

3. There are no ambient air quality standards for boron or boron compounds, although the World Health Organization has recommended an ambient standard of 50 ug/m^3 for boron.

4. The expected boron emissions from the cooling tower will be 1500 lbs/yr. Based on this annual emission rate, resultant ambient boron concentrations are not expected to exceed suggested standards for boron.

5. Emissions of boron and resultant boron compounds would be dispersed and diluted during transport.

Conclusions

1. Emissions of boron during normal power plant operation and during periods of steam stacking will not adversely affect public health.

2. The effects of boron emissions on vegetation shall be monitored by the Applicant. See Biology Findings and Conclusions.

Findings - TSP

1. Total suspended particulates can, depending on their particle size and chemical composition, produce adverse health effects.

2. The California Act Resources Board has adopted an annual standard for TSP of 60 ug/m^3 and a 24 hour standard of 100 ug/m^3.

3. Emissions of Unit 17 will not prevent the attainment, interfere with the maintenance, or cause a violation of the ambient air quality standard for total suspended particulates (TSP) during normal operation.

4. Emissions from the steam release valve will not prevent the attainment, interfere with the maintenance, or cause a violation of the ambient air quality standard for TSP during periods of steam stacking.

5. The ambient air quality standard for TSP is intended to protect the public from public adverse health impacts.

Conclusions

1. Emissions of TSP during normal power plant operation and during periods of steam stacking will not result in adverse public health impacts.

2. The NSCAPCD will determine if ambient monitoring of TSP should be required for permitting Unit 17.

Findings - SO_2

1. Atmospheric oxidation of H_2S may form small amounts of sulfur dioxide (SO_2).

2. The California Air Resources Board has established a 24 hour ambient air quality standard of 0.05 ppm in the presence of oxidant or particulate standard exceedance.

3. The California ambient air quality standard for SO_2 will not be exceeded as a result of operation of Unit 17 during normal power plant operation or during periods of steam stacking.

Conclusions

1. SO_2 resulting from operation of Unit 17 will not adversely affect public health.

2. The NSCAPCD will determine if ambient monitoring of SO_2 should be required for permitting Unit 17.

STRUCTURAL ENGINEERING

1. The Applicant has proposed to design and construct Unit 17 and its related facilities consistent with the information provided in the following documents:

   a) Geysers Unit 17 AFC, Section 4.3, "Structural Engineering Design and Appendix A entitled "Design Criteria and Guidelines for Geysers Geothermal Projects.";**

   b) "Applicants Response to Staff Interrogatories," 79-AFC-1, dated April 24, 1979, June 11, 1979, and June 13, 1979; and

   c) "Additional Information on H_2S Abatement and Preliminary Data on Major Components," 79-AFC-1, dated July 20, 1979.

2. In the case of discrepancies between the criteria contained in the above documents, the Applicant should use the highest design criteria in the final design of the facility.

3. When using ATC 3-06, the Applicant shall use a value of 1.0 for the coefficient "P" in equation 8-2. In any event, the anchorage criteria shall be consistent with other design and performance criteria.

4. If Applicant designs the facility pursuant to 1, 2, and 3 above, the Applicant's seismic design criteria for critical structures and components will be, with the exception of the criteria for the cooling tower structure, the oil circuit breaker (OCB) switchyard structure, and the gas ejector structure, adequate to achieve the performance criteria specified in Reliability Finding No. 1.

5. Applicant and Staff agree that the preliminary design information submitted by the Applicant indicates that the preliminary design of the OCB switchyard structure and the gas ejector structure does not meet Applicants performance criteria. Applicant shall demonstrate in the final design calculations and construction drawings that these two structures will withstand a peak ground acceleration of 0.3g without exceeding first yield or ultimate stress with appropriate damping factors.

6. Applicant and Staff agree that the design of the cooling tower structure, using the Equivalent Lateral Force Method and a base shear coefficient of 0.2w, requires strengthening in order to meet Applicant's performance criteria. Staff and Applicant agree that:

   a) Applicant shall specify to the cooling tower manufacturer that the design of the cooling tower structure will be based upon: (1) a working stress criterion; (2) a peak ground acceleration of 0.16g; (3) a design spectrum as specified in NRC Regulatory Guide No. 1.60, or the site specific spectrum referred to in the AFC scaled to 0.16g zero period ordinate; (4) a damping ratio of 7 percent; and (5) a dynamic analysis using conventionally acceptable methods;

   b) Two hundred and forty (240) days prior to the start of construction of the cooling tower structure, Applicant shall submit for Staff review the dynamic analysis methods and models which will be used in the models which will be used in the analysis. Applicant may proceed with the analysis unless notified otherwise by the Executive Director within thirty (30) days. Upon such notification, the Commission will convene a hearing within twenty (20) days to resolve any disputes, and will issue its decision within ten (10) days thereafter;

c) One hundred and eighty (180) days prior to the start of construction of the cooling tower structure, a design check will be submitted which is based upon: (1) a peak ground acceleration of approximately 0.3g; (2) a response spectrum as specified in 6(a) above; (3) a damping ratio that is appropriate for the anticipated stress levels; and (4) a dynamic analysis using conventionally acceptable methods. Applicant may proceed with processing final designs unless notified otherwise by the Executive Director within 30 days.

d) Applicant and Staff anticipate that the design check will verify that the stresses in the structure are within ultimate limits. In the event that they are not, Applicant will either:

1) Make appropriate design modifications to increase the strength of the structure; or 2) perform a cost-benefits-risk analysis to select an optimum design based on a lower criterion;

e) One hundred and twenty (120) days prior to cooling tower construction, the Applicant shall submit the final design calculations and drawings to the CEC and the Sonoma County Office of Building Inspection for review pursuant to the procedures outlined in Civil Engineering Monitoring and Compliance Findings 1-10.

7. The following standards and documents will apply to the design of Unit 17 and its related facilities:

a) Uniform Building Code, 1976 Edition (UBC 76), except Section 2312 (Note: the UBC 76 is adopted by Title 24, California Administrative Code (CAC) as the minimum legal state building standard).

b) Sonoma County Ordinance No. 2395 excepting Section 2312 of the reference adopted in Section 4-14(a). (UBC 76.)

c) American Society of Mechanical Engineers' Boiler and Pressure Vessel Code (ASME BPV Code) (Note: the ASME BPV Code is adopted by Title 8, CAC).

d) American National Standards Institute "B 31.1 Power Piping Code" (ANSI B 31.1)

e) American Concrete Institute (ACI) "Building (ACI 318-77).

f) ACI "Building Code Requirements for Structural plain Concrete" (ACI 322-72).

g) ACI "Commentary on Building Code Requirements for Reinforced Concrete" (ACI 318C-77).

h) American Institute of Steel Construction (AISC) "Specification for the Design, Fabrication, and Erection of Structural Steel for Buildings", Nov. 1978 (AISC SDCESS 78).

i) AISC "Commentary on the Specification for the Design, Fabrication, and Erection of Structural Steel for Buildings" (AISC CSDCESS 78).

j) AISC "Specification for Structural Joints Using ASTM 325 or A490 Bolts", April 1978 (AISC STT 78).

k) American Iron and Steel Institute (AISI) Specification for the Design of Light Gage Cold Formed Steel Structural Members" (AISI SDLGCFSS).

l) Steel Joist Institute "Standard Sepcifications and Load Tables" (SJI SSLT).

m) American Welding Society "Structural Welding Code AWS D.1.1-79" (AWS D.1.1-79).

n) "National Design Specification for Stress-Grade Lumber and Fastenings 1977" (NDS 77)

o) American Association of State Highway and Transportation Officials "Standard Specifications for Highway Bridges", 1977 Edition (AASHTO BRIDGE 77).

p) The Standards listed in AFC Appendix A, and Appendix D to Appendix A, Section 2.04. In case of discrepancies between the criteria in Appendix A and the criteria in the Findings, the Applicant should use the highest design criteria in the final design of the facility.

q) Structural Engineers Association of California (SEAOC), "Recommended Lateral Force Requirements", 1975, Code and Commentary as incorporated into UBC 1976 (SEAOC Code and Commentary), Section 2313 (a).

7a The following standards and documents will be used as guides:

a) Seismic Safety Commission, Policy on "Locating Designing, and Operating Critical Facilities and Lifeline Facilities," 1978 (SSC LDOCF).

b) Joint Committee on Seismic Safety, "Final Report to the Legislature, State of California", 1974 (CDMG SP No. 45).

c) Earthquake Design Criteria for Structures", G.W. Housner and P.C. Jennings, EERL 77-06, CIT.

d) Applied Technology Council, "Tentative Provisions For the Development of Seismic Regulations for Buildings:, " ATC 3-06, 1978.

8. Analysis of the information available to date indicates that the Applicant will be able to comply with the standards listed above. However, final design is necessarily incomplete at this time. Review of final design plans and inspections during construction as described in Civil Engineering Monitoring and Compliance Findings 1-10 is necessary to ensure compliance with such standards.

Conclusions

1. The Applicant shall design and construct Unit 17 and its related facilities as described in Findings 1, 2, 3, 5, and 6.

2. The Applicant's design of Unit 17 will likely comply with applicable standards with respect to structural engineering and seismic safety, and will likely achieve Applicant's performance criteria.

3. In order to ensure compliance with applicable standards, the Applicant shall submit design calculations and drawings for review pursuant to the procedures described in Civil Engineering Monitoring and Compliance Findings 1-10.

RELIABILITY (SEE ALSO STRUCTURAL ENGINEERING)

1. The Applicant has agreed to design and construct Unit 17 so that critical facility structures and components (structures and components essential to continued power generation, or whose replacement cost or time is excessive) will be able to withstand seismic events resulting in peak ground accelerations of approximately 0.3g with minor damage and no structural collapse.

2. The probability of exceedance of a peak ground acceleration of approximately 0.3g is about 10 percent (Applicant's estimate) during the plant life (i.e., the recurrence interval for such an event is about 350-400 years).

3. Design and construction of the facility as specified above should ensure reasonable facility reliability with respect to potential seismic events.

4. The operating availability of Geysers Units 1-11 was 90.6 percent in 1976, 91.2 percent in 1977, and 81.5 percent in 1978. The decrease in operating availability is primarily due to the employment of condensate treatment systems on units 3, 4, 5, 6, and 11.

5. The average capacity factor for Geysers Units 1-11 was 81.8 percent in 1976, 81.3 percent in 1977, and 67.6 percent in 1978.

6. Major generating equipment and most other equipment for Unit 17, with the exception of the hydrogen sulfide abatement system, will be similar in design principles as the equipment at Units 1-11, and have been improved where possible.

7. Complete operating data on the hydrogen sulfide abatement systems that will be employed at Unit 17 are currently unavailable. However, such systems

should not adversely affect the overall reliability of the facility, as established at Units 1-11.

8. There is no danger that the lant site will be adversely affected by overland water flows. (See Hydrology Findings.)

9. Proper mitigation measures can ensure that the adverse geotechnical conditions encountered will not adversely affect plant reliability. (See Geotechnical Findings.)

10. The supervisory and plant control systems proposed for Unit 17 are adequate to protect the facility components and to reduce outages that have historically occurred at Geysers units.

Conclusions

1. No conditions exist at the Unit 17 site which would have a significant adverse effect on Unit 17 reliability.

2. Unit 17 shall be designed as described in Finding 1.

3. Unit 17 should attain or exceed historical levels on reliability for the Geysers power plant.

RATE IMPACTS

Findings

1. The currently estimated capital cost of the project is $41.8 million, not including the cost of secondary H_2S treatment.

2. The Staff of the California Public Utilities Commission stated by letter to the Commission, dated December 19, 1978, that the relatively low cost Geysers Unit 17 proposal in relation to PG&E's total rate base will have a negligible effect, if any, upon the rates paid by PG&E's customers.

Conclusion

1. Geysers Unit 17 will not cause any unacceptable rate impacts upon PG&E's customers.

MISCELLANEOUS FINDINGS

1. The Commission finds that the Applicant will construct and operate the Geysers Unit 17 power plant and related facilities in a manner that will protect public health and safety, and therefore, does not require the Applicant to acquire, by grant or contract, the right to prohibit development of privately owned lands in the areas surrounding the facilities in order to protect public health and safety, pursuant to Public Resources Code section 25528.

2. The Commission adopted load management standards pursuant to Public Resources Code section 25403.5 on July 9, 1979. None of the reports that such standards required utilities to file as a first step toward compliance will be due until after the close of this proceeding. Therefore, compliance or non-compliance with such standards cannot be determined at this time.

3. No standards of efficiency for operation of the facility have been adopted by the Commission pursuant to Public Resources Code section 25402(d). Therefore, compliance with such standards cannot be determined.

4. During the proceedings, changes or alternatives have been required in, or incorporated into, the proposed facility which mitigate or avoid the significant environmental effects of the facility identified in the Final Environmental Impact Report or the findings and conclusions set forth in the Decision. There are no specific economic, social, or other considerations which make infeasible the mitigation measures identified in the Final Environmental Impact Report or the findings and conclusions. The project, by itself, will not result in significant adverse impacts if mitigated as provided herein.

APPENDIX B

Appendix B: Monitoring and Compliance

Public Resources Code section 25532 requires the Commission to establish a monitoring system to assure that any facility certified by the Commission is constructed and operated in compliance with applicable law, regulations, and conditions.

The Geysers Unit 17 AFC is the first Application to be concluded by the Commission. Thus, this proceeding has been used to lay a foundation for a Commission-wide monitoring and compliance system. The primary elements of the program are included in Appendix B. In addition, the Staff and PG&E are continuing to develop secondary elements to the monitoring program with the assistance of state and local agencies having an interest in compliance with the applicable laws and regulations.

In order to further the establishment of a comprehensive monitoring system, the Committee orders as follows:

1. The Applicant and Commission staff shall meet and confer to develop a comprehensive monitoring system to assure compliance with applicable laws and regulations in the construction and operation of Geysers Unit 17. The Applicant and Staff shall submit a written report containing the elements of the monitoring system by December 31, 1979.

   If the Applicant and Staff cannot agree on the elements of the monitoring system at the time of the filing of the report, the Executive Director shall notify the Commission. Upon such notification, the Commission shall hold a hearing to resolve any disputes within (20) twenty days and issue a decision within (10) days of the hearing.

2. All tasks and submittals required by the terms of Appendix B shall be performed, notwithstanding paragraph 1 above.

CUTURAL RESOURCES

Findings

4. Applicant will make arrangements to have an archaeologist available should artifacts of perviously unknown sites be uncovered during initial grading and trenching. If artifiacts are uncovered, the Applicant shall immediately notify the archaeologist and the Commission. The consulting archaeologist shall follow standard practices in evaluating and perserving such artifacts, and all construction which may affect the newly discovered resources shall cease until such time as the archaeologist has completed the evaluation.

7. During the excavation of foundations and site grading, Applicant's geologist will collect samples of newly exposed chert for archiving at the Sonoma State University Geology Department. At least five samples will be taken from each significant body of chert.

8. Within 30 days of trenching, filling, and grading, Applicant's geologist will submit a report of his findings. If no archaeological artifacts are uncovered, Applicant shall submit a letter to that effect within 30 days of trenching, filling, and grading. If archaeological artifacts are uncovered, Applicant's archaeologist will file a report within 30 days after completing his evaluation.

NOISE

Findings

13. In order to monitor compliance with the Lake and Sonoma Counties Noise Elements, the Applicant has agreed to undertake the following measures:

    a. Within 90 days after the plant achieves a steady state operational condition, the Applicant shall conduct noise surveys at 500 feet from the generating station and the nearest sensitive receptor:

        1. The survey should cover a 24-hour period during which the plant is operating.

        2. Results of the survey should be reported in terms of L_x, L_{eg}, and L_{dn} levels.

        3. The Applicant should provide a report of the survey to the Energy Commission and Lake and Sonoma Counties. If the report indicates that the Counties standard is being exceeded, the report shall contain a mitigation plan and schedule to correct the noncompliance.

        4. The Applicant need not provide any additional noise surveys or reports of the off-site operational noise of the project unless the public registers complaints or the noise from the project is suspected of increasing due to change in the operation of the facility.

14. To verify compliance with standards for the protection of employees from noise impacts, a noise evaluation as required by Title 8, California

Administrative Code, Article 105, should be performed to determine the magnitude of employee noise exposure. The results of the evaluation shall be forwarded to the Commission within 90 days of the time the facility has attained its anticipated capacity factor. The results of the noise survey shall be maintained by the Applicant and shall be made available to DOSH upon request.

16. In the event that the Applicant receives public complaints on the noise due to construction of the facility, the Applicant shall take the following actions:

    a. Conduct noise surveys at the sensitive receptors registering the complaints and at the facility property line nearest the complaining receptors. Surveys shall be taken for the period of construction working day and under similar circumstances that the complaints were registered. Survey should be reported in terms of the L_x and L_{eq} levels.

    b. Prepare and submit a report to the Counties and, upon request by the Executive Director, to the CEC of the results of the surveys, a record of the public complaints, mitigations which the Applicant has applied to resolve the impact, and the results of mitigation plans.

Conclusions

8. The Applicant shall limit the use of heavy earth moving equipment to daylight hours whenever possible. If the Applicant limits the use of earth moving equipment to daylight hours, the noise caused by plant construction will be tolerable to local receptors.

WATER QUALITY

Finding

11. PG&E has proposed to conduct the programs listed in Table 1 (attached).

Table 1

Summary of Proposed or Existing Programs
Which Monitor or Measure Effects of Soil Erosion,
Drift Deposition, or Spills of Liquid Wastes

Subject	Program Description	Reference
Soil erosion	A sedimentation study was initiated in 1976 to determine effects of construction on trout spawning beds in Squaw Creek.	Geysers Unit 17 NOI, Appendix C, Section IV
Soil erosion	PGandE will monitor the sedimentation yield by measuring the amount of sediments removed from the sedimentation pond.	PGandE's Proposed Findings and Conclusions, Soils, Conclusion 2
Drift deposition	PGandE has proposed to conduct a drift study program which will include leaf tissue analysis of boron, sulfate, and other selected elements.	PGandE's Proposed Findings and Conclusions, Biological Resources Finding 32
Liquid wastes	PGandE is monitoring accidental spills in accordance with the accidental spill monitoring requirements specified by the NCRWQCB for The Geysers area.	CRWQCB order Nos. 79-150 and 78-16
General	PGandE has collected monthly data at five stations in the Big Sulphur Creek drainage since 1968. In November 1977, another station in Squaw Creek was added. This data is submitted to the NCRWQCB on a regular basis.	EII G17-161

SOILS

Findings

8. The sedimentation yield should be quantified by monitoring the amount of sediment removed from the sedimentation pond.

Conclusions

2. The Applicant shall monitor the sedimentation yield through measuring the amount of sediments removed from the sedimentation pond. This information shall be submitted to the NCRWQCB and the California Energy Commission.

BIOLOGICAL RESOURCES

Findings

16. Applicant has proposed a Wildlife Mitigation Plan to compensate for loss of wildlife habitat from the construction of Unit 17. This plan contains four elements. They are:

    a. Wildlife Food Plantings;

    b. Wildlife Water Impoundment;

    c. Wildlife Cover; and

    d. Brush Conversion.

    The Applicant will monitor the effectiveness of the Wildlife Mitigation Plan. A report documenting the effectiveness of the plan will be issued two to four years after implementation. The report will describe the plan in detail, discuss the implementation of the plan, assess the effectiveness of each mitigation measure, and present recommendations for future mitigation measures. The Applicant will provide CEC staff with a description of the monitoring plan described above by December 31, 1979. If the Applicant and Staff are unable to agree to the proposed program, the Applicant may request the Commission to convene a hearing to mediate the dispute.

17. Additional proposed mitigation measures are as follows:

    a. The Wildlife Water Impoundment/Sedimentation Basin will be started during the initial phase of site preparation and complete as soon as possible.

b. Construction involving earth moving at the site and related facilities will be suspended during periods of continuous rainfall.

c. Temporary erosion control measures will be used during the rainy season. The contractor will submit detailed plans to PG&E showing proposed measures to be taken to control erosion. These plans will be available at the PG&E project office for review.

d. Construction involving earth moving at the site and related facilities will not be planned for the months of December, January and February. However, if weather conditions are favorable, PG&E will notify the Sonoma County Building Department and receive its concurrence prior to undertaking earth moving operations during November, December, January, February or March. In addition, the Applicant will notify the CEC and CDF and G of such activities.

e. Revegetation to control erosion, including punched straw seed bed preparation, hydroseeding, slope stepping, and, if necessary, establishment of an irrigation system, will be implemented for cut and fill slopes. Native species of shrubs and trees will be used whenever possible.

f. A monitoring program will be implemented to provide data on the success of the revegetation planting program and subsequent establishment of natural vegetation.

32. Applicant has proposed to conduct studies to monitor the effect of cooling tower drift from Unit 17 which will include quantitative measurements of:

- o Observable vegetation damage;
- o Growth of native woody revegetation species;
- o Growth of native woody vegetation; and
- o Leaf tissue analysis for boron sulfate, and other selected elements. Sampling intensity for sulfates and other selected elements will be of a lower level than boron.

The drift study program will commence one year prior to start-up in order to collect baseline data.

33. The Applicant agrees to include in the Drift Monitoring Program:

- o Analysis of boron concentrations in cooling tower circulating water for the purpose of determining the cause of boron accumulation.
- o A continuation of annual infrared aerial photogrammetry.
- o Soil analysis for boron accumulation.
- o Details of sampling techniques, frequencies, locations, and species.
- o Methods of data analysis.
- o Examination and monitoring of areas at a distance from Unit 17 for cumulative effects.
- o Monitoring of drift at operating units will be evaluated annually, terminated if appropriate, and in any event terminated at the end of three years.

34. Applicant agrees to provide CEC staff with a description of the monitoring program outlined above by December 31, 1979. If the Applicant and Staff are unable to agree to the proposed program, they may request that the Commission convene a hearing to mediate disputes.

CIVIL ENGINEERING - SOLID WASTE MANAGEMENT

Findings - Monitoring and Compliance

2. Applicant shall submit the grading plans to the Sonoma County Chief Building Official for review prior to construction in accordance with Chapter 70, Section 7006 of the Uniform Building Code (1976 edition). Applicant shall make in-lieu payments to Sonoma County equivalent to the fees listed in Chapter 70, Section 7007 of the UBC (1976 edition) for review of the grading plans and permits. The Chief Building Official shall check the plans and specifications in accordance with the Counties plan check procedures. He shall notify the Energy Commission and the Applicant when the work described in the plans and specifications conforms to the requirements of UBC and pertinent laws and ordinances. The Chief Building Official shall return one copy of the approved grading plans and calculations to the Applicant after submission pursuant to the requirements of UBC Section 7006.

3. The Applicant shall submit building plans (as defined in UBC) to the Sonoma County Chief Building Official. He will review the plans in accordance with the counties plan check procedures. Applicant shall make in-lieu payments to Sonoma County equivalent to the fees listed in Chapter 3, Section 303 of the UBC (1976 edition) for review of the building plans. The Chief Building Official shall notify the Energy Commission and the Applicant when the work described in the plans and specifications conforms to the requirements of UBC and pertinent laws and ordinances. The Chief Building Official shall return one copy of the approved building plans and calculations to the Applicant.

6. PG&E shall ensure quality control of the project by providing, through the General Construction Department, a staff of field engineers and inspectors to monitor conformance with all contract specifications. Field engineers and/or inspectors will be present on-site at all times to monitor construction activities. The Sonoma County Chief Building Official, his agent, or the CEC Staff may, upon reasonable notice, inspect the site at any time. Upon completion, PG&E will prepare and submit to Sonoma County and the CEC Staff the following:

   a. summary of soils compaction tests;

   b. "as-built" grading drawings;

   c. summary of concrete strength tests;

   d. copies of concrete pour sign-off sheets;

   e. bolt torque inspection reports;

   f. weld (field) inspection sheets;

   g. "as-built" drawings for the construction of civil and architectural work (changes approved by the Building Official shall be identified on the "as-built" drawings); and

   h. a monthly summary of construction progress.

9. The Applicant will notify the Sonoma County Chief Building Official and the Energy Commission of substantial design changes to the plans as required by UBC Sections 7014, 7015 and 302. The changes shall be deemed approved unless the Applicant is notified otherwise within 5 days. Upon receipt

of such notification, the Applicant may appeal such decision to the Commission, which must hear such appeal within 7 days of notification and must render a decision within 3 days of said hearing.

10. After completion of the work, the Applicant shall submit to the Commission and, if requested, to Sonoma County, final reports and site approvals by the responsible civil engineer, soil engineer, and engineering geologist.

Findings - Solid Waste Management

3. Applicant shall inform CEC and Solid Waste Management Board of the disposal option selected for construction wastes generated.

SAFETY

A. Fire Safety

5. A registered fire protection engineer shall certify, prior to the commencement of commmercial operation of Unit 17, that its design and construction are in reasonable conformance with the following applicable fire safety codes and standards:

California Administrative Code

Title 8, Chapter 4.7, Groups 20 and 27

Uniform Building Code (1976 edition)

Chapters 5, 20, 32, 33

National Fire Protection Association

Standards 10, 13, 14 (Class II Service) 198, 194, 196, 20, 30, 70, 214, 198, 26, 27, 231A

6. The Applicant should make the Unit 17 facility available for inspection by CEC safety personnel. CEC Staff shall give notice of a fire inspection not less than 24 hours prior to such inspection.

B. Hazardous, Toxic, and Flammable Materials

Findings

6. The Applicant should submit to the Commission, no later than 30 days prior to the first turbine roll, copies of Certified Code papers for all pressure vessels designed to ASME standards.

7. Within 90 days after first turbine roll, the Applicant shall allow the CEC or its agent to review final construction drawings, stamped and executed by a registered professional engineer familiar with the design and construction of Unit 17, for compliance with the standards specified in Finding 2 above. Either the CEC or the appropriate state agency may inspect the storage vessels for compliance with the standards specified in Finding 2.

C. Worker Safety

Findings

2. The Applicant should request the State Division of Occupational Safety and Health's (CAL-OSHA) Consultation Service to review its accident prevention program for compliance with the requirements of 8 Cal. Admin. Code Section 3203.

4. The Applicant should submit to the Commission, not later than 150 days prior to the operation of Unit 17, a letter from the CAL-OSHA Consultation Service of CAL-DOSH verifying compliance with the requirements of Section 3203 of Title 8 of the California Administrative Code.

GEOTECHNICAL

Findings - Analysis

6. Survey markers to monitor lateral and/or vertical movements will be installed by PG&E:

   a. when excavation reaches plant grade; and

   b. in major structrual foundations (Final Report, page 70, Geotechnical Findings 13 and 14).

   PG&E (responses to June 15, 1979, workshop interrogatories) proposed to survey these markers according to the following schedule:

   a. once a week during first month after reaching plant grade;

   b. once a month thereafter until start of foundation construction;

   c. every three months thereafter until completion of facility construction; and

   d. once a year thereafter.

   This monitoring schedule should provide adequate identification of rebound and/or differential settlement provided that the survey markers are appropriately placed to provide meaningful information.

7. The appropriate placement of initial markers shall be determined at least seven days prior to completion of final grading. At that time, PG&E shall notify the Commission of proposed survey marker locations. Unless the Commission indicates otherwise, Applicant's proposal will be deemed

adequate within seven (7) days after providing notification to the Commission. In any event, the Applicant need not halt construction activities pending resolution of any differences in marker placement.

8. When specific plans to mitigate any adverse geologic conditions associated with the shear zone rocks are developed, the Applicant should submit such plans to the Commission for determination of their acceptability. Unless the Executive Director indicates otherwise within three (3) working days of notification, the Applicant's plans will be deemed adequate. Upon receipt of such notification, Applicant will halt construction on the affected area only, with the exception of that necessary for safety, pending resolution of the dispute before the Commission, which shall take place within seven (7) days of receipt of such notification by the Applicant.

11. If geologic conditions encountered during excavation for the fill base for the possible additional cooling tower cell differ from those predicted in the Earth Science Associates report enough to warrant substantial modifications of their design and construction recommendations, the Applicant should submit revised mitigation plans (and the information on which they are based) to the Commission for determination of their acceptability. Unless the Executive Director indicates otherwise within three (3) working days of notification, Applicant's plans will be deemed adequate. Upon receipt of such notification, with the exception of that necessary for safety, pending resolution of the dispute before the Commission, which shall take place within seven (7) days of receipt of such notification by Applicant.

12. The Staff agrees with PG&E (May 14, 1979, responses to Staff geotechnical interrogatories) that as soon as possible after the Applicant confirms the

existence of an imminent geologic hazard at the site and within a maximum of 24 hours, the Applicant's Geotechnical Engineer (or Civil Engineer) will notify the Commission by telephone.

13. PG&E has indicated (responses to June 15, 1979, workshop interrogatories) that if adverse geologic conditions are encountered during site preparation and foundation excavation which differ sufficiently to warrant substantial* mitigation measures, the PG&E geotechnical engineer will notify the Commission promptly after the conditions have been evaluated by the Applicant's Civil Engineering department and the new site geotechnical information will be submitted to the Commission by the responsible geotechnical engineer. On the other hand, new site geotechnical information that warrants only minor changes in design or other mitigation measures will be reflected in the "As-Built" or "As-Graded" drawings. The Staff believes this procedure is acceptable.

17. In addition, at final completion of site excavation and grading, the responsible engineering geologist should prepare and submit, in accordance with provisions of UBC Section 7015, a Geologic Grading Report with his approval that the site is adequate for the intended use as affected by geologic factors.

*"Substantial" changes in facility design would include all changes which required an alteration in design concept and consequently, the preparation of new design calculations. For example, if newly discovered geologic conditions were encountered which would require the cooling tower basin foundation to be thickened by one foot, this condition would be reflected in the As-Built drawings since the facility design change will be considered minor. However, if newly discovered geologic conditions were encountered which required the foundation to be deepened by ten feet or redesigned as a network of pier foundations, these conditions would be promptly brought to the attention of the Commission.

18. The PG&E geotechnical engineer or a qualified subordinate shall be responsible for preparation and submittal, in accordance with provisions of UBC Section 7015, of a Soils Grading Report with approval that the site is adequate for the intended use.

AIR QUALITY

Findings - Emissions Limitations - Normal Power Plant Operation

13d. Although Unit 17 may be licensed on the basis of a modified hydrogen peroxide/catalyst system, the Applicant may use other means to comply with Rule 455(b). The Applicant will submit, no later than two years prior to scheduled commercial operation date of Unit 17, the conceptual design of the Secondary Abatement System, including data demonstrating that compliance with Rule 455(b) can be achieved. Such data shall be submitted to the Staff, the ARB, and the NSCAPCD. The Applicant may proceed with construction of this proposed system unless otherwise notified by the Executive Director within 30 days. In this event, the Commission shall hold a hearing within 10 days and issue a decision within 20 days of the hearing.

49. Applicant shall install and operate on Unit 17 a source testing method equivalent to the eventually used on Geysers Unit 15.

Since the concentration of H_2S in the off-gas stream is in excess of 1000 ppm, the following conditions are required in order to ensure compliance with NSCAPCD Rule 455(a):

a. The H_2S control system shall be operated to preclude the release of untreated off-gases to the atmosphere or the cooling tower during normal power plant operation, plant start-up, and plant shut-down.

b. Applicant shall install and operate a continuous H_2S monitoring device in the off-gas vent to the atmosphere and the off-gas vent to the

cooling tower. The gas analyzer shall have an accuracy of ±10 percent of full scale accuracy for the 1,000-1,500 ppm range. The flowmeter shall have an accuracy of ±10 percent of full scale for the range of 500-2,000 cfm range. Data shall be logged on a strip chart or other similar device which will be available for inspection on site upon request.

c. By September 1, 1980, Applicant shall determine the feasibility of a continuous condensate monitoring system for H_2S, including estimated costs, which is capable of ± 20 percent accuracy and which requires less than ten hours per month maintenance. The Applicant shall also provide test data substantiating the proper sampling method and frequency for a noncontinuous sampling system to ensure compliance with Rule 455. The Applicant shall submit quarterly reeports to the APCD and the CEC on its efforts toward these determinations.

52. Applicant shall operate an ambient H_2S monitoring station at the location of SRI #4 for the first three years of plant operation unless an alternative method of ambient monitoring mutually agreed upon by the Applicant, the CEC and the Northern Sonoma County APCD is implemented, or monitoring at SRI #4 is performed by another party.

52a. The Applicant shall, at a location which has been approved by the APCO, undertake ambient monitoring for TSP and sulfates every six (6) days for a 24-hour period. The Applicant shall commence such monitoring no later than 3 months prior to commercial operation and should continue until 6 months after commercial operation.

53. The Applicant has submitted information required for a Permit to Operate by NSCAPCD Rules to the NSCAPCD and the Commission. The Applicant, within 60 days of commercial operation, agrees to demonstrate that the applicable emissions limitations of NSCAPCD rules are being maintained during normal operations. Failure to completely and accurately make such demonstrations may be cause for Commission action to shut-down or curtail the operation of Unit 17 until remedial action can be taken after proper notice and public hearing.

Findings - General

1. Applicant and Staff Agree that a quarterly steam analysis for ammonia (NH3), arsenic (As), mercury (Hg) and boron (B) shall commence within 45 days of commercial operation of Unit 17.

2. Applicant will report the results of the quarterly steam analysis within 30 days of the analysis.

3. The quarterly steam sampling program will run for one year. At the end of one year, the results will be analyzed to determine future monitoring requirements, if any.

5. Applicant and Staff agree that if pollutant concentrations do not vary more than ± 20 percent, and rates of emission are low, monitoring will be terminated for specific pollutants unless new regulations have been adopted requiring monitoring. Not later than 120 days prior to commencement of commercial operation, Applicant and Staff will agree on levels of emissions for each pollutant that shall be considered significant, considering ambient concentrations. The Executive Director shall inform the Commission as to the nature of this agreement. If Applicant and Staff are unable to reach agreement, the Staff shall request the Commission to convene a hearing for the purpose of resolving disputes with respect to an adequate monitoring program. The Commission shall convene a hearing within 30 days of receipt of a request from Staff, and shall issue a decision within 30 days thereafter.

6. If new wells are added to supply steam to Unit 17, additional steam analysis may be required to guarantee that pollutant emissions do not change significantly (± 20 percent). The Applicant shall inform the Staff if a new well, which has not been tested, is supplying steam to Unit 17.

9. Since there are no ambient air quality standards for NH3, As, or Hg, it will be difficult to define significance. Not later than 120 days prior to commercial operation, Applicant and Staff will agree upon ambient concentrations for NH3, As, and Hg that shall be considered significant. Disputes between Applicant and Staff shall be resolved as specified in Finding 5.

10. Applicant will consider the emissions of all its present and currently planned geothermal power plants and will predict corresponding maximum ground-level impacts in Cobb Valley. Applicant agrees to evaluate existing baseline concentrations of mercury, arsenic and ammonia in ambient air in the vicinity of The Geysers Power Plant. Ambient boron monitoring will not be conducted at this time.

    This evaluation for mercury and arsenic will include:

    a. review of previous ambient monitoring results;

    b. analysis of several of the most recent hi-vol samples collected in The Geysers area;

    c. conduct vapor phase ambient monitoring at locations representative of population exposure. Final details will be agreed upon by Applicant and Staff. Monitoring will be conducted not later than 120 days prior

to commercial operation to confirm this methodology prior to commencement of Unit 17 operation.

This evaluation for ammonia will include:

a. review of previous ambient monitoring results;

b. ambient ammonia concentrations will be extrapolated using the emissions ratio of hydrogen sulfide and ammonia, and ambient H_2S data. (Spot field mearsurements will be used to confirm this methodology prior to commencement of Unit 17 operation. If a significant and/or measurable concentration, as defined in Findings 8 and 9, of any pollutant from geothermal development is predicted, Applicant will initiate a monitoring program. The extent of the monitoring program will be determined by Staff and Applicant at that time.

Findings - Radionuclides

8. PG&E will conduct quarterly monitoring of the steam of Unit 17 to verify that effluent concentrations of Radon 222 have remained below applicable standards. Results will be reported to the California Department of Health Services on a yearly basis.

9. Upon confirmation of sample results, PG&E will notify the California Department of Health Services (1) within 24 hours if the ^{222}Rn concentration in the cooling tower exhaust exceeds 6.0 pCi/1 and (2) within 30 days if the ^{222}Rn concentration in the cooling tower exhaust exceeds 3.0 pCi/1.